Bulletin 62

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
JOSEPH A. HOLMES, DIRECTOR

NATIONAL MINE-RESCUE AND FIRST-AID CONFERENCE

PITTSBURGH, PA., SEPTEMBER 23-26, 1912

BY

HERBERT M. WILSON

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NATIONAL MINE-RESCUE AND FIRST-AID CONFERENCE, PITTSBURGH, PA., SEPTEMBER 23-28, 1912.

By HERBERT M. WILSON.

INTRODUCTION.

The act (36 Stat., 369) that established the Bureau of Mines in the Department of the Interior defined as part of the bureau's province and duty the making of "diligent investigation of the methods of mining, especially in relation to safety of miners and the appliances best adapted to prevent accidents," and it authorized the bureau from time to time to make such public reports of its work and investigations as the Secretary of the Department of the Interior may direct, with the recommendations of the bureau.

The national mine-rescue and first-aid conference was projected in the hope that it would be a factor in increasing safety in the mining industry through the recommendation of better and safer methods of conducting mine-rescue operations, more efficient methods of extending and giving training in the use of artificial-breathing apparatus, and approved and more effective methods of administering first aid to injured miners and of training miners in first-aid work.

The bureau feels warranted in publishing the resolutions adopted by the conference as a guide to mine workers and others concerned in obtaining greater safety in mining, and in presenting such extracts from the discussion as indicate the reason for the adoption of any particular method. In issuing this bulletin, however, the bureau does not indorse these resolutions in whole or in part as a final expression of its views regarding the best method or procedure in any case. It does believe, however, that the resolutions furnish an excellent starting point from which to develop a standard code of procedure in mine-rescue and first-aid work.

It will be noted that in some important cases further information is necessary before any standard procedure can be recommended, particularly as regards types of bandages, methods of resuscitation, the use of stimulants, the cumulative effect of poisonous gases, the diet of men engaged in rescue work, the physiologic effect of the pressure

of breathing apparatus on the head, the amount of oxygen required in training, and the effect of concentrated oxygen, high temperature, etc. Regarding these subjects the bureau, in cooperation with a subcommittee appointed by the conference, will make tests and obtain further information with a view to perfecting apparatus and methods.

It is contemplated that additional conferences of a similar nature may be held, probably coincident with the formation of a national organization or society, in which event the Bureau of Mines may issue from time to time technical papers or miners' circulars giving such of the results as the bureau may wish to recommend for adoption.

At the conference here reported there were present 11 surgeons, 23 mine operators, 2 State inspectors, 14 company inspectors or representatives of safety departments, and 14 employees of the Bureau of Mines interested in that branch of its work having to do with increasing safety in the mining industry. The earnestness and interest of those assembled evidenced that they felt that there was much to be done to place organized mine-safety efforts on a more uniform basis. These men devoted themselves diligently to three days of serious consideration of the problems before them.

In this report endeavor has been made to eliminate all unnecessary remarks; but in order that those who hold diverging views regarding the subjects discussed may have before them the arguments that led the conferees to vote for the 36 resolutions adopted, the discussion had in the committees and in open session is published practically in full. Moreover, for the information of those mining officials, operators, and surgeons who are unfamiliar with approved methods of first-aid training and training with breathing apparatus and safety devices and methods of rescue, it seems equally desirable that the few opening addresses and closing remarks made in general session should be published as an expression of the reasons for such work and for the conference.

An outcome of the deliberations of the conference was the appointment of a committee charged with organizing a permanent association for the development of safety in mines. It is believed that meetings similar to the conference will be held by that association.

EVENTS LEADING TO THE CONFERENCE.

The national mine-rescue and first-aid conference here reported was held in Pittsburgh, Pa., September 23–26, 1912, as a logical sequence to the first national mine-safety demonstration held in the same city the previous year.

In the year that had elapsed the spread of instruction and training in first-aid treatment of injured miners and in the use of artificial breathing apparatus and other appliances for mine rescue and fire-fighting work had penetrated to every coal field and to a number of

the metal-mining fields in the United States. Numerous public demonstrations and first-aid contests had been held in the territory extending from the coal fields of eastern Pennsylvania to those of Washington and from Alabama to Minnesota. Many mining companies had established safety departments, the officers in charge having as their chief duty the organization of mine-rescue and first-aid training and the introduction of better safety measures in mining.

There had developed as a natural consequence a desire for a general conference for the coordination and standardization of this work. Mine surgeons and others engaged in first-aid instruction taught different and in some cases conflicting methods of treating certain injuries. Varying standards as to the kind and amount of training necessary with artificial breathing apparatus were adopted by the various advocates. Various rules for the holding of first-aid contests and differing methods of rating and judging in these had rendered it difficult to compare the relative merits of the same kind of work in different coal fields.

The Director of the Bureau of Mines, at the suggestion of a number of mine officials interested in these matters, and with a view to standardizing and improving the character of this work as demonstrated by the bureau, authorized the assembling of a conference, the personnel of which should include representatives of the mine-operating and the mine-safety departments and mine surgeons from those mining companies that maintained organized safety training and instruction.

INVITATIONS ISSUED.

On August 5, 1912, invitations for the conference were sent to all such mine operators as were known to maintain first-aid and rescue corps and as were located within a reasonable distance of Pittsburgh. In addition, invitations were sent to a few of the more distant operators who had shown interest and sympathy in the work by attendance or representation at the first national mine-safety demonstration of the previous year.

The 25 mining companies enumerated below responded to the invitation by promising to be represented by mine officials and surgeons. It will be noted that the companies are well distributed throughout the country.

Cleveland Cliffs Iron Co., Ishpeming, Mich.; Colorado Fuel & Iron Co., Pueblo, Colo.; Continental Coal Corporation, Wallsend, Ky.; H. C. Frick Coke Co., Scottdale, Pa.; Hailey-Ola Coal Co., Haileyville, Okla.; Keystone Coal and Coke Co., Greensburg, Pa.; Knoxville Iron Co., Knoxville, Tenn.; Lehigh Coal and Navigation Co., Lansford, Pa.; Lehigh Valley Coal Co., Wilkes-Barre, Pa.; Lehigh and Wilkes-Barre Coal Co., Wilkes-Barre, Pa.; Oliver Iron Mining Co., Duluth, Minn.; Oliver & Snyder Steel Co., Oliver, Pa.; Pardee Brothers & Co., Lattimer Mines, Pa.; Penn-Mary Coal Co., Heilwood, Pa.; Philadelphia &

Reading Coal and Iron Co., Pottsville, Pa.; Pittsburgh Coal Co., Pittsburgh, Pa.; Republic Iron and Steel Co., Youngstown, Ohio; Superior Coal Co., Gillespie, Ill.; T. C. Tipper & Co., Pittsburgh, Pa.; Tennessee Coal, Iron and Railroad Co., Birmingham, Ala.; Vandalia Coal Co., Terre Haute, Ind.

EXHIBITS SOLICITED.

On September 3 manufacturers of first-aid materials and mine rescue appliances were invited to exhibit their products at the conference, and the near-by manufacturers of explosives were asked to exhibit dummy cartridges of permissible explosives, also detonators, etc.

In response to this invitation exhibits of the apparatus indicated were displayed during the conference by the following manufacturers:

Fidelity International Agency, safety lamps; Hughes Bros., safety lamps; Edward Schenk, breathing apparatus; Draeger Oxygen Apparatus Co., breathing apparatus and pulmotor; Siebe, Gorman & Co., breathing apparatus; Westphalia Engineering Co., breathing apparatus; Johnson & Johnson, first-aid materials; American National Red Cross, first-aid materials; Burroughs, Wellcome & Co., first-aid materials; Western Electric Co., mine telephone; Portable Electric Safety Lamp Co., electric lamps; Servus Rescue Equipment Co., breathing apparatus.

DELEGATES PRESENT.

The following persons were present and participated in the proceedings of the conference. Their names are grouped alphabetically by occupation and employment:

MINE OFFICIALS.

G. W. Barager, general manager, Pardee Bros. & Co., Lattimer Mines, Pa.; H. P. Dowler, general superintendent, Penn-Mary Coal Co., Heilwood, Pa.; Edward Elliot, general manager, Hailey-Ola Coal Co., McAlester, Okla.; Thomas G. Evans, stable boss, Lehigh Valley Coal Co., West Pittston, Pa.; J. R. Fleming, mining engineer, Penn Central Power Co., Altoona, Pa.; A. Gluding, engineer, Lehigh Valley Coal Co., Mahanoy City, Pa.; G. W. Hutchinson, chief engineer, Keystone Coal and Coke Co., Greensburg, Pa.; J. E. Jones, superintendent, Martin Coke Works, Republic Iron and Steel Co., Martin, Pa.; William Johnson, general manager, Saline County Coal Co., Canton, Ill.; William Lewis, mine foreman, Hailey-Ola Coal Co., Haileyville, Okla.; P. F. Lynch, superintendent, Cross Mountain Mines, Knoxville Iron Co., Briceville, Tenn.; J. M. McHugh, Tennessee Coal, Iron and Railroad Co., Ensley, Ala.; M. C. McHugh, Tennessee Coal, Iron and Railroad Co., Birmingham, Ala.; B. J. Matteson, assistant manager, Colorado Fuel and Iron Co., Pueblo, Colo.; J. F. Meagher, general superintendent of coal mines, Tennessee Coal, Iron and Railroad Co., 917 Amery Street, Pratt City, Ala.; R. B. Moss, superintendent of mines, Continental Coal Corporation, Arjay, Ky.; Charles Mountain, mine foreman, Crabtree, Pa.; F. B. Nold, general superintendent northern coal mines, Republic Iron and Steel Co., Republic, Pa.; J. P. Reese, general superintendent, Superior Coal Co., Gillespie, Ill., Consolidation Coal Co., Buxton, Iowa; T. I. Stephenson, president and manager Cross Mountain Mines, Knoxville Iron Co.,

Knoxville, Tenn.; J. D. Thomas, superintendent, Republic Iron and Steel Co., Gans, Pa.; T. C. Tipper, general manager, T. C. Tipper & Co., Jenkins Arcade Building, Pittsburgh, Pa.; H. P. Zeller, superintendent, Republic Iron and Steel Co., Republic, Pa.

MINE SURGEONS.

G. H. Halberstadt, Philadelphia & Reading Coal and Iron Co., Pottsville, Pa.; J. W. Kennihan, Pittsburgh Coal Co., Sharpsburg, Pa.; A. F. Knoefel, Vandalia Coal Co., Linton, Ind.; D. H. Lake, Delaware, Lackawanna & Western R. R., Scranton, Pa.; R. F. McHenry, Penn-Mary Coal Co., Heilwood, Pa.; F. L. McKee, Lehigh & Wilkes-Barre Coal Co., Wilkes-Barre, Pa.; J. W. Parshall, H. C. Frick Coke Co., Uniontown, Pa.; W. D. Richards, Knoxville Iron Co., Briceville, Tenn.; W. S. Rountree, Tennessee Coal, Iron and Railroad Co., Birmingham, Ala.; M. J. Shields, American National Red Cross, Washington, D. C.; J. H. Young, Lehigh Coal and Navigation Co., Lansford, Pa.

MINE-SAFETY OFFICIALS.

C. L. Albright, manager relief department, H. C. Frick Coke Co., Scottdale, Pa.; Atherton Bowen, assistant inspector of equipment, Lehigh Valley Coal Co., Wilkes-Barre, Pa.; Clyde G. Brehm, first-aid instructor, Oliver & Snyder Steel Co., Oliver, Fayette County, Pa.; William Conibear, safety inspector, Cleveland-Cliffs Iron Co., Ishpeming, Mich.; George H. Hawes, mine-rescue engineer, Oliver Iron Mining Co., Duluth, Minn.; Edward W. Judd, adjuster of claims, relief department, Pittsburgh Coal Co., Pittsburgh, Pa.; Austin King, chief inspector of mines, H. C. Frick Coke Co., Scottdale, Pa.; William Nisbet, inspector, Keystone Coal and Coke Co., Greensburg, Pa.; J. E. McDonald, superintendent relief department, Pittsburgh Coal Co., Oliver Building, Pittsburgh, Pa.; Henry R. Owens, engineer in charge of rescue station, Lehigh and Wilkes-Barre Coal Co., 76 Churst Street, Wilkes-Barre, Pa.; John L. Simons, fire inspector and first-aid instructor, Lehigh Coal and Navigation Co., Lansford, Pa.

STATE INSPECTORS.

J. F. Bell, Dravosburg, Pa.; F. W. Cunningham, Charleroi, Pa.

MISCELLANEOUS.

H. N. Elmer, general agent for Mexico and North America, Siebe, Gorman & Co. (Ltd.), 1140 Monadnock Building, Chicago, Ill.; T. B. Dilts, Y. M. C. A., Greensburg, Pa.; W. D. Roberts, mining instructor, public schools, Pittsburgh, Pa.

EMPLOYEES OF THE BUREAU OF MINES.

G. H. Deike, assistant mining engineer; Charles Enzian, coal-mining engineer; Jesse Henson, foreman miner; J. W. Paul, mining engineer; D. J. Price, foreman miner; G. S. Rice, chief mining engineer; C. O. Roberts, first-aid miner; J. C. Roberts, mining engineer; J. J. Rutledge, mining engineer; J. T. Ryan, assistant mining engineer; H. I. Smith, assistant mining engineer; C. S. Stevenson, foreman miner; E. B. Sutton, foreman miner; H. M. Wilson, engineer in charge of Pittsburgh experiment station.

DETAILED PROGRAM.

In pursuance of instructions by the director of the bureau, the author, as engineer in charge of the Pittsburgh experiment station,

in conference with J. W. Paul, engineer in charge of the mine-rescue and first-aid work of the bureau, and with the assistance of various mine surgeons and operators, and of employees of the bureau, arranged a program. Among those whose suggestions were most helpful were Drs. W. S. Rountree, A. F. Knoefel, M. W. Glasgow, R. F. McHenry, and J. W. Kennihan; mine operators T. I. Stephenson and B. J. Matteson; and Bureau of Mines foreman miners W. A. Raudenbush and C. O. Roberts.

The program outlined was as follows:

BUSINESS PROCEDURE.

MONDAY MORNING, SEPTEMBER 23.

9.30.—Opening address of welcome by Director Joseph A. Holmes.

Organization of conference.—H. M. Wilson, engineer in charge, Pittsburgh experiment station, Bureau of Mines, temporary chairman; C. S. Stevenson, Pittsburg, Kans., temporary secretary.

10.00.—Address by J. W. Paul: "Mine Rescue and First-Aid Work in the Bureau of Mines."

Informal addresses on mine-rescue and first-aid work in the various coal-mining regions.

11.30.—Appointment of committees; committees to be called together by their chairmen at 1.30 p. m. to-day.

12.00.—Adjournment until 9.00 a. m. to-morrow, when committee reports will be received.

TOPICS FOR DISCUSSION.

A. FIRST-AID METHODS.

1. Resuscitation from gas, electricity, and shock; methods of artificial respiration.
2. Treatment of dislocated shoulder and hip.
3. Splinting a broken back.
4. Applying splints to the limbs; should a long splint be used in all cases?
5. Should a first-aid man try to reduce a dislocation?
6. Should the triangular bandage be used in preference to the roller bandage?
7. Should a first-aid man attempt to wash a wound?
8. In case of a severe hemorrhage, the hemorrhage being controlled with a tourniquet, and no sterile dressing to be had, what is the proper thing to do?
9. Methods for transporting the injured; which is proper in various injuries?
10. Methods of rescuing patients from electric contact, and the most important thing to do first.
11. Method of conveying patient from place of injury to top of mine.
12. Development and acceptance of new methods and dressings.

B. FIRST-AID TRAINING.

1. What are the duties of a first-aid miner?
2. Instruction; its kind and amount.
3. Training and practice; kind and amount.
4. Systems of training: Red Cross, Navy, or new combination; value of a standard system for miners.

5. Methods of organizing first-aid corps.
6. Number of trained men per 100 miners.

C. FIRST-AID CONTESTS AND EXHIBITIONS.

1. Relative merits of contests and exhibitions; intracompany, intercompany, State, and interstate.
2. Standardization of methods of judging, number of judges, method of marking, etc.
3. Proper rating for speed.

D. MINE HOSPITALS.

1. Economic value to company and men of first-aid training and of mine hospitals.
2. Number, kind, and management of mine hospitals.
3. Underground first-aid stations and equipment.

E. BREATHING APPARATUS, SAFETY LAMPS, AND SAFETY APPLIANCES.

1. Methods of testing breathing apparatus.
2. Spare parts and repairs.
3. Safety and electric lamps.
4. Emergency equipment at rescue stations.
5. Use of birds and mice.

F. TRAINING WITH BREATHING APPARATUS.

1. Physical examination and requirements of persons given training.
2. Physiological effect of pressure on the head due to wearing helmet; physiological effect of pressure of nose clip.
3. Outline of course of instruction and training necessary to qualify for rescue work.
4. Diet of men doing rescue work.
5. Organization of rescue crews; how best to obtain volunteers for the work, compensation of volunteers, etc.
6. Amount of oxygen required in training.
7. Merits of smoke room and of outdoor and underground training.

G. CONDUCT OF RESCUE OPERATIONS.

1. Use of untrained men in rescue work.
2. Outline of procedure before and after entering a mine following explosions or mine fires.
3. Maximum distance rescue crews should proceed beyond fresh air.
4. Rest necessary for rescue men and limit of hours of work.
5. Cumulative effect of imbibing poisonous gases.
6. Use of stimulants.

CONFERENCE COMMITTEES.

At the opening session of the conference the chairman was authorized to appoint seven committees to consider the phases of the subject of the conference as outlined in the program. He was also authorized to appoint an eighth committee on permanent organization. The resolution directed that as secretary of each committee the chairman should designate an employee of the Bureau of Mines versed in

the subject matter to be considered by the committee, and that each committee should elect its own chairman.

The personnel of these committees, as finally organized, was as follows:

Committee 1—Mine-rescue apparatus and mine-rescue training.—J. W. Paul, chairman; D. J. Price, secretary; William Conibear, H. P. Dowler, Edward Elliott, D. K. Glover, William Nesbit, G. H. Hawes, Morgan Price, Austin King.

Committee 2—Rescue operations.—J. P. Reese, chairman; George H. Deike, secretary; B. J. Matteson, J. B. Meagher, H. P. Zeller, P. F. Lynch, F. W. Cunningham, William Raudenbush, William Johnson, W. J. German.

Committee 3—Safety lamps and electric lamps.—Austin King, chairman; J. T. Ryan, secretary; H. H. Clark, J. P. Bell, N. M. Lewis, J. M. McHugh, E. N. Judd, H. I. Smith.

Committee 4—First-aid methods.—W. S. Rountree, chairman; E. B. Sutton, secretary; Dr. W. G. Richards, Dr. A. F. Knoefel, Dr. J. W. Parshall, Dr. M. J. Shields, Dr. J. H. Young, Dr. J. W. Kennihan, Ralph McHenry, William Raudenbush, W. D. Roberts, Atherton Bowen, J. E. McDonald, Dr. G. H. Halberstadt, Dr. F. L. McKee.

Committee 5—First-aid training.—Dr. A. F. Knoefel, chairman; J. J. Rutledge, secretary; C. G. Bragh, Dr. M. J. Shields, Dr. J. W. Kennihan, Dr. F. L. McKee, Dr. J. H. Young, Dr. G. H. Halberstadt, Jesse Henson, E. W. Judd, T. B. Dilts, Dr. Ralph McHenry, J. E. McDonald.

Committee 6—First-aid contests.—H. R. Owens, chairman; J. C. Roberts, secretary; T. B. Dilts, G. W. Barager, E. W. Judd, E. E. Bach, J. L. Simons, Dr. M. J. Shields, H. P. Dowler, Dr. W. S. Rountree.

Committee 7—Hospitals and safety stations.—Dr. M. J. Shields, chairman; C. O. Roberts, secretary; T. I. Stephenson, Dr. J. W. Parshall, G. H. Hawes, R. B. Moss, John Meagher, Dr. W. S. Rountree, Dr. Ralph McHenry, G. W. Hutchinson, Dr. G. H. Halberstadt.

Committee 8—Permanent organization.—H. M. Wilson, chairman; H. A. Wadsworth, secretary; J. P. Reese, Dr. W. S. Rountree, Dr. A. F. Knoefel, Austin King.

RESOLUTIONS ADOPTED BY THE CONFERENCE.

The chairman of the conference was directed to refer the various resolutions recommended for adoption by the several committees to a committee on resolutions. The committee appointed comprised the following: Dr. F. L. McKee, chairman; J. W. Paul, secretary; B. J. Matteson, Dr. W. S. Rountree.

The resolutions, embodying minor amendments made as a result of general discussion, were reported to the conference on the morning of September 25, and were adopted. The phraseology of the resolutions as here printed has been slightly changed so that they appear as direct conclusions, as follows:

RESCUE APPARATUS AND RESCUE TRAINING.

1. Breathing apparatus used for mine-rescue and mine-recovery work should be of such types as have passed the tests of the Bureau of Mines.

2. The course in rescue training as outlined by the Bureau of Mines schedule for educational purposes and for familiarizing miners in the use of the breathing apparatus should be followed, as should the recommendations of the bureau pertaining thereto, to the extent that for actual mine-rescue work supplemental and practical training of two hours each should be taken at intervals of not more than three months.

3. All mine-rescue stations should be equipped with at least five breathing apparatus and the necessary accessories for the continuous operation of the apparatus for 24 hours, and at remote stations 48 hours. Such equipment should be so located as to admit of its assembly in one hour at a central point for emergency use.

4. The keeping of birds and mice at rescue stations for the purpose of detecting carbon monoxide is desirable.

5. All persons before being admitted for rescue training should present a medical certificate qualifying them for rescue work and stating that they are free from contagious diseases.

6. The Bureau of Mines should be requested to prepare lists of stations, together with the names and addresses of the persons who have completed training with mine-rescue apparatus, and to list the names on a roll of honor to be submitted for publication by the press in the various mining localities. Mine-rescue volunteers should be compensated for services and should be considered when promotions are being made.

7. The smoke room is best adapted for the first course of training. In addition to the smoke-room training as prescribed by the Bureau of Mines outline, supplementary practice to be taken underground is desirable.

The program subjects "Physiological Effect of Pressure on the Head Due to Wearing Helmet" and "Diet of Men Doing Rescue Work" having been referred to the general conference, were by it referred to a special committee of surgeons and rescue men, to be appointed by the chairman and to make report to the next annual meeting.

RESCUE OPERATIONS.

8. In mine-rescue work untrained men should not be permitted to use breathing apparatus except when such course is necessary in the saving of life and will not unduly jeopardize the life of the rescuer. In selecting untrained men, those should be chosen who are readily amenable to discipline.

9. A desirable outline of procedure before and after entering a mine following explosions or mine fires is as follows:

OUTSIDE ORGANIZATION.

a. All openings should be carefully guarded.

b. There should be a man in charge of outside arrangements who should see that ventilating appliances are put in readiness for operation when required.

c. Competent men who can be relied upon to obey the orders given them should be stationed at all mine openings.

d. A competent person should be placed near the mine entrance to examine all safety lamps before they are allowed to be taken into the mine.

e. Some specified person should be placed at the mine entrance to record all persons going into and coming out of the mine.

f. Proper food and shelter should be provided for parties engaged in rescue work.

g. A physician should be on hand while rescue parties are in the mines.

h. Around all openings there should be established safety lines inside of which no open lights should be allowed.

i. A man should be placed in charge of the rescue squads to organize and have them ready to enter the mine when called upon.

INSIDE ORGANIZATION.

a. A man should be placed in full charge of the inside operations on each shift.

b. An advance squad under a competent leader should explore the workings in advance of the stretcher squads and the other squads who are advancing the ventilation, making repairs, etc. The squads should advance in the following order: (*a*) Breathing-apparatus or advance squad; (*b*) stretcher squads; (*c*) temporary-ventilation squad; (*d*) material squad; (*e*) permanent-ventilation squad.

c. An inside station should be established as a base of operations. A competent person should be placed in charge to reexamine all lights before they pass to the interior of the mine.

d. A telephone communicating with the surface should be established at the inside station and should be carried forward as fast as possible.

e. A doctor provided with necessary supplies should be present at the inside station.

f. No person should go in advance of the ventilating current except the advance squad, which should examine the atmosphere for gas, and examine the return air current frequently for indications of fire; also for any other dangers which are likely to exist.

g. The advance squad, when proceeding into the mine, should mark all unexplored openings with a danger sign.

h. Strict discipline should be maintained at all times.

10. The maximum distance rescue crews may safely proceed beyond fresh air should, owing to the different conditions in different mines and the hazardous work undertaken, be left to the decision of the trained official in immediate charge, in conjunction with the mine officials, who should be governed by the probability of being able to save human life, using the time limit on all explorations.

11. Except when absolutely necessary, the shift of rescue men should not exceed two hours. This should be followed by not less than six hours' rest.

The program subjects, "Cumulative Effect of Imbibing Poisonous Gases," and "Use of Stimulants," were referred by the general conference to the committee on first-aid training for future report.

SAFETY LAMPS AND ELECTRIC LAMPS.

12. No open light should be used.

13. In coal mines only such types of safety lamps and electric lamps as have passed the tests of the United States Bureau of Mines should be used.

14. Electric lamps unaccompanied by safety lamps should not be used unless the party is equipped with breathing apparatus.

15. Both safety lamps and electric lamps should always be used up to the point where breathing apparatus is put on, and beyond such point no safety lamps should be used except one carried by the leader of the party; if explosive gas is present in dangerous quantities, even the leader should not carry a safety lamp.

FIRST-AID METHODS.

16. The Sylvester method of artificial respiration is the preferable method, provided no injury of the person to be resuscitated prohibits the use of this method.[a]

17. In the case of dislocation of a hip or a shoulder, the dislocation should not be reduced, but the limb should be fixed in the line of deformity.

18. A man injured with a broken back should be handled as little as possible. If found in any other than a recumbent position, he should be kept in that position; if found in a recumbent position, posterior splints extending from the head to the feet should be applied, or he should be laid on rolled blankets.

19. In the treatment of any fracture of a long bone it is necessary to apply splints long enough to fix the joint above and below the fracture; for example, if there is a fracture of the lower part of the leg, the splints should be applied so that they extend below the ankle and above the knee. Long splints are especially to be recommended in fractures of the legs. The forearm and arm splints designated by Dr. M. J. Shields and described in American National Red Cross textbook on first-aid, page 71, are commendable.

20. It should not be the duty of a first-aid man to reduce a dislocation except of the lower jaw or a finger.

21. The triangular bandage should be used in preference to the roller bandage.

22. A first-aid man should not wash a wound. The application to a wound of any foreign substance other than a sterile substance should be condemned.

23. In the case of a severe hemorrhage that is being controlled by a tourniquet, if no sterile or antiseptic dressing is available, no dressing should be applied to the wound.

24. An injured person should be carried feet first on a stretcher, unless there be some reason for a contrary method.

25. In the case of an electric shock the current should first be either cut off or short-circuited, if possible; if not possible, the rescuer should insulate himself and remove the patient from the body that carries the current. The treatment of electric shock prescribed in Miner's Circular 5 of the Bureau of Mines should be adopted.

26. In moving an injured man his injured side should be next to the first-aid men lifting him. A rescue corps bearing an injured man should in all cases have the right of way to the surface.

Topic A 12, "Development and Acceptance of New Methods and Dressings," was, by resolution 27, referred by the conference (see p. 39) to the executive committee.

FIRST-AID TRAINING.

28. The duties of a first-aid man are to act intelligently and efficiently between the time of an accident and the time the injured man is placed in the hands of the physician or surgeon or in a hospital.

29. The program subjects "Instruction; Its Kind and Amount," "Training and Practice; Kind and Amount," and "Systems of Training: Red Cross, Navy, or New Combination; Value of a Standard System for Miners," should be treated as one subject, and the Red Cross system of first-aid training should be adopted as the standard.

[a] The author suggests that judgment regarding the preference given the Sylvester over the Shafer method be suspended pending report on an exhaustive investigation of the subject for the Bureau of Mines by a committee designated by the American Medical Association.

30. Successful first-aid work at any given mine must have the personal interest of the operating officials, the financial support of the mining company, and the cooperation of the mine physician, surgeons, and employees.

31. Every mine should at all times have a sufficient number of first-aid men on duty to take care of any persons injured during any of the 24 hours of the day.

FIRST-AID CONTESTS.

32. For the larger companies having a great many mines, intracompany contests are to be preferred as against exhibitions, whereas for the smaller companies, operating only one or two mines, intercompany contests are preferable.

33. The method of judging should be by a system of discounts, the following discounts to prevail at all contests:

Discounts for judging first-aid contests.

	Points discounted.
1. For not doing most important thing first	2
2. For captain's failure to command men properly	2
3. For slowness in work	2
4. For failure to entirely cover a wound	2
5. For wrong artificial respiration	2
6. For loose splint	2
7. For not padding splints properly	2
8. For loose bandage	2
9. For bandage too tight	2
10. For "granny knot"	2
11. For awkward handling of patient on stretcher	2
12. For lack of neatness	2
13. For assistance lent by patient	3
14. For tourniquet too tight	3
15. For failure to stop bleeding	5
16. For not treating shock	5
17. For failure to be asceptic	10

34. Each contest should consist of not more than five events. The judges, who should be first-aid men and surgeons, should be of sufficient number, so that one judge does not inspect in any single event more than three teams, and preferably less. These judges should inspect sets of teams progressively.

35. In all contests speed should not be an essential element, but a certain time should be allotted to each event. Failure to finish in the allotted time should be discounted 1 point for each minute over time.

HOSPITALS AND FIRST-AID STATIONS.

36. Underground surgical hospitals are unnecessary, but there should be deposited at different points in the mine a sufficient number of first-aid packages properly equipped with first-aid emergency dressing. In addition there should be located central first-aid dressing stations at the bottom and at the surface opening of the mine.

PERMANENT ORGANIZATION.

The last resolution of the conference is presented below in substantially the form in which it was unanimously passed.

37. Resolved that this first national mine-rescue and first-aid conference should be made a permanent organization; that to this end there should be

created a temporary committee to draw up a constitution and by-laws and otherwise complete the organization; that the committee should be composed of 10 members, the presiding chairman of this conference, H. M. Wilson, to be the president and C. S. Stevenson the secretary, the vice president to be elected and the other seven members of the committee to be appointed by the president.

A draft of a constitution for the proposed permanent organization is presented in a subsequent section of this report.

OPENING SESSION OF CONFERENCE.

The opening meeting of the conference was called to order by H. M. Wilson at 9.20 a. m., September 23, 1912. He announced that Dr. J. A. Holmes, Director of the Bureau of Mines, regretted that urgent official engagements elsewhere prevented his being present to welcome the delegates. By request of the director, Mr. Wilson welcomed the delegates, his remarks being as follows:

ADDRESS OF WELCOME.

The Bureau of Mines is immensely gratified at the splendid response made to its invitation. It is not only gratifying to the bureau, but it must be equally gratifying to yourselves and to those you represent that so large and so representative a body of men have gathered here this morning. We have here delegates representing districts scattered from eastern Pennsylvania to Montana and from Michigan to Alabama, and we believe that such a representation makes this meeting an assured success. We want to make this a real heart-to-heart business talk on the details of those subjects outlined in the program before you.

Having welcomed you on behalf of the Director of the Bureau of Mines, I now, at his request, assume the duties of and will speak as temporary chairman.

CHAIRMAN'S PRELIMINARY REMARKS.

The chairman continued his remarks, as follows:

I am sure you will all agree that though we want this conference to be conducted by you, the representatives of the mining industry concerned in first-aid and mine-rescue work, it was necessary that some one take the initiative in organizing for business. Therefore I know you will appreciate the motive of the Bureau of Mines in asking certain of its officials to act temporarily as chairman and secretary and in submitting a tentative program. Subsequently I shall turn the proceedings over to you for such action as may suit your pleasure.

First, however, I believe that there should be a little preliminary discussion in order that we may settle our minds upon the subject in hand after the fatigue of the long journeys which many of you have undergone. I will accordingly outline the way the subject impresses me and will then call upon spokesmen of the different interests here represented to express briefly their opinions as to what this conference may do.

By invitation of Vice President Richards, of the Philadelphia & Reading Coal and Iron Co., I was present last Saturday at East Mahanoy Junction, Pa., at the company's annual field meet, certain features of which impressed me greatly.

There were present nearly 2,000 employees of the company, representing all classes of employment; and as I glanced over them I recognized many of the higher officials of other great mining companies, and I wondered as to the amount of the pay roll represented by the employees there idle in the cause of humanity. The Philadelphia & Reading Coal and Iron Co. had on that day, in the interest of this great movement, withdrawn from work many of the best men in its 66 collieries, had prepared a dinner—not a luncheon—for 2,000 people, had employed several bands of music, and had run a half dozen special trains. The pay roll alone represented by the idle men could not have been less than $20,000. The interruption to the business of a company that was thousands of tons behind in its contracts, with other items of expense involved, must have made a total loss considerably in excess of $50,000. This expenditure measures the interest of that one great company in the increased safety of its employees. On the other hand, the long weeks of training by the miners and their earnest work for the success of the field events clearly showed their appreciation of the company's efforts and the importance of the first aid to themselves and to their fellow miners. And the same sort of thing is now going on all over this country.

We who have had experience in this work find that, aside from the expense involved, it is quite an effort to maintain the interest of the men, and various expedients must be devised to keep up an interest that will otherwise soon die out. In the competitive meets appropriate and valuable prizes are presented to the winners, and some of the mining companies have rewarded their winning teams by sending them to this very meeting; some were sent to the first national mine-safety demonstration last fall. One of the most important things to be considered here is what can be done to retain the interest of the men and to induce them to develop the elementary stage of the training. Another is the adoption of some standards in first-aid and mine-rescue training methods. The program outlines many of those subjects regarding which there are differences of opinion, and we hope that in the deliberations of this conference many of these differences may be swept aside and replaced by a clear understanding of each other's methods. There are several systems of judging first-aid contests, and it is utterly impossible for the men of one district to compare the merits of their work with that of another district by published ratings. We should this week get together and establish a standard form of judging.

It is undoubtedly clear to all of us that standards of training and judging are desirable, for they will give us standards of comparison that will lead to the establishment of the work on a systematic basis. We have all been working independently, and we have not been able to profit by the experience of others, but we believe that through the medium of this conference it will be possible for us to arrive at a common understanding. The Bureau of Mines, if so requested by this conference, will itself undertake the publication of your conclusions on these several matters.

I now present to you a man who has had a wide experience in this work. Others of you may have had as great or greater experience locally, but none, I believe, have had the opportunity of studying in so many different parts of this and foreign countries the subjects that we shall consider. I introduce J. W. Paul, who is in charge of the mine-rescue and first-aid operations of the Bureau of Mines.

ADDRESS BY J. W. PAUL.

Mr. Paul addressed the conference as follows:

Mr. CHAIRMAN AND GENTLEMEN: The testing of breathing apparatus by the employees of the Bureau of Mines and the outline of mine-rescue and first-aid

training therewith used by them have been patterned largely after the practices abroad. We have endeavored to profit by the work done in European countries by sending representatives of the bureau to visit their stations and to ascertain the details of the manner in which they test the apparatus and the details of the methods followed in training men in the use of the apparatus. We have been training men now for about four years, and a large number of miners have been trained throughout different part of the United States. As we have received valuable suggestions from those interested in the work we have freely adopted them. These suggestions do not always come as frequently as we desire, and we recognize that the training we give is not as extensive as it should be, as compared with the course of training at some foreign stations where regular rescue crews are maintained, and it is hoped that this conference will enable us to adopt a satisfactory standard of training for the miners. This will serve as a basis of training the miners in the principles and proper use and care of the apparatus.

There are some differences of opinion as to the amount of training that a man should have before he should be certified as qualified to participate in actual rescue operations. We should like your suggestions as to the number of hours a man should be trained with oxygen, and as to whether training without oxygen is valuable. Then, too, the physical standard of the man who is to take the training is as yet not a definite matter. These are some of the points that we hope the deliberations of this conference will settle with some degree of satisfaction.

The operations of the Bureau of Mines in this work have covered practically all of the mining fields of the United States, and have led to the adoption of various types of rescue apparatus by many mining companies and the establishment of many rescue stations by different companies and States. We have schedules outlining the training of miners in rescue and first-aid work, a form used for the physician's examination of the men, and forms for recording the training work. They will be at your disposal for consideration, and we hope to have your criticisms and suggestions on them. Mr. Wilson has largely covered the field of first-aid work and pointed out the need of unification in that work. We have profited greatly in our work of first aid to the injured by the experience of those interested in this work in the anthracite field, in the Birmingham (Ala.) field, and in the Colorado field, and by the work of the Red Cross.

During the last year the bureau had at its several rescue cars and stations 63,631 visitors and 36,000 auditors at lectures. Of these 4,700 wore the apparatus, 2,332 were given first-aid training, and 2,000 were given rescue training. These figures will give you some idea of the extent to which the Government training has extended.

GENERAL DISCUSSION.

At the conclusion of the foregoing remarks by the chairman and Mr. Paul on behalf of the Bureau of Mines, the chairman threw the meeting open to more general discussion, introducing first Mr. J. P. Reese, with remarks as follows:

The CHAIRMAN. Having heard from a man who speaks for training in general throughout the country, I now take pleasure in calling upon one who represents the operators' viewpoint—a man who has had an unusual experience in that he has been a mine worker; he has also been connected with State commission work, and he is now the superintendent of the Superior Coal Co., of Gillespie, Ill. I introduce to you John P. Reese.

J. P. REESE. Gentlemen, I came here to learn and not to instruct. This is my first meeting of this nature, and I hope to be a better authority on mine-rescue and first-aid work on next Thursday, which marks the conclusion of these proceedings. I realize, however, that we are all new in this business and that we should not hesitate on account of our lack of experience to express our views. Our company, as do most of the companies in this country, realizes the importance of having trained men at hand to take care of the unforeseen emergency. We as a company have not progressed far in this work, but we have made a beginning. We have sent a few dozen of our men to be trained at the Springfield station, where they have obtained their certificates, and these men are meeting weekly and training other men in turn. We have equipped our two operations, one in Illinois and one in Iowa, with the rescue and first-aid materials that we have been advised are necessary for the successful operation of this work. We have at each place helmets, pulmotors, electric lights, safety lamps, and first-aid materials. We have no statistics on the practical results as yet, but we do know that in our mines the nearest first-aid man is always summoned immediately after the injury of a man. We believe that the suffering is thereby reduced to a minimum during the wait for the arrival of the physician, a period that at best is from one-half an hour to two hours. We believe that all of the money we have thus far spent has been amply repaid by the results we have obtained, and we hope for still better results in the future. We believe that in time it will be demonstrated that even from a financial standpoint this effort has been a good investment; we already know from a humanitarian standpoint that it more than pays. We need the first-aid work all of the time.

I hope to receive enlightment upon the best expedients to be used in retaining the interest of the men already trained and in extending the work to as large a number as possible of their fellow workmen. We have no standards to which we aspire; every one has had to work out his own plan. But we have succeeded in getting a great number of our best men interested. The miners' union should take more interest in this work, from their national president down to the local pit committee, and if this meeting can present this matter forcibly to the dominant powers of the miners' organization it will do a great favor to the mining industry.

The movement we represent here to-day is one that should receive the cooperation of all mining interests. When the miners fully realize that this work is being done from a humanitarian standpoint alone, we will have no trouble in training great numbers of them and in keeping them thoroughly interested in the work. So far I can not say that any real assistance to the movement has been given by the miners themselves. In reality the pioneers of the movement have been scoffed at. But we have had the rescue apparatus and have used it under actual rescue conditions. Two weeks ago three members of our organization, together with myself, explored a large area that we had holed into and which was filled with gas in which men could not long live. We explored six entries, keeping three men at the fresh air for relay and any necessary rescue work. We have used the apparatus in two other squeeze territories that were full of gas—one of them having been shut off for over two years—and we had no difficulty at all; most of the boys that used the apparatus had been to Springfield and taken the instruction. I personally had had no training except that which we took at home; but you will find that the breathing apparatus, if used with a little common sense, is a reasonably safe instrument; and although we were not compelled to build any fire walls nor carry out unconscious men, we found that we could do such things with the apparatus if we had to. We also explored one territory that had had the ventilation off of it for over a year and

was filled with black damp. We remained in the territory for 30 to 45 minutes, found out all we wanted to know, and came out with no bad effects.

It is my opinion that the coal companies will all cooperate in this first-aid and rescue work as soon as it is forcibly brought to their attention. It will be hard to interest the employees and hard to keep them interested after once attracting their attention, and undoubtedly we will have a few more actual examples of avoidable fatalities before the benefits of the system are accepted by all. However, I look forward to the day, in the not distant future, when every coal mine and all other mines will have a large percentage of their employees trained to administer first aid. Then, if we are unfortunate enough to have explosions and mine fires that call for rescue work, we will be able to reach the danger quickly and not have to wait for one of the rescue cars to come from an adjacent State or for the crew to come from the rescue station. We will have a trained corps of men and a reasonable amount of equipment on hand, and we will be able to do the work with the help of our neighbors, and when the big fellows get there with the cars they will pat us on the back and say, "You have done all that we could have done." I hope that within the next few days we who have assembled here will become well acquainted and shall leave greatly profited by each other's association.

J. C. ROBERTS. Do you have to pay these men to take the training?

J. P. REESE. That's a family secret. I'll say that we have paid in part, not in full. We pay them for actual first-aid work. We do not pay for their evening meetings, but we did pay all of their expenses when they were taking the training at the Springfield station.

The CHAIRMAN. The question that Mr. Roberts raises and that Mr. Reese has just answered is, I think, a very important one, and I hope that the committee concerned will deal with it very fully, as it has never been definitely settled as to whether it is justifiable to pay the men for this training. I also noted with pleasure Mr. Reese's statement of his ambition to be independent of State or Government assistance in the time of disaster.

I now take pleasure in introducing to you a physician and surgeon who has had much to do with the development of the magnificent first-aid work that many of us have seen in the Birmingham, Ala., district. He represents the Tennessee Coal, Iron & Railroad Co.. and it is through him that the first-aid work has kept apace with the other great developments of that company. I take pleasure in presenting Dr. W. S. Rountree.

Dr. W. S. ROUNTREE. We are here to consider preventable disasters and to work out the methods for caring for the injured in the cold light of truth. Let us not deceive ourselves in the least; let us apply the rod of self-punishment without flinching and try with might and main to correct, as far as possible, our corrigible faults. I speak of the elimination of the preventable disasters as if we had arrived at that height of perfection at which there are no longer any disasters, or only few, to eliminate.

From the standpoint of the doctors and surgeons, let me say that he is unfortunate indeed who finds himself in one of those old-school mining camps that do not have first-aid men to support him in time of disasters. Moreover, this does not apply only to mines, but to communities where steel mills, furnaces, railroad shops, and quarries are located or to any place where a great number of men are collected. It has been my good fortune in my small individual way to organize and train first-aid and mine-rescue corps in Alabama and we feel that our men are as efficient in this great work as the more seasoned teams of the anthracite regions.

I have not been engaged in the work very many years, but what we have done in Alabama seems to be bearing good fruit. I am eager to continue this work,

and I know by coming to this meeting I will be furnished with food for thought. I can remember that it was only a few years ago when it was a common occurrence for men to lose their lives in mills and mines of our State owing to the absence of first-aid men in the vicinity of the accident.

Gentlemen, the conservation of human life and human energy should be our watchword. It is by far the most important of all questions before the American people to-day, and I believe that the first-aid movement is a step in the right direction. We physicians and surgeons must push this work along. It devolves upon us to do the greater part of the work by teaching the layman how to prepare himself for the saving of the life of his fellow workman, and thus we will render an everlasting service to suffering humanity.

In teaching the layman first aid to the injured you will find that he will grow very tired, because it is a dry subject and especially so to the miner, but by persistent efforts and by injecting social features into the training you will keep up interest. By and by the beauty of the work will begin to unfold itself and all will experience genuine pleasure through their ability to relieve suffering.

I might state in passing that the knowledge I try to impart to the layman by lectures and demonstrations is based upon the teaching of modern surgical practice and common sense. The suggestions are not elaborate or extensive, the ruling consideration being simplicity. Much that is ordinarily embraced in the teaching of surgery is omitted in an effort to select that which is essential and most helpful. Technical terms are avoided and slight attempt is made to teach anatomy, physiology, and hygiene. We believe that in a few years first aid will be taught in our public schools and in all places where great bodies of men are assembled in industrial pursuits.

In order that first aid may be successfully taught you must have the personal interest and financial support of the company officials and the hearty cooperation of the physician, surgeon, and employees. In my State some of the companies and the doctors are slow to take up this much-needed work. I must say, however, that in my company the interest is universal—from the lowest official to the highest—and by virtue of that fact first-aid and mine-rescue work is a success with us from every standpoint.

Our company a few months ago gave quite a few of our men substantial checks for some of the work they had done. It happened that two of the men in one of our mines were shocked by electricity, and two of our first-aid men reached them in time to resuscitate them. They were one hour in resuscitating one of the unfortunate men, and an hour and a quarter elapsed before the second was brought to consciousness, but the two are to-day living and working. This is only one example of what men trained in this work are able to do.

I draw no color lines in teaching this work. We have black men as efficient in giving first aid to the injured as are the white men. Again, the beauty of this work is not only taught to the men but to the women and the girls and to the boys who are soon to take our places in the great industrial pursuits of this age. Many women come to me and tell me of cases in which they have been the first who have been asked to take care of an injury, and they have since asked me what they should have done. It is within the province of womankind to relieve suffering, and in the future we are going to teach them the work of first aid to the injured in our mining camps. A few months ago an accident occurred in which 15 men were killed and many injured, and a first-aid woman undertook the work of caring for the injured, and I am pleased to say that her services were the most beautiful of any so engaged after the accident. At the recent demonstration of the International Red Cross at

Washington it was my pleasure to witness the work of four teams of women so trained, and their work was very creditable indeed.

Gentlemen, think what first aid means to the wives and children, as well as the men themselves; how it may save many a man from being crippled for life; more than this, how it may mean the difference between life and death itself. The time has come when we must be teachers as well as doctors and mine experts—forgetting selfish motives, remembering the great fundamental principles embodied in "Do unto the other man as you would that he should do unto you."

One of the things that I hope this conference will do is to adopt certain standards of first-aid training, the lack of which has heretofore caused friction in our first-aid meets and competitions.

The CHAIRMAN. I have been very much interested in this address by Dr. Rountree. It has brought to my mind for the first time the fact that it is entirely possible and practical for the women of our mining camps to be of service in this great effort for reducing the loss of life in our mines. I see no reason why the work can not be extended to women with the full expectation that we shall be greatly repaid by our efforts. It is certainly within the province of womankind to take care of the injured, and as an example we have only to recall the great work done by the Red Cross nurses on the field of battle. I hope that the proper committees will give this matter of the training of the women of our mining camps the consideration that its importance seems to me to demand.

I now take pleasure in introducing to you a man who represents the inspector's point of view in this work. He is one well known in the inspection force of the bituminous district of the State of Pennsylvania. I take pleasure in presenting F. W. Cunningham.

F. W. CUNNINGHAM. Mr. Chairman and gentlemen, I did not come to this conference with the expectation of addressing you, but I came in the hope of listening to the wise counsel of others and profiting thereby. I fully appreciate that we are in need of some standard system for this work. I find different methods at each camp where first aid has been inaugurated, and it may never be possible to have a uniform quality of work throughout the whole country. Men will insist on performing their work by that method which they know how best to apply.

I believe there is great good done by first-aid exhibitions. They not only maintain the interest of the regular rescue crews, but they are of positive instructional value to the spectators. For instance, the other day in one of our mines a boy was injured while trying to jump aboard a trip of moving cars. The trip rider was a Hungarian who had seen the first-aid teams in operation, but who had never been given any actual training himself. He, however, administered first aid from his memory of the work that he had seen the first-aid crews do; he claimed that the boy was unconscious for half an hour and that blood flowed from his nose and mouth. Just what process he used to restore the boy he could not explain, but I do know that he must have made a heroic effort and that the boy is living and well to-day.

I believe it is important for this conference to adopt standard methods of judging the work in these first-aid meets. We have no assurance that equal rating as published in reports from Alabama, Colorado, and Pennsylvania means that the work of the teams in those States is of equal value.

The Pennsylvania law requires that all necessary first-aid materials be kept at each mine. We have, however, gone a step further than they have in some States, in that we have decided that since we must have the first-aid materials at hand we should also have at hand men who know how to apply such mate-

rials. The only compulsory first-aid work in this State is that which requires men working around electricity to be able to apply resuscitation in the event of shock. I find that in the bituminous district of Pennsylvania the higher officials of the companies stand nobly by this work; our greatest trouble is that the officials at the mines do not give the proper cooperation. I believe that the bituminous field of Pennsylvania deserves credit for the work it has already done. Still greater advance is possible, but in many localities of this field you will find a good proportion of the men trained and capable of taking care of an injury to their fellow employees. The mining department of the State of Pennsylvania believes that fatal accidents due to falls of roof and other similar causes may be cut in two by the work of properly trained first-aid men, and it is unnecessary for me to say that the cooperation of that department is assured in anything that this conference may do that will assist this great cause.

The CHAIRMAN. Perhaps no other agency has done more to develop first-aid work than has the American National Red Cross, and to one man more than to any other is due the credit for the great work that the Red Cross has done in this line. He it was who trained the first crew instructed in an American mine; he is the man who trained the first-aid men of the Bureau of Mines; and it is largely through his efforts that we have seen this work developed in the United States to its present standard of excellence. I take great pleasure in introducing to you Dr. M. J. Shields, of the American National Red Cross.

Dr. M. J. SHIELDS. Mr. Chairman and gentlemen, an invitation was presented to Maj. Charles Lynch of my department to be present at this conference, but due to the pressure of other business he found it impossible to be here, and I have been ordered to report in his absence. I am very glad of this opportunity to be present. I see here many of the friends who have cooperated with me in this work during the past three years, and the occasion is indeed a pleasant one.

As Mr. Wilson has pointed out, I believe that the object of this conference should be the practical standardization of first-aid methods, and, if these contests are to be continued, the standardization of the methods by which they are to be judged. For instance, I have always been an advocate of the triangular bandage. The roller bandage requires a great deal of skill for its proper application; indeed a great many physicians in the United States to-day can not correctly apply the roller bandage—that work is usually done by the nurse; yet we have advocates of the use of the roller bandage in first-aid work. I have in mind a case where an injured man was delayed an hour and a half in his arrival at the hospital because the first-aid man wanted to apply a fancy roller-bandage dressing. This could have been done with a triangular bandage in two minutes; and because of the facility with which the triangular dressing is applied I believe we should all advocate its use. First aid, as I understand it, is the connecting link between the time a man is injured and the time he arrives at a hospital. I feel fully convinced that it is a mistake to teach the rank and file the use of the roller bandage.

One of the important things for this conference to do is to standardize the methods of judging first-aid contests. In the past it has been a common thing to have friction at these meets because of the difference in the teaching of the various teams. If we have suitable standards adopted here men will in the future know what to expect in these contests and friction will be avoided. I shall be very glad to assist in this work in any way that I find possible, and I believe the doctors all over the country will welcome any information as to how they should teach and what they should teach.

In the line of compensation for first-aid men I believe that the system used by the company where I organized this work in the anthracite field was one deserving attention. Men who were faithful attendants and skillful artisans in this work were given precedence in the matter of promotion in the mine, but no direct compensation was made for the efforts that the men directed to the work. I have often made the statement both to miners and railroad workers that it is they who derive the greatest benefit from this work. It is their lives that are saved by the efforts of the first-aid men. I tell the men that it is the best insurance which they can have if they are engaged in a hazardous occupation; I tell them that with the proper administration of first aid they will get well from a serious injury 10 to 60 days earlier than without it.

The matter of judging has given me greater worry than any other feature of this work. I remember that in the first contest in the anthracite field in 1906 we gave 33⅓ per cent for correct method, efficiency 33⅓, and time 33⅓ per cent. By giving so large a percentage to the element of time we found that all men were inclined to speed up their work and thereby put on an inefficient dressing. Gradually this element of time was cut down as much as possible, so that in our meets at the present time men proceed with all the care that the seriousness of the injury demands. T. B. Dilts and a local physician at Greensburg inaugurated at a recent contest a system that will eventually overcome much of the wrangling often seen at these contests. Mr. Dilts's plan is to have five physicians do the marking, and after each dressing these physicians change to a different team, and in this way each team gets the benefit of the marking of different physicians. It will be impossible, perhaps, to create a table of discounts that will fit all circumstances. H. M. Wolfflin, one of the engineers of the Bureau of Mines, has suggestions in this connection that I believe are excellent.

In the matter of maintaining the interest of the men, after extended experience throughout the United States, I find that, after all, it is simply a question of what interest the officials may have in the work. Where the officials are passive the men are passive, and where the officials are active the men reflect their interest.

It has been my experience that we should not teach first-aid men to wash wounds. Prominent surgeons to-day do not wash wounds as they did formerly. I have told men that iodoform is the medical skunk, and that that popular disinfectant, peroxide, is nothing but wind and water; that the best they could do is to use nothing but the local air and keep impure materials and disinfectants away from the wound. I tell them that germs are, in a way, like flies; they are on your clothing and your hands, but they do not fly around in the air to any large extent.

The CHAIRMAN. I believe that Dr. Shields's remarks should be the keynote of this conference, and that the committee should give close attention to this matter of the triangular bandage versus the roller bandage, and to the proper protection of a wound to prevent infection. I was much impressed with the reason assigned for the use of the roller bandage in one field that I recently visited. It was that the men were taught the use of the roller bandage as a postgraduate course to the simpler and more elementary triangular bandage, and that it was done largely to retain the interest of the men in the work over long periods.

Dr. M. J. SHIELDS. The Red Cross is about to promulgate what we call a "medallion course" of instruction, which will be very nearly equivalent to the work of the St. John's ambulance corps in England. This medallion crew will have a personal connection, as it were, with the army in that these men will

be called upon in time of need, but of course may use their pleasure as to enlistment. This has been done simply to retain the interest of the men. The instructors of others in first aid should undoubtedly have had an advanced course that is the equivalent of our medallion course; they will then be enabled to teach others from a broader point of view.

The CHAIRMAN. The chair now asks the pleasure of the conference, and will entertain any motion regarding procedure.

T. B. DILTS. Gentlemen, I move you that the conference be divided into committees, as outlined in the program, and that these committees be appointed by the chair.

Dr. A. F. KNOEFEL. I have heard nothing yet as to the organization of this conference, and I think that it is well that we should consider the appointment of a committee by the chair for organizing this body permanently. We need an executive committee, to which all matters that may come in dispute from time to time may be referred.

T. B. DILTS. I amend my motion to include the appointment of eight committees by the chair, to take care of those subjects outlined in the program, and a committee on organization, as Dr. Knoefel has suggested.

The amended motion was unanimously adopted by the conference.

J. P. REESE. I move that the organization committee be composed of five individuals, and that all other committees be composed of three individuals.

This motion was not seconded, but was followed by discussion as to whether the first meetings should be in sections or whether the individual committees should meet at once. It was finally decided that medical and first-aid men should meet in joint conference, regardless of committee assignments, during the afternoon of September 23, and that mining men and those interested in rescue work, regardless of committee assignments, should also meet separately on the same afternoon; and that in the evening and during September 24, mining men and surgeons who were members of committees 5, 6, and 7 should meet in joint conference.

J. P. REESE. I move that all committees be composed of a minimum number of three, except the organization committee, which shall be composed of a minimum number of five.

Unanimously carried.

Dr. M. J. Shields moved that each committee should have a chairman and a secretary appointed by the chair, and Dr. A. F. Knoefel amended the motion to read that the chairman be elected by each committee, and that the secretary be appointed by the chair from a member of the Bureau of Mines staff. The motion as amended was unanimously carried.

J. P. Reese moved adjournment for 30 minutes, in order that the chairman might make selections for the various committees.

The chairman called the meeting to order at 12.20 p. m., and announced committee appointments as mentioned in a foregoing section.

PROCEEDINGS OF JOINT MEETING OF COMMITTEES 1, 2, AND 3.

Committees 1, 2, and 3 met jointly at 2 p. m., September 23. J. W. Paul was elected chairman and D. J. Price was elected secretary.

The CHAIRMAN. The purpose of this joint committee meeting is to discuss breathing apparatus, training courses, and the operation of crews in mine-rescue and recovery work.

There is placed before you for your perusal and criticism the bureau's publication on rescue apparatus,[a] and an outline of the bureau's course of training with breathing apparatus. We earnestly solicit your criticism and ask for any suggestions you may care to make that will aid us in making our work more efficient.

The meeting is in your hands and the chairman will be pleased to entertain any motions, resolutions, or discussions you may present.

On motion by Mr. Reese, the secretary, read extracts from the Bureau of Mines miners' circular above mentioned relative to the use and care of mine-rescue breathing apparatus.

J. C. ROBERTS. I think it bad to instruct rescue men to remove bottle or cartridge from their own apparatus.

CHARLES ENZIAN. I helped originally to suggest the idea of training men to remove the cartridge.

AUSTIN KING. A trained man is one who knows how to act, one who will never enter a mine to do rescue work alone. I think it is a very good idea to train the men to replace their own oxygen bottle, so that they can act together in case of an emergency.

J. P. REESE. I am opposed to the doctrine that two men could not go in alone. It is not necessary for four or five men to enter at one time. I have had experience with a party of three men which worked out successfully.

HENRY OWENS. A crew of not less than four men is safe, and in preparation of a man for emergency work I have trained the men to remove the bottle themselves.

J. L. SIMONS. I believe it is necessary to have at least four men in a crew.

WILLIAM CONIBEAR. Referring to removing oxygen cylinder and cartridge, I see no advantage in a man doing it himself. I think it is wise to have no less than five men in a rescue party, in which case a man could be assisted in removing the oxygen cylinder and cartridge.

H. P. DOWLER. I think the question of how many men should constitute a party should be left to the operators.

H. R. OWENS. I believe you should always get five or six men if you can; not less than four.

G. H. HAWES. The Oliver Mining Co. has three stations a half hour away, with three men at each station, so that they can all be assembled in a short time.

J. L. SIMONS. I do not think two men can take out one man.

G. H. HAWES. Our practice work included the carrying out of one man by two men to the bottom of the shaft and to the cage. The man was laid on a car and pushed out—actually carried and dragged, tied to a rail—a distance of 300 feet from the bottom of the shaft.

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[a] Paul, J. W., The use and care of mine-rescue breathing apparatus. Miners' Circular 4, Bureau of Mines, 1911, 24 pp., 5 figs.

AUSTIN KING. The Frick Co. have gone carefully over this question, and I think has spent more money than any other company in the training-to-rescue business. We believe it is best to have 5 persons to a team, 1 of whom should be the captain. We have 36 rescue teams and 3 stations, and we believe that a team of 5 men is an ideal team. We try to make the training as difficult as possible so that the men will be thoroughly trained.

WILLIAM NISBET. I have had an experience in a mine and am not in favor of one or two men going into a mine. There had been a very large mine fire there and in order to recover part of the mine it was necessary to go about 700 feet and build two stoppings. While working one of the men was partly overcome and we had great difficulty in getting him out. There should be not less than seven men to go into a mine in a fire or an accident. I think we ought not to take a chance with one or two men.

AUSTIN KING. The truth of the matter is that we take only a few men from the outside, and they are men of exceptional make-up. Some outside men are afraid to enter the mine, and we try to pick out those that will, and have them on our rescue team. We try to get men who are not afraid to work in the mine when a disaster occurs. I suppose that we could get our 36 corps to one place in 3 hours if it was necessary.

B. J. MATTESON. In the West, in regard to helmet work, we have five stations and a car, which, in addition to four helmets and a pulmoter each, have a telephone with each crew. The telephone is taken in 4,000 feet, which is considered far enough for a helmet crew to go. This portable telephone is certainly a great help to the helmet men. It is similar to what linemen use and is a pocket telephone. It has one mile of twin-conductor cable, and the wire is wound on a reel with a handle, which makes it very easy to carry.

The earpiece is strapped to the carrier's head. It is a very satisfactory arrangement and very easy to carry.

AUSTIN KING. I agree with the gentleman that these telephones are a great convenience. In Pennsylvania they are sometimes of a portable character, but generally they are of the regulation mine-telephone type. There is no doubt but that they are a very great help.

WILLIAM LYNCH. I think a telephone would be a great help to the Bureau of Mines. Why not put the telephone lines in through their life line, and when we have a man in the mines we can talk to him if we desire? That is something new and is undeveloped as yet.

J. W. PAUL. The bureau has such telephone equipment on each of its safety cars. The helmet has a transmitter inside and the receiver fits over the ear in a manner similar to those used by telephone girls.

By the end of the week I hope to have on exhibition here a new type of telephone made by the Western Electric Co. This is a telephone by which one can talk by using the ordinary receiver, and by the transmitter, a little disk that is strapped on the neck, one can talk and be distinctly understood at the other end of the line.

In regard to the course of training calling for the removal and replacing of the regenerator and oxygen bottles of the Draeger apparatus, it is not recommended that men do this in actual mine-rescue work except in case of extreme necessity—in case a man finds that he can not get out of the mine without a renewal of his oxygen supply. If he finds that he is not able to get back and has no assistance, he might possibly be able to save his life if he could put a freshly charged bottle on his apparatus.

In regard to the number of men that should compose a rescue party, the Bureau of Mines has been insisting upon not less than five men to compose a

rescue crew, for the reason that if one meets with an accident, there would be four men to bring him out.

We think a man has a right to refuse to go into a mine alone, as he has no assurance that he will be able to get out alive; nor should only two men enter a mine filled with poisonous gases. There should be a sufficient number of men to guarantee confidence on the part of all the men.

Some of our men have had considerable experience in mine-recovery work, and when they have been on prolonged expeditions extending over four or five days or probably a week, making long journeys several times daily, they have found they prefer the mouth-breathing type of apparatus. After using the mouth breather a certain number of times they found it was not objectionable, although they have difficulty in talking; but talking is not necessary with a properly organized crew.

There is a general disposition on the part of people who know little of the apparatus to expect greater things of the men who wear the apparatus than they are capable of doing. The bureau thinks there should be some regulation as to the amount of work that should be required, as to the number of hours of rest for the men, as to whether or not they should take stimulants, and as to what should be the maximum distance they should proceed in poisonous gases.

B. J. MATTESON. In regard to helmet men, I believe all men that are trained to act as helmet men should pass a medical examination as to their physical ability to wear a helmet, as a man with a weak heart or affected lungs is liable to overexert himself in trying to keep up and do his share; should he fall with a helmet on in this condition there is a possibility that he would lose his life before he could be taken to the outside and properly treated.

AUSTIN KING. We train 180 men and the expense to us is $5 apiece for each practice, and that costs money.

B. J. MATTESON. We give them training at almost any point along the mine, but before we make them members of the regular crew they have to stand a medical examination. If the doctor pronounces them all right, they go on with the training; if their hearts are weak, they are generally excitable, and they might go down and lose their lives.

HENRY OWENS. For our training we have a tunnel driven 400 feet into the mountain and with only one opening. We build a wood fire right near the opening and burn a lot of sulphur. We tell the men there has been an explosion, and they are supposed to go in and investigate. They must stand a doctor's examination. In our company we train anybody.

AUSTIN KING. We train miners and drivers, and we try to give these men preference. They are the men upon whom we would have to depend. We try to get that class of men to train, and also the fire boss, who ought to make a good leader. In most cases the mine foreman is the captain of the team. Our superintendents are of no use for that work. A superintendent should stay on top; and if he is not a practical mining man, he ought to be compelled to stay there.

CHARLES ENZIAN. Do not send into the mine less than five men. At one time I was an advocate of a corps composed of few men well trained, but have since changed my opinion on this matter. It has proved better practice to have a larger number of men fairly well trained. I know of a case in point. In a party of four men one was lost because the three men could not carry him out, although he did not weigh over 150 pounds.

The colliery labor force changes very rapidly, amounting to almost a complete change, with the exception of the officials, about every three or four years. The ordinary mine workman shifts from mine to mine. We all agree with Mr. King

that the cost of $5 or more to train a man amounts to quite a sum of money at each mine, and therefore the work practically resolves itself into one classification; that is, only the salaried men are thoroughly trained, because they are more or less permanent employees.

F. W. CUNNINGHAM. In our district the mine bosses and fire bosses have to go at a 3.30 gait. Our mine bosses and mine foremen should be trained in first aid and in the use of the helmet.

At least five or six men should be on a team. It is difficult to get the right kind of men who are not afraid of work underground.

J. P. REESE. I believe in getting what you can get, using what you have. I disagree with my friend King about the superintendent. I would rely on our superintendent more than any other man on the job.

I believe that this movement is so young and there are so many problems that we will not really be able to do much at this meeting.

How far should we permit men to go with helmets? I think that is a problem we can make recommendations on. There is a time when we can keep our fresh air within a few feet of the face. But this meeting will be recognized as the highest authority on some of these problems and we can do some things.

AUSTIN KING. The reason that we do not think a superintendent is a fit person is because he knows where everything is. He is the one that has general control of everything—keeping people away, giving general instructions—and he can do more good on top than he could underground. That is why it is better to keep him out of the mine.

B. J. MATTESON. I believe that the superintendent should be trained in the use of the helmet as well as the pit bosses and other men.

J. P. REESE. I move that the joint session adjourn and that committees 1, 2, and 3 meet immediately at their respective places.

The motion was seconded and carried.

PROCEEDINGS OF COMMITTEE 1 RELATIVE TO RESCUE APPARATUS AND RESCUE TRAINING.

Committee 1 met September 23 at 3.30 p. m., adjourned at 5 p. m., and met again September 24 at 9 a. m., adjourning at noon. D. J. Price acted as secretary by appointment of the chairman of the conference and called the meeting to order. J. W. Paul was elected chairman. The members are mentioned on page 12. The resolutions adopted (see pp. 12–13) were separately presented and discussed. The discussion of importance in connection with these resolutions is reported under the proceedings of the sectional session (pp. 27–30), and in connection with the adoption of the resolutions by the conference at its closing session (pp. 51–54).

PROCEEDINGS OF COMMITTEE 2 RELATIVE TO RESCUE OPERATIONS.

G. H. Deike, acting as secretary by appointment of the chairman of the conference, called the meeting to order September 23 at 4 p. m. J. P. Reese was elected chairman. The members of the committee are mentioned on page 12.

DISCUSSION ON USE OF UNTRAINED MEN IN RESCUE WORK.

J. P. REESE. I favor using trained men, where available, in rescue operations, but where there are no trained men I favor taking the untrained men at hand.

F. W. CUNNINGHAM. I favor trained men in the use of breathing apparatus. Untrained men will probably carry out orders better than trained men in recovery work.

B. J. MATTESON. The helmet men used by our company are all trained men; the untrained men to follow up the helmet men must all be experienced mine men. The helmet men use the portable phone while advancing, and at a distance of 2,000 feet or more, considering the conditions on the inside, they put up the regular Stromberg-Carlson mine phone. A man is then stationed at the mine phone inside the mine, the helmet crew reporting to him through the small portable phone, and he in turn giving the information to the outside through the mine phone. We have had good success in following these rules; we have lost no helmet men nor had any untrained men injured.

P. F. LYNCH. The greatest dependence could be placed on the miners themselves in rescue operations. Do not allow any men to go into the mine unless they are experienced miners. With good leaders, the untrained men give good service.

WILLIAM JOHNSON. The greatest difficulty is in keeping men from rushing into the mine following a disaster. Several untrained men who are acquainted with the mines can be used to advantage.

On motion of B. J. Matteson, the chairman referred the subject, "Outline of Procedure Before and After Entering a Mine Following Explosions or Mine Fires," to a subcommittee consisting of Messrs. Matteson, Cunningham, and Raudenbush.

DISCUSSION ON MAXIMUM DISTANCE CREWS SHOULD PROCEED BEYOND FRESH AIR.

J. P. REESE. In saving life there should be no limit to distance.

F. W. CUNNINGHAM. Local conditions must govern the distance for a crew to go beyond fresh air.

J. P. REESE. I am in favor of establishing a margin of safety rather than a limit of distance. I am not in favor of establishing a limit as to number of feet to be traveled.

J. F. MEAGHER. I am in favor of a limit of time rather than of distance.

B. J. MATTESON. If birds or mice go down, the helmet men are permitted to go only 2,000 feet. If there is any possibility of there being any men alive inside the mine, the helmet squad is made up of eight men. In this case the oxygen supply governs the advance working.

On motion of F. W. Cunningham, the chairman referred the subject under discussion and the subject, "Rest Necessary for Rescue Men and Limit of Hours of Work," to a subcommittee consisting of Messrs. Lynch, German, and Zeller.

On motion of B. J. Matteson, the subject, "Cumulative Effect of Imbibing Poisonous Gases," and the subject, "Use of Stimulants," were referred back to the general conference for reference to the committee to consider the physiological effect of wearing helmets.

PROCEEDINGS OF COMMITTEE 3 RELATIVE TO SAFETY LAMPS AND ELECTRIC LAMPS.

J. T. Ryan, acting as secretary by appointment of the chairman of the conference, called the meeting to order September 23 at 3 p. m. Austin King was elected chairman. The members are mentioned on page 12.

The chairman suggested that the committee confine its discussion of lamps to their relation to mine-rescue and recovery work. He then asked for an expression from some member of the Bureau of Mines as to the practice of the bureau regarding the use of lamps in rescue work.

J. T. RYAN. The bureau's men are equipped with Wolff safety lamps, portable Hubbel electric lamps, and usually carry in addition a hand electric flash-light. In rescue and recovery work one or more safety lamps are carried by the party to test for explosive gas, except where the party is going to enter an area known to have an explosive or extinctive atmosphere.

The chairman and J. P. Bell commented on this practice and related some of their experiences at mine disasters. Both were of the opinion that the practice of carrying both types of lamp was a good one, but Mr. King did not see the advantage of carrying two kinds of electric lamps. He thought that the flash-light would be sufficient on account of its penetrating qualities. In reply to a question of H. I. Smith as to how a man would hold the flash lamp when working, Mr. King demonstrated a method of fastening the lamp on top of the cap by means of rubber bands and having the light in about the same position as the Hirsch electric lamp.

M. C. McHugh, in describing his experience in the use of lamps after mine disasters, stated that he had usually found a mixture of lamps at a mine disaster, and that he believed that electric lamps should not be used in recovery work, preferring only safety lamps.

H. H. Clark expressed his opinion on the safety of the different types of electric lamps that are in use in the mines. He briefly outlined the tests made of electric lamps by the Bureau of Mines and called attention to Technical Paper 23, "Ignition of Gas by Miniature Electric Lamps with Tungsten Filaments." He thought it impossible to obtain from an ordinary 2 or 3 cell flash-light a spark sufficient to ignite gas.

The CHAIRMAN. Having now heard from the committee members, I suggest that we approve the practice of the Bureau of Mines and that there should be some restrictions on the promiscuous use of safety and electric lamps. In view of the fact that we are restricted in this State by law to the use of certain approved safety lamps that have been subjected to tests of the Bureau of Mines, and as the bureau is also making tests of electric lamps, I further suggest that we recommend a list of approved lamps similar to the list of permissible explosives.

J. T. RYAN. I don't know whether this committee is simply to discuss the use of safety lamps and electric lamps or not. I think, however, that we should

take some action regarding the use of open lights in mines after explosions or fires and I suggest a resolution that no open lights be used in mines during rescue or recovery work.

Considerable discussion followed, and all members were of the opinion that no open lights should be allowed in a mine after an explosion or fire. The chairman and J. P. Bell stated that this was universally understood, and asked if the bureau had the experience of being called to the scene of a mine disaster where open lights were being used. Mr. Ryan related several instances where the difficulty had been encountered, and J. W. Paul, who came in at this point, called their attention to an explosion in the Middle West that happened in a mine where gas had never been found before and where, after an explosion had occurred, three different parties went in at intervals with open lights and ignited the gas and caused an explosion each time. H. I. Smith, who had visited the mine a few days after, gave a full account of this explosion. Messrs. King, Bell, and McHugh emphasized the importance of using safety lamps in controlling mine fires in so-called nongaseous mines and pointed out the danger of using open lights. They related from personal experience instances of explosions caused by open lights in fighting mine fires.

Mr. King then pointed out the danger from open lights in a mine where the coal dust was very inflammable, and told of a mine in West Virginia where his son was mine foreman, and where two men loading coal at a working face had on three different occasions ignited dust with the flame of their torches and caused local explosions. On one occasion his son examined the place carefully for gas and found no evidence of gas on the safety lamp, and he then watched the men at work and stayed long enough to witness the ignition of the dust.

Mr. Paul stated that he had also seen the dust ignited at this mine tipple.

Mr. King had known the dust to be ignited by a torch at the tipple of another mine while coal was being prepared.

Mr. Ryan moved that the committee recommend that in mine-rescue and recovery work no open lights be used. The motion was seconded and passed without a dissenting vote.

The CHAIRMAN. I suggest putting the results of our discussion in the form of recommendations, and I shall name a subcommittee, which can meet in the morning and draft the recommendations, to be passed upon later by the entire committee. I name as members on this subcommittee Mr. Clark, of the Bureau of Mines, who is familiar with the electric lamps and has conducted tests on them; Mr. Bell, who is a Pennsylvania State mine inspector, and who is very familiar with the use of the safety lamp; and Mr. Ryan, of the Bureau of Mines, who has had experience in rescue and recovery work and in testing safety lamps.

At the adjourned meeting of the committee on September 24 all members present agreed that wherever possible both electric lamps and safety lamps should be used in rescue and recovery work and that recommendations should be made defining the limits in which they should be used by parties equipped with breathing apparatus and by those not wearing breathing apparatus.

Mr. Clark then proposed that the committee consider first electric lamps, and recommend to what extent they should be used alone, if at all, by men without breathing apparatus and also by men equipped with breathing apparatus. Mr. Clark also proposed that the committee should consider also the use of safety lamps in the same manner.

Mr. Bell thought that both electric and safety lamps should be carried by a rescue party on all occasions. Mr. Ryan objected to this recommendation, stating that oftentimes a rescue party would attempt to explore an area in which there was known to be an explosive mixture of gas or an extinctive atmosphere, or would explore an area (as a sealed section) where from the start of the exploration work there would be an explosive atmosphere. In that case there would not be any use in carrying a safety lamp, and in the former case, where an explosive atmosphere would be almost sure to be encountered, a safety lamp might be a source of danger and in any case would require careful watching, and if gas was found in dangerous quantities the lamp would have to be extinguished to proceed with safety.

Mr. Bell thought that the leader of the party should carry a safety lamp unless the conditions were such that it would be useless from the start. Otherwise the leader should carry a safety lamp and devote all his attention to his lamp; if the lamp showed the presence of gas it could then be extinguished.

Mr. Lewis thought that this was a good suggestion, and stated that this had been about the practice carried out at several disasters in which he had assisted in the rescue work.

The committee then adjourned.

PROCEEDINGS OF COMMITTEE 4 RELATIVE TO FIRST-AID METHODS.

E. B. Sutton, acting as secretary by appointment by the chairman of the conference, called the meeting to order September 23, at 3 p. m. Dr. W. S. Rountree was elected chairman.

Dr. J. W. KENNIHAN. We use in our first-aid work the Sylvester method except for broken arms, also except in cases of severe injuries to the chest.

Dr. J. W. PARSHALL. We use the Sylvester method.

Dr. R. F. MCHENRY. Regarding the Sylvester method, this is the best method of artificial respiration, provided there is no injury to interfere. It is my opinion that it is.

Dr. M. J. SHIELDS. In Europe, I understand, and some mines in this country the Schaefer method is preferred. Personally I am partial to the Sylvester method, as is also Maj. Charles Lynch, who is head of the Red Cross department I represent. The one chief objection to the Sylvester method, it seems to me, is the difficulty of getting out the tongue and holding it out if there is only one man using the Sylvester method. This feature is troublesome. I have a way of getting out the tongue that I think can be handled by one man successfully. It consists of passing a cloth around the tongue and under the chin and tying it back of the neck.

Of course, in the Schaefer method you do not have to hold out the tongue, but I do not think that you get the atmospheric pressure as directly that way as you do when the man is lying on his back. In the first national mine-safety demonstration a year ago we had an event in which a man was supposed to be burned on the face by electricity, and it was suggested that the Schaefer method be used on account of the back burns. I noted a number of the subjects when they got up had their mouths full of mud, showing that their faces had been buried in it. You can readily see that you could not get oxygen into the lungs with the mouth full of dirt.

W. D. ROBERTS. I suggest using this method: Place the center of the bandage on the tongue, pass the bandage around and cross under the chin, then pass these ends up in front of the ears and tie on top of the head.

Dr. M. J. SHIELDS. Tying a bandage around the neck pulls the jaw down.

Dr. A. F. KNOEFEL. The jaw can be held as in giving an anesthetic.

Dr. J. W. KENNIHAN. I would say with Dr. Knoefel that in giving an anesthetic a man never ties the tongue; and if he holds the jaw the patient will never swallow the tongue.

Dr. M. J. SHIELDS. He could not pump the arms and hold the jaw at the same time.

Dr. R. F. MCHENRY. Would it do any harm to the patient in case of constriction of the muscles?

Dr. J. W. KENNIHAN. I do not think you have the constriction long enough. If your man starts to breathe you are through.

W. D. ROBERTS. Suppose a man works several hours on a patient.

Dr. M. J. SHIELDS. Artificial resuscitation has been used with a patient two hours. [Mr. Shields then read Dr. Wingwright's letter stating that four men had been resuscitated by the Sylvester method, the tongue being tied.] In recommending the adoption of a preferred method it might be provided that in contests either the Sylvester or the Schaefer method, if used correctly, should receive the same merit.

R. B. MOSS. To straighten out these differences some standard method should be adopted which will be given to the miners all over the United States, so that there will be one method agreed upon as a basis of judging.

Dr. A. F. KNOEFEL. We as a committee decide upon and introduce a resolution to the joint assembly, and the joint assembly either accepts or rejects it. If we recommend a method for producing artificial respiration, they can either adopt or reject it.

Dr. M. J. SHIELDS. The anthracite companies north of Wilkes-Barre agree that the correct use of either the roller or the triangular bandage should be given the same credit. Still there is a point, I think, that the triangular bandage is more practical. Of course the time would be an element. I think that a dislocation of the shoulder should be treated with a triangular bandage and that the dislocation of hips should be treated with splints.

Dr. A. F. KNOEFEL. In a dislocation of the shoulder, no matter whether forward, downward, backward, or upward, the first-aid man should put the shoul-

der in the position in which it gives the patient the least pain. I suggest padding underneath with waste, clothes, or anything, and then applying the triangular bandage as a sling to hold it in best possible position. As for dislocation of the hip, I think it wrong for the first-aid man to attempt to reduce the dislocation, unless he knows that he can not get a doctor within 6 or 8 hours.

Dr. R. F. McHENRY. The injuries should be fixed on the line of deformity. We teach our first-aid men to take the weight off the dislocated shoulder and to support it by bandaging. A splint could not always be put on a dislocated hip.

The CHAIRMAN. We have quite a number of dislocations of the shoulder and hip and we never teach our men to reduce a dislocation because he will bring more pressure to bear and in some manner often rupture ligaments. We teach our men to take their jumpers and make a pad, and the bandage is brought around the body and tied in such a manner that the patient can not move his shoulder. In dislocation of the hip joint, we put the patient in any convenient position, and the first-aid men are taught to place that limb, whatever position the patient may be in. They are also taught to place the splint from the back down to the heel, and to use a bandage in securing the splint, as by so doing the patient can be transported many miles without further injury. The main point is to make him as comfortable as possible.

Dr. J. W. PARSHALL. It seems to be the consensus of the meeting that a dislocated leg or arm should be put in the position most comfortable to the patient.

Dr. R. F. McHENRY. The points to be remembered in treating a broken back are, first, to take off the weight of the upper extremities; second, to prevent the dragging of the lower extremities; and, third, to fix the spinal column so that there is no motion in transportation. We use an improvised stretcher about 6½ feet long, with a space between parallel pieces of about 5 inches.

Dr. M. J. SHIELDS. The apparatus that Mr. McHenry presented at Greensburg on August 17 was one of the most practical things I had ever seen.

JESSE HENSON. It had been the practice of first-aid miners of the Bureau of Mines in treating a broken back to use two long splints and lay the patient straight on his back, but while in Rock Springs I learned through a physician there of a man who had broken his back and who had a kink in it. Had their treatment been used there the man would probably have died, as the physician pointed out that when a man is found with a broken back you should put him in the position you find him, as with a dislocated hip or shoulder.

Dr. A. F. KNOEFEL. Straightening a patient out is in some instances likely to cause a most serious injury. The first-aid men should merely pad the back, supporting the man in the position in which he is found, and wait for a physician, and let him take the responsibility of moving the patient.

Dr. R. F. McHENRY. The object of this splint is that it will with care meet the majority of cases of broken backs. A first-aid man would be very foolish if, on finding a man in a semiprone position, he should straighten him out. In such a case it is best to fix the body or spine in the line of deformity. In the majority of cases, however, broken backs are due to falls of rock, and should the man be found straight splints can be used.

The CHAIRMAN. My company has a number of cases of broken backs and they are handled with the patient left in the line of deformity. The company has long since adopted this method of splint, and the Bureau of Mines has the same thing, namely, two parallel bars with two pieces across them, and it seems to be an ideal splint for an injury when the man is stretched out.

ATHERTON BOWEN. I would suggest just placing a patient with a broken back on a padded stretcher, possibly securing him to it with bandages, and taking him to the hospital without splints.

Dr. M. J. SHIELDS. I recommend taking two ordinary mine blankets and rolling them up rather tightly, laying them parallel on the stretcher, so that the blankets are directly under the hollow of the injured man's back; that would take the pressure off the spine.

C. O. ROBERTS. There has been some discussion as to whether it is proper to lift a man with a broken back onto the stretcher or roll him onto it. I have always advocated lifting him, placing the hands as near to the fracture as you can. If you roll him, one side would be apt to roll more than the other.

ATHERTON BOWEN. I have personally never seen a case of broken back, but have seen several methods in first-aid practice. One was to take an ordinary mine blanket and carefully work it up under the body by moving it slightly back and forth. Another was, if the man had a coat on, to roll the coat up from the sides and pass two triangular bandages, each folded twice, under the legs; then by means of the coat and bandages lift the patient and place him on the splints or stretcher.

Dr. M. J. SHIELDS. It would depend on the position in which the man was found.

Dr. R. F. MCHENRY. I am in favor of lifting a man. I think it very serious to roll a man with a broken back.

Dr. A. F. KNOEFEL. There are two ways in which this injury may be received, either by slate falling from the roof, bending him down and doubling him up like a jackknife, or by a direct fall on the spinal column. No matter in what position the patient is found I think it better to lift him than to roll him.

The CHAIRMAN. In some cases in our mines they rolled the man on to the stretcher.

C. O. ROBERTS. The Bureau of Mines uses three men on one side and an extra man. One man places his hands above the fracture, one below the fracture, and the other man raises the man's feet.

Dr. J. H. YOUNG. The rule we use in regard to the length of the splint to be applied to limbs is to take splints long enough to go above the joint above the fracture.

Dr. A. F. KNOEFEL. In the treatment of all fractures of long bones, it is necessary to splint at the immediate fracture, including the joint above and below, so that you get a complete fixation of the bone or bones involved. If there is a fracture of the tibia, splints long enough to include the ankle and the knee should be applied. If I have to treat a fracture of the forearm, I find that by applying a right-angle splint the patient can be transported better.

Dr. J. W. KENNIHAN. I think it better in case of simple forearm fracture not to splint it at all, but merely to bandage it.

C. O. ROBERTS. I do not know whether that would be practical in mines, on account of the narrowness of some of the entries and on account of difficulty of transportation.

Dr. M. J. SHIELDS. In case of break between wrist and elbow it is the policy of the Lackawanna Railroad merely to apply a splint on the outside from the fingers to the elbow.

Dr. R. F. MCHENRY. In putting a long splint on the forearm it is possible to create a compound fracture out of a simple fracture. I thought the question referred merely to the fracture of the leg.

Dr. M. J. SHIELDS. Would it not simplify the matter if we recommend that splints for the thigh be 4½ feet long, 4 inches wide, and ½ inch thick, and that splints for the lower part of the leg be about 30 inches long, 4½ inches wide, and ½ inch thick?

T. B. DILTS. I move that this question apply only to the lower limbs, and that if anyone wants to make a new motion in regard to bandaging the arm he should do so.

The motion was seconded and passed.

Dr. R. F. MCHENRY. I am very much in favor of splints, as laid down by Dr. Shields in his book, for arm and forearm. It suits my work better than anything else.

Dr. M. J. SHIELDS. I do not believe in spending too much time in making diagnosis. Give the man the benefit of the doubt and put on splints.

Dr. R. F. MCHENRY. First-aid men should be taught the application of roller bandages, because there are dressings that can be done with roller bandages that can not be done with triangular bandages. I think the question should be discussed fully; that this committee should be very careful in going on record, and should avoid misunderstandings or wrong deductions.

Dr. A. F. KNOEFEL. The resolution says "in preference," and I still say that it should be used in preference. That does not eliminate the roller bandage. The roller bandage will not stay in position unless applied by some one proficient in its use. It is often wrapped too tight when, like a string tied tightly around a man's finger, it is a hindrance to circulation. The triangular bandage, although a less sightly dressing, is easily applied so it will stick.

Dr. M. J. SHIELDS. The men generally tie the roller bandage too tight in order to make it stick

Dr. J. W. KENNIHAN. I think that first-aid men should not wash a wound.

Dr. M. J. SHIELDS. Usually the man has no facilities for getting sterile water, and he will likely put in more dirt on account of his hands being dirty than he would get out. I think that we should discourage the idea of so extensive a use of peroxide. I think if you are going to clean a wound that gasoline is a good deal better than peroxide and it is antiseptic.

Dr. W. D. RICHARDS. We never teach men to wash the wound. If left alone the blood will coagulate and will form a protective cover in a way. In case foreign bodies enter and are very large, he may push them out of the way, provided he does not touch the wound. When the patient reaches the hospital, we use gasoline with about 5 or 10 per cent of iodine, which makes a most excellent antiseptic to use in those injuries.

Dr. R. F. MCHENRY. Just one word about peroxide. I think particular attention should be given to this. The blood clot is a protection and when you apply peroxide you dissolve the blood clot and open the wound, which makes it more liable to infection.

Dr. J. H. YOUNG. I think this committee ought to go on record strongly against the use of applying a chew of tobacco to a wound. [Cited a case of a woman receiving erysipelas from her son.]

Dr. W. D. RICHARDS. I move that we condemn the application to a wound of any foreign substance, other than a sterile substance.

The CHAIRMAN. In Dr. Shields's book, which we referred to a while ago, there are two opposite statements. In one place he states you must move head first, and in another case in similar circumstances he states you must move feet first. I believe that a man ought to be carried feet first.

Dr. R. F. MCHENRY. If you are carrying a man who is suffering from shock and who has a tendency to faint, you want to carry him so as to get as much blood to his head as possible. If he had an injury in the head you should do exactly the opposite.

R. B. MOSS. It seems that there has been some discussion in our part of the State about what to do first for a man suffering from electric contact,

and most instructors have been teaching first-aid men to insulate themselves before trying to take care of the patient.

ATHERTON BOWEN. I think that the current should be either cut off or short-circuited first, if possible; if this is not possible, then insulate yourself and remove the patient from the body that carries the current, or remove the body that carries the current from the patient.

C. O. ROBERTS. After you have rescued the man from the wire, is it proper to dress the wound or try to save the man's life? I claim that the most important thing to do is to revive him, get him back to consciousness.

Dr. R. F. MCHENRY. One of the main points is to lay something between the patient's wound and the ground.

T. B. DILTS. We are considering the case of a man who has been shocked with electricity so that he is insensible. The question is whether we are to take care of the burn first or revive him first.

The CHAIRMAN. In case a man gets his arm lacerated in a machine, the first thing to do is to put your finger over the artery or use a tourniquet, which stops the flow of blood, and in this manner you will be able to save his life. I therefore believe that in electric shock, when a man is insensible, you should first attempt to revive him by artificial respiration before dressing the wound.

Dr. R. F. MCHENRY. I do not advocate wasting time with dressing a wound. By the time the man is removed from the wire somebody has a pad underneath him.

ATHERTON BOWEN. From which side should the first-aid corps handle the patient? For instance, in a compound fracture of the thigh, after splinting him, should the men work on the injured or uninjured side in putting him on the stretcher?

Dr. J. W. KENNIHAN. The first-aid men should be on the uninjured side.

W. D. ROBERTS. If a man is injured on the right side he should be handled by the corps on that side, because when they raise a man in placing him on the stretcher the side away from the men lifting will fall a little. I say that the injured side should be next to the men lifting the patient.

R. B. Moss. The American Red Cross recommends that the patient be handled next to the wound and that the stretcher be placed closest to the wounded part.

The CHAIRMAN. If this organization goes through there ought to be uniformity in the methods used in the United States; when Indiana meets Pennsylvania, when Tennessee meets Colorado, they should all use the same methods of dressing.

Dr. R. F. MCHENRY. My idea is to allow the first-aid men after any contest to demonstrate any new devices they may have developed, and to have these devices passed on by a board of censors and accepted or rejected. This course will stop taking on first-aid features that are practically experimental.

The CHAIRMAN. I recommend that an organization be formed and that this organization be the arbitrators of dressings to be used in first-aid contests.

R. B. Moss. I move that if this organization is perfected we recommend a committee of seven persons, consisting of two first-aid men, two operators, two physicians, and one representative of the Bureau of Mines, to act as an advisory board or executive board, that any time any new dressings are brought forth at these contests they be turned over to this advisory board for an opinion as to whether or not they should be used by first-aid men.

PROCEEDINGS OF JOINT MEETING OF COMMITTEES 5, 6, AND 7.

J. J. Rutledge, acting as secretary by appointment of the chairman of the conference, called the meeting to order September 24 at 9.40

a. m. Dr. M. J. Shields was elected chairman. The members are mentioned on page 12.

Dr. G. H. Halberstadt discussed the death rate before and since the establishment of first-aid work, stating, among other things, that in 1911 11,000,000 tons of coal was mined, and that there were 82 deaths—1 death to 144,000 tons; that the Philadelphia & Reading Railroad Co. was the first company to take up the organization of mine first-aid corps, starting with 400 men; that carron oil is no longer used for dressing burns, gauze saturated with a 2 per cent solution of picric acid being at present used; that the dressing often remains on for 48 hours.

Dr. Halberstadt cited the case of a man who had been injured in a railroad yard. When the patient, who had been meanwhile treated by a doctor, arrived at the hospital Dr. Halberstadt found it was not possible to operate on him even after working upon him for 48 hours. Identically the same accident happened at a mine and was treated by a first-aid man. There was no loss of blood and the patient was successfully operated upon at the hospital, as the shock had been properly treated previous to reaching the hospital.

Dr. Halberstadt said further that the trouble with doctors is that they do not have the appliances at hand to treat such an injury, or they think it is a case to be treated in transit, and so handle it. He stated that in the first-aid work in his field the appliances are well placed and the first-aid work well done; that treatment is free and that indemnity is paid during certain loss of time.

Dr. J. W. PARSHALL. The Frick Company makes payments to men while in the hospital; also so much indemnity for the loss of an eye, a limb, etc.

Dr. G. H. HALBERSTADT. We keep them on relief for six months, and the company has been paying to this fund. We have three State hospitals and one local hospital that take care of the injured men. I see the men only in case they are very seriously injured, when I may be sent for to look after the case.

The CHAIRMAN. I think that we have two things to discuss here: The economic value to the company and to the men of first-aid training, and then the topic of mine hospitals, in regard to where they should be located, etc. I can indorse what Dr. Halberstadt has said, as it has been my experience in the upper region. I have a number of hospital reports of the hospitals in Scranton; also, I want Dr. Rountree, of the Tennessee Coal, Iron & R. R. Co. to quote figures that were given out by them about two years ago. I assisted Dr. Rountree and other surgeons in organizing first-aid teams in 1909, when the death rate was about one man for every 90,000 tons of coal mined. The following year it dropped to one man in every 140,000 tons, and the following year it dropped to one man for every 190,000 tons of coal mined. You can not attribute all of that to first aid, but first aid played an important part. Perhaps 80 per cent of the accidents that happen have an element of contributory negligence. The mere agitation regarding accidents, talking about them, the introduction of first aid, gets the men to thinking about them, makes the men more careful for themselves, and they warn others, and also gets the company

interested in making the mines safer, and the two cooperating with each other cut the death rate down.

Dr. F. L. McKee. Previous to using first-aid corps it has been difficult to get men who have been hurt to report to the mine hospital for treatment. Since the order went into effect to report to hospital for treatment, there are only about half the number of men drawing fees from the relief fund that did before, showing that many men feigned illness. In connection with dressing wounds, we wash all our wounds, using 4-ounce hard-rubber syringes and a 2 per cent solution of soluble cresol. The only two cases of infection that we had were cases that did not report to the hospital to have their wounds washed.

Dr. W. S. Rountree. My experience has been somewhat that of Dr. Halberstadt. I will say that in the past few years since we have first aid in some of our mines, our death rate has been cut down very, very much, far more than was ever expected, and the percentage of infection lower than ever dreamed of. The wounds of our men are dressed when they come from the mine, and I have seen only few infections in two or three years where the first-aid men get hold of the men soon after the injury. We do not wash wounds. We do not allow our first-aid men to wash them. If a first-aid man hasn't a first-aid box near him when an injury occurs, he simply leaves the wound open, bare, rather than to cover it with a piece of his jumper or other material used in the mine, such as waste or brattice cloth. They don't put tobacco on a wound any more, and if they leave the wound open, nature soon forms a dressing with blood clots and it seems to act beneficially. When we surgeons get hold of a patient we don't probe, don't put our hands in the wounds, never attempt to get inside. In other words, if the wound is covered with dust and dirt we use about a 5 per cent solution of gasoline and iodine to clean it, and then we put on sterile dressing. When the wounds are treated in this way we very seldom have infection, and as a result the wounds seem to heal quickly, and it is not very long before the man is back at his work.

There are a number of things that we teach the first-aid man to use for burns. I like a dressing made of a saturated solution of bicarbonate of soda, it seems to act beautifully. In first and second degree burns the first-aid man puts on a sterile dressing saturated with a solution of boracic acid or bicarbonate of soda. For third-degree burns we use the old fashioned balsam, which makes a very nice dressing, but is somewhat painful.

I believe that it is a wrong idea to allow first-aid men to wash a wound. Dr. Murphy, of Chicago, a surgeon of wide experience, says that he finds it best to never probe or fuss with a wound, that his success in treating injuries has been remarkable, and that this view is confirmed by other experienced surgeons.

Concerning electric shock: When men suffer little or no shock the first-aid man is taught to give aromatic spirits of ammonia. In the long-ago, before first aid was introduced, whisky was a popular remedy and a very poor one, as it has a tendency to increase shock. The percentage of deaths has been cut down very greatly in the past five years, so that it is no doubt of great economic value to the companies to have first aid in their mines, mills, etc., and certainly it is of great benefit and help to the surgeon in charge. When we can get hold of a man who has been injured and later dressed by first-aid man we feel pretty sure that the fellow is going to return to his work soon. However, no matter how beautifully a man is dressed by his fellow workman it is the surgeon's duty to open the dressing and inspect the wound, so that if anything has been done wrong he may be able to correct it before any damage has been done.

R. B. Moss. I would like to ask Dr. Rountree whether or not they find it advisable to wash a wound that has been caused by a man going back on a shot. In the Kentucky coal fields we have quite a bit of solid shooting coal, and such accidents are common. Getting pitted with coal and dirt leaves a horrible-looking face on a man. I would like to hear this matter discussed, whether it would be advisable to wash such wounds or not.

J. J. RUTLEDGE. I was given the circumstances of such an accident by a superintendent of a big coal company in the State of Washington. The general manager, the superintendent, and some of the foremen went into the mine and walked up on a shot. The first man in the party was killed, the others injured. The man most severely injured kindly allowed us to examine him, and there were 107 punctures of the skin, and in some of them I could see particles through the skin as large as the end of my thumb. He said he wasn't washed at all. The man had absolutely perfect use of his limbs, his functions seemed to be all right, and his condition splendid. It was a remarkable accident and an exception.

Dr. W. S. ROUNTREE. We have quite a number of injuries in our mining district of this sort. Long ago men whose faces were blackened by explosions went through life that way. They were simply treated in a way, and the coal dust remained in the wounds. In the last few years we have never sent a man away with a black face after such an accident. With a salt solution and a stiff brush every particle of coal dust may be removed. Sometimes the coal dust is buried so deep it can not be reached with the stiff brush, but with a curette all particles may be removed. The only way we have been successful with these patients was to immediately anesthetize, scrub with brush or curette, wash with salt solution, and dress with sterile bicarbonate or some other dressing. Sometimes after a patient goes 24 hours or so the face swells, and many particles are shoved up, and are thus much easier to remove, even at that time; but by letting them go so long more infection is caused. However, such infection is not so dangerous as infection received on the surface. The use of a stiff brush destroys some tissue, but causes no scars, and practically all the dirt can be reached with the brush.

Dr. J. W. PARSHALL. I perfectly agree with Dr. Rountree; but it appears to me that we are getting into a medical discussion of surgeons instead of first aid, and I think we had better stick to the text.

With regard to the economic value to the company and to the men of first-aid training in hospitals, in my experience it has been very economical to the company where the company pays the bills and also has the services of the man before it would have had them if these wounds had become infected by reason of not receiving first-aid treatment. The greatest trouble is to get our men to report to the first-aid man, and I have had such cases as a man accidentally striking himself with a pick and neglecting the wound so that a stay of four months or more in the hospital was necessary, where a few days would have sufficed if he had received first-aid treatment. We urge our superintendents to have first aid administered, and every time one of these men becomes infected we report it, and the head offices get after the superintendents to warn the men and try to give them instructions so when a wound occurs, no matter how slight, they will have it treated by a first-aid man and then reported to the surgeon. Neglect causes most of the serious injuries and creates loss of time and men.

Dr. R. F. MCHENRY. I do not know that I can add much to what has been said regarding the economic value of hospitals, as we are too young in the business. In about seven years' experience in an isolated mining town in western Pennsylvania, starting with crude hospital equipment, we have had our troubles.

As far as economic value to itself is concerned the company is very well satisfied with it. We started with an assessment of 10 cents per month for injuries only, and we raised it to 20 cents and finally to 40 cents; this assessment covered not only accidents but all sickness. The company built a hospital at an expense of about $20,000 and we furnished it and are running it without State aid. We care for 15 patients per month. Also, we look after sanitary conditions. We make it a point to prevent all the sickness possible. The company has a man going over the town with a garbage wagon collecting all garbage, disinfecting cesspools, etc., and we have had only two cases of typhoid fever in seven years, with a population of approximately 3,000 people, and we have had comparatively few cases of sickness of any kind.

We instruct our first-aid men and try to make missionaries out of them. We tell them that no matter how trifling an injury is the injured man should be sent to the physician, and I want to say that since the work was organized it has been a rare thing for a man to come into our offices who hasn't had first-aid treatment or has failed to report himself promptly. The days of infection are pretty nearly over. The men are well taken care of in the mines, their wounds are treated properly, and recoveries are much more satisfactory and a great deal more rapid. We are mining about 3,000 tons of coal a day, and at the most we have had only one death from accident this year.

Dr. G. H. HALBERSTADT. Dr. Rountree says they never get infection from mine wounds. In the anthracite region the contrary is the case. We don't have the wounds washed, but cover them with sterile gauze. We have splendid facilities for moving patients to hospitals, and there the surgeons do as they see fit. The cases that are not disturbed immediately by surgeons are probably severe burn cases in which men are burned from the waist up; if the burns are dressed with picric-acid gauze and the patient is suffering from shock the surgeons let such cases go for 24 hours without further dressing. We have found that it is a punctured finger or a slight puncture of the foot that takes away most of the relief fund. I had a sign put up, printed in several languages, that men must report the slightest wound before leaving the collieries. I have found on Monday morning men would come back to work with injuries they had received Saturday night and didn't report. If I can stop infected fingers and feet we can increase our indemnity still further, but most of the foreign miners go home, poultice a wound for a week, and after it is infected, report to the doctor, and often a lost limb is the consequence. The requirement ought to be that all men who want indemnity must report accidents immediately and must have wounds treated properly if they want to get any of the beneficial fund.

Almost all wounds of the eyes, corneal wounds, become ulcers, followed by loss of vision. All such cases we are trying to drive to the doctors and hospitals and so reduce the time of disability. This last year I have not talked to any of our men on first aid. I have been hammering into them conservation of human life. I have submitted a new form of accident report which I wish to submit here.

As a whole, our work is coming out very well. Eighty per cent of our men are injured through their own carelessness. We don't allow men to clean wounds, because they can not do it properly, and the time is wasted. We tell them simply to cover wounds up, putting on sterile dressings or tourniquets.

J. W. PAUL. Will Mr. Moss tell the committee how his company has spent $25,000 in sanitation at their mines during the last year?

R. B. MOSS. When my company purchased the 15 mines in Bell County, Ky., the sanitary conditions were very poor. There were 150 cases of typhoid

fever; several hundred cases of bowel complaint, and fully 50 per cent of the entire population of the camps was affected with hookworm. The typhoid was quickly traced to the open springs and wells. These were closed, and 25 new wells were bored, none of them less than 100 feet deep. Over 400 new closets were built, and built in such shape that it was practically impossible for a fly to get to the excrement. The rubbish, filth, etc., were hauled away and burned, and the houses were cleaned, with the astonishing result that in the summer of 1912 not a single case of typhoid appeared among the Continental Coal Corporation's 6,000 employees, and very few cases of bowel complaint were reported to the company's physicians.

The hookworm campaign was started under the direction of the Rockefeller Institute by the State board of health of Kentucky, and at this time the work is being carried on with great success, the people responding generally. The treatment is very simple, and does not keep the men from working.

All of the houses, fences, and closets were whitewashed, and all of the above-mentioned things were done, with the result that in the fiscal year ended June, 1912, my company loaded about 22 per cent more coal with the same number of men than did the old companies under separate management.

Dr. J. W. PARSHALL. We have a number of hospitals installed, and my assistants attend to the outside part of this work, and I am not very well versed in that work. I think we ought to try to recommend some action as to how to get men to report when they are hurt.

The company has spent quite a great deal of money in fitting up emergency hospitals, without their being of any use to us, for, as a rule, these patients are generally immediately sent to the outside hospital. A room with proper first-aid supplies, or possibly a table for a surgeon, if present, would be sufficient.

Other companies have reported that they could pay a benefit by assessing the men. Our company pays all expenses from the time the men are injured, pays all bills, transportation, etc., and pays 35 per cent for single men and 45 per cent for married men, with 2 per cent added for each child under age. In regard to this I think it has gone beyond what is necessary in putting in mine hospitals, because we haven't used them. Our men are all transported to the general hospital as soon as taken from the mines. In the hospitals which I represent at Uniontown, we treat probably half the patients of the company, which has 68 mines.

Dr. W. S. ROUNTREE. We are trying to work out a plan of hospitals by having an emergency hospital at the mines, and a base or central hospital somewhere in the district. When a man is injured, a first-aid man takes charge of him and treats him, and he is then sent to this emergency hospital; if suffering from shock he is treated there for such condition, and if he appears "hospital worthy" he is sent on to the central hospital. I believe an underground hospital impracticable. The men who are injured are never taken to the so-called hospitals underground. They are attended by first-aid men and removed to the surface. Consequently it doesn't seem the thing to have a hospital underground. There is but one in our section, and nothing is being done in this hospital. I believe a system of emergency hospitals with a central hospital will be the plan of the future.

R. B. Moss. Our company recently, at the request of its employees, equipped a hospital in Pineville, Ky., with 20 beds. The building and equipment is furnished by the company, the equipment being entirely modern in every respect. We have a medical staff and advisory board of several surgeons and physicians, and four trained nurses in constant attendance.

The hospital is supported by a voluntary cut upon every employee of the company, from the general manager down, of 25 cents per month. The hospital has been a success from the start, and it is my opinion that it will result in a decrease of the number of damage suits against the company. It is an emergency hospital only. Patients are accepted, however, from other mining companies upon payment of $10 per week. The cut of 25 cents per month includes all charges so far as our employees are concerned, and it is thought that in time this cut can be reduced.

A recent case in one of our mines was that of a miner's daughter, who was allowed to stay at home and be doctored for stomach trouble until she was almost dead with appendicitis. She was taken to the hospital, operated upon successfully, and left the hospital after staying there five weeks. The only expense to her parents was the 25 cents per month paid.

Dr. R. F. McHENRY. So far as underground hospital equipment for surgical operations is concerned I don't think it is the right plan. Physicians ought to refrain from asking companies to waste money in work of no benefit. I think when you are equipping underground for surgical purposes in the ordinary mine of western Pennsylvania you are throwing money away. I know of no place in our district that requires underground surgical equipment at all. Money so expended could have been used in a different way, one which would be of more benefit to the men.

In seven years' experience we have had only one man bring damage suit against the company, and he asked for only $150, which was given to him.

Dr. G. H. HALBERSTADT. It would appear that such stations or hospitals as are required by Pennsylvania mine laws are simply first-aid stations. It has never been intended that the doctor should go underground and operate.

I merely reverse conditions and take the dressing station to the patient. He is then taken to the surface and shipped to the hospital. We have dressing stations installed inside and outside of the mine. Dressings would keep sterile, but it would be impossible to keep instruments underground. A man when injured wants immediate practical assistance, and wants to have confidence in the man doing the work, and wants to see daylight. When a man's wounds are dressed at the surface he is transferred from the room to the ambulance and rushed to the hospital.

My advice is this: When a man is dressed put him in a mine wagon or a spring litter such as we have, and rush him to the slope or shaft and hustle him to the surface. A man wants to see daylight when hurt. First-aid equipment is all underground; it is taken to the man when hurt instead of the man being taken to the intermediate station.

Dr. M. J. SHIELDS. It is the opinion of this committee that underground hospitals are unnecessary and that there should be deposited in the mine a sufficient number of properly equipped first-aid emergency cases of dressings.

Dr. A. F. KNOEFEL. First-aid rooms are often used, when a man is killed, as a place for keeping the body until the undertaker arrives and where the body can be prepared for burial without trouble to the family.

Underground hospitals are unnecessary. There should be deposited at different points in the mines a sufficient number of properly equipped first-aid emergency cases, so that they can be quickly taken to any part of the mine.

In the Vandalia Coal Co.'s mines in Indiana the men carry first-aid packages, consisting of sealed metallic boxes containing a compress, triangular bandage, and safety pins. First-aid dressings should be brought to injured men, rather than to move the men to the dressing. If the man had a simple fracture, it might become a compound fracture, or soft tissues might be otherwise injured

by moving him to the first-aid station. A large first-aid cabinet should be placed at each parting.

Dr. F. L. McKee. I am going into the mines nearly every day. If first-aid stations are installed at the surface of a mine, they would have to be protected in some way in case of a serious accident, as the relatives and friends on the outside would likely tear them open to get to injured persons.

C. O. Roberts. I think a dressing room is the proper thing. In some cases it would be advisable to have a dressing room, where an injured man could be taken and kept warm until he recovered from shock or other injury.

At the mines in the anthracite region, where I was captain of a first-aid team, we would take the first-aid cabinet to the man, dress his wounds, and then take him to the dressing room and keep him warm until he could be taken to the surface.

Dr. J. W. Parshall. Regarding hospitals: The places referred to by me were fully equipped as hospitals, with operating tables, etc., and I consider it unnecessary expense. As the plants were widely distributed, there was more reason for such arrangement. First-aid stations are maintained throughout the mine, and about one first-aid man in ten is distributed around the mine, so that prompt treatment can be taken to the injured man. We have instituted a system of telephoning in the larger mines, but I think, as these other gentlemen do, that it is absolutely necessary and important to have a receiving room in case of delay or some reason why a man should be treated before being taken to the hospital. I merely criticize the too elaborate hospitals.

Austin King. In all our plants the company has taken up conditions of hygiene and sanitation, and it has spent a half million dollars making open drainage and other improvements, fixing up property, and also for policemen, that is, men who look after contagious diseases, sanitary conditions, etc. These things are all done at the expense of the company.

It is our practice to distribute first-aid supplies to the points most convenient to those where men are employed. For the safe storage of these supplies we use tubes made of galvanized sheet steel of proper gage, 8 feet long and 8 inches diameter, to contain stretcher, blankets, etc., and one of similar diameter $2\frac{1}{2}$ feet long which contains first-aid supplies. These supplies are to be kept sealed so they are always dry and fit for use at any moment. Some superintendents go further and have a painted sign with the Red Cross on it, so the men know where a first-aid station is. Usually a telephone is close to each station, and when supplies are taken the first-aid man telephones to the surface for a doctor to be summoned.

Speaking of treatment: First-aid supplies are carried to the place of an accident, or to a place of safety, and treatment is given for shock. Safety lamps are placed under blankets and aromatic spirits of ammonia are given and other measures taken to keep the patient warm before bringing him to the surface.

Atherton Bowen. One point partly brought out is the sealing of first-aid cases; this is done in the anthracite regions. Material must be kept dry or it becomes absolutely unfit to use in case of accident.

H. M. Wilson. Dr. Knoefel wasn't sure whether to speak of stations, hospitals, first-aid stations, or what. It has developed here that the law of Pennsylvania requires using underground hospitals, and it appears that the companies are going to considerable expense to establish hospitals. I think one of the things this conference might well consider is the question of terminology, because our deliberations may have an important effect upon legislation. This conference should fix terminology as to what is a hospital—whether under-

ground places for rehandling should be called first-aid stations, hospitals, or what.

Dr. F. L. McKee. I think we should retain our inside stations and prepare for others outside.

G. W. Barager. The Pennsylvania laws require the use of carron oil. Patients dressed with this oil excited unfavorable comment on the part of the hospital officials.

Dr. G. H. Halberstadt. We keep carron oil, but have the corks driven in so tight they can not be removed.

J. W. Paul. I agree with Mr. Wilson's remarks, and I think the next thing in order would be to consider a motion indorsing first-aid stations or dressing rooms in the mines. A great many men suffer, especially during the winter months, when brought out in a crippled condition, whereas were a room provided, suffering would be very much relieved.

PROCEEDINGS OF COMMITTEE 5 RELATIVE TO FIRST-AID TRAINING.

J. J. Rutledge, acting as secretary by appointment of the chairman of the conference, called the meeting to order September 24 at 2 p. m. Dr. A. F. Knoefel was elected chairman.

Dr. M. J. Shields. It has not been the policy of the Red Cross to take the doctor's work away from him. The duty of a first-aid man is to form the bridge that takes the man safely over the danger of an infected wound, over the danger of unnecessary or exhausting hemorrhage, over the danger of possible crooked leg or amputation, over the danger of dying unnecessarily after a noninstantly vital electric shock, and on the other hand to place in the hands of the general hospital or the physician a man who has a cleaner wound, a straighter leg, perhaps, a man who is suffering from less shock, suffering less pain, and a man who will get well from 10 to 60 days sooner than he would if he had not had this first-aid treatment.

Dr. F. L. McKee. I think that Dr. Shields has covered almost everything that can be said on this subject. The duties of a first-aid miner will depend on his general aptitude for the work, whether he has the nerve to do the work, and whether he will obey explicitly the instructions he has received and will follow them to the letter.

Dr. G. H. Halberstadt. The first-aid miner should be educated in the work. He should get to his injured comrade as promptly as possible in order to put on proper dressings, then get the patient into the ambulance and off to the hospital. One thing I especially impress upon my men as much as anything else is to make no prognosis. If a man has a finger injured, the first-aid man should not say, "Do not let the doctor take that finger off." Their business is to cover the wound, using splints or sling or any other apparatus necessary, and to get the man into the hands of the doctor as promptly as possible.

Dr. R. F. McHenry. The question of who shall instruct the first-aid men is a rather delicate one for a physician in practice. Any man who has sufficient preliminary education to understand the subject matter of first-aid treatment and is an experienced instructor is capable of instructing first-aid men. We have both physicians and laymen instructing first-aid men, but only laymen of experience are capable of giving such instruction. The amount of first-aid training or instruction that is necessary can not be limited by hours or days or time. In the method of obtaining first-aid training and instruction what every individual needs is to get the work and get it in a way that he can apply it. To

accomplish this it is necessary in the first place to teach him the subject matter, and in the second place to do the actual work on a well subject, until the first-aid student becomes skilled in the actual work.

The CHAIRMAN. A superintendent was outlining last night the plan adopted by his company, whereby the man, after taking a certain amount of first-aid and rescue work, was issued a certificate of proficiency. If he went from Indiana to Pennsylvania he could present that certificate and receive a certain amount of recognition. The question is one that is proper and just. Here is Dr. Young, who requires his men to meet once a week, two hours a night, for three months; Dr. Rountree, who has his men meet every other night for two hours during six or nine months. There ought to be some standard to go by, and I would like to hear a thorough discussion of this question by all of you as to your personal opinion of what you believe should be the standard.

Dr. G. H. HALBERSTADT. I do not know anything about the Red Cross system of training. In the first place, we ask for volunteers. When the whole thing was started I showed the men first the simple bandages, avoiding technical terms, giving them simple injuries—for instance, a broken leg, by simply demonstrating from binding a broken shaft. From treating broken legs I went on to treating hemorrhages. We have charts of the human body which we study, and I have taken the men on and on, at the same time increasing the difficulty of the bandages. Now, you can not take the same set of men and keep them interested in working all the time, so I go around and talk to them on anything but the application of bandages. You have to give them some other entertainment and get on some other subjects. I have been talking to them largely this year on the conservation of human life. Each year we have an annual contest which is practically on the application of bandages.

Dr. W. S. ROUNTREE. I have been teaching first aid for a number of years, and our methods have been similar to those of Dr. Halberstadt. In organizing our corps we first ask for volunteers or select so many men from the works or the mines, and after fixing meeting nights and getting classes arranged I give about 20 or 30 minutes' talk on anatomy and physiology, omitting all technical terms, simply using as plain words as I can to express myself.

After my lecture I demonstrate from the chart and then I take up simple injuries; for instance, an injury of the hand, and teach the men how to dress it. We go from that to more severe wounds. We will take up a simple fracture of the forearm and spend one night teaching the applications of bandages and adjusting splints, then compound fractures, and so on throughout the whole calendar of fractures until we have accomplished the treatment of that class of injuries. I teach the men never to reduce a dislocation.

Occasionally we have a night devoted to a quiz. I mark the men according to the answers and keep a record of the marks. At the end of the term we take well-informed men and put them into a separate class and later give them a corps to instruct, and in this way we have been able to keep up interest. I will also say that other things must be injected in this work. We have little smokers, banquets, musicals, and some nights are given over to talks on how to keep up physical efficiency and to prolong earning capacity. I also touch upon the social evil, as miners are prone to fall a prey to such diseases, and by these methods I have been able to keep the men interested in this great work.

Dr. F. L. MCKEE. I have been introducing Morrow's book, L. H. Doty's book on first aid, and the Red Cross book, and recommend each of them. So far as organization goes we watch a man for his aptitude, and get somebody else if a man does not show a general aptitude for the work.

T. B. DILTS. We have invariably adopted the industrial edition of the American Red Cross and we have asked the doctors who have charge of these differ-

ent classes not to spend too much time at the beginning on lectures, but just as quickly as possible after the second or third lesson to start on practical work—such as the use of different bandages, splints, etc.—and wherever they have done so the classes have been successful; where they have not, the classes have generally broken up after the seventh or eighth meeting and it was hard to interest the men again.

Dr. R. F. McHENRY. My experience has been small, but as a matter of fact I think we must have standard instructors for our men. I read the book to the men and at the same time I have the charts. I then ask the men to stand up and answer questions. This method makes them confident and relieves embarrassment. At the end of the lesson a short time is given to anatomy and chemistry. We spend about three months on that first practice before the final examination. The Red Cross send their representatives to examine our men and we have had only one man fall below 75 and only four men below 90. We need a standard book that is generally before the men employed in and around the mines. I personally think that the Red Cross book is more generally before these men to-day than any other book we have. It is not a finished book; I do not presume it was intended to be. It should be revised; at least, there are many things necessary in first-aid instruction that are not emphasized in this book.

JESSE HENSON. We follow the American Red Cross textbook, industrial edition, in the Bureau of Mines. We go into a mining camp about a week at a time. We use the most simple methods possible in training, and in tying bandages, etc. In some places where we have organized first-aid classes the miners furnished their material, each man paying 10 cents per month in some places and in others 25 cents per month; in still other places the men held social functions. But to continue the work we always had to look to the physician.

The CHAIRMAN. At the beginning of the first-aid movement we had two classes a week for two hours, from 7 to 9 p. m., on Tuesday and Saturday. As the disinterested dropped out we combined the meetings to once a week and this class took nine months to finish. The book we adopted and the one we still use is the American Red Cross textbook, industrial edition.

We use both roller and triangular bandages, with preference for the triangular. We first started on anatomy and hygiene, and followed these subjects with physiology.

The first-aid men to be competent must know that cleanliness is far beyond godliness in first-aid work.

Dr. M. J. SHIELDS. The Red Cross Society, one of the greatest societies the world has ever known, is not confined to the United States. We desire to receive any suggestions. We want to cooperate with any movement that has for its object the benefit of humanity, the same as we are cooperating with the Bureau of Mines, the Y. M. C. A., the Y. W. C. A., the Boy Scouts, and the Boys' Brigade. We have, through the assistance of the Surgeon General, promulgated what will be known as the medallion course; that is, the men will bear standards and will be somewhat similar to the National Guard. They have to be examined physically, etc.

Maj. Charles Lynch was the author of the Red Cross industrial book, which was based in part on the first-aid book of the St. John's Ambulance and a little book I had published myself. The Red Cross general edition, whose author is also Maj. Charles Lynch, is used by the Y. M. C. A., the Boy Scouts, and the Y. W. C. A. The Red Cross publishes the industrial edition in four foreign languages. We would like to get suggestions in regard to revising the book.

We are arranging a pamphlet of lectures for railroad men. Sometimes the railroad men can not attend because they are at the other end of the line. By the use of these pamphlets they can study what the class is being taught while they are absent. I might say that about 25,000 copies of the industrial edition have been sold throughout the United States.

Dr. G. H. HALBERSTADT. I think a good method of organizing a first-aid corps is to take five boys out of a colliery and show them the work for three hours, one hour at a time, for three weeks. I use X-ray pictures and motion slides as much as possible, because this interests the men. If you want to keep your corps together to do good work, to do work that you will not be ashamed of, to do work that will stand out, keep them on the roller bandage; give them something to fight for.

The CHAIRMAN. When my company began the organization of the first-aid association, the different locals refused to enter into the movement, although the company agreed to pay their expenses; but later an independent first-aid company was organized and the members of this association included laborers, loaders, and anyone who desired to take up the work. The entrance fee of this organization was 50 cents, each member being presented with a Red Cross first-aid textbook and a metallic first-aid package. The dues were 10 cents per month, these to be used for incidental expenses.

Dr. D. H. LAKE. I would like to say how I made a failure. I got interested in first aid and bought charts and first-aid books and had plenty of bandages. Called a meeting and about 50 men were present; this was the first meeting; gave a lecture probably too long, but I thought I was making it interesting, a talk of two hours. Got out all the bandages, distributed them, went around and showed them how to apply them. Arranged for a meeting the next week; there were about 20 men present at the next meeting. We went over the bandages again; all were very much interested. The next meeting about five men appeared. I tried to find out why they did not appear. Some men seemed to belong to societies, etc., and had to go to them the night we were to meet. We tried to have a night that would not interfere. The next meeting I was the only man there. I am here to find how you keep the men interested in the work. I will start another first-aid corps if I can find that out.

Dr. M. J. SHIELDS. It has been my experience in a number of years in this work that where you find the officials passive you find the men passive; and where you find the officials active and interested in this work you find the men interested, and it will be very easy to get them. In the last two years in our Red Cross work we have covered about 75,000 miles of railroads, including the New York Central, Rock Island, Illinois Central, Harriman lines, Santa Fe, Northern Pacific, Milwaukee, Baltimore & Ohio, and Erie, and when we get to a division where the superintendent of that division is heartily interested we find the men get interested. If the superintendent thinks that it is something extra to the regular work, we do not get any results.

T. B. DILTS. In one place where we tried to interest men but had not been successful, I went over and got six of the men together and told them that was all we wanted. After about an hour's demonstration they got very much interested and arranged to meet one day a week to practice under the direction of the superintendent. After about three months they were each asked to captain a team. We have 35 men there to-day organized and greatly interested in first aid. At another place we had the same thing. We started with five men and after about a year's training of these men each one was then put in as captain of a squad.

The CHAIRMAN. What is the opinion of the men present as to the ratio of trained men per 100 miners?

Dr. M. J. SHIELDS. Of the coal-mining companies whose work I have helped start, the Hillside Coal & Iron Co., the Temple Iron Co., and the Pennsylvania Coal Co. tried to get at least 1 man in 20. The Tennessee Coal, Iron & Railroad Co., 1 in 25, the H. C. Frick Coke Co., the same, the Oliver Iron Mining Co., 1 in 30. We contend that it is a good theory to ask for more men than you want, so that if you do not get the allotted number you may get a sufficient number. When with the H. C. Frick Co., we planned to get 1 man out of 50. We thought this would be all we could get together. We held some of the meetings in the daytime. We got together 750 men out of 15,000 employees, and our last meetings were larger than the first. The people were invited to come whether they were asked by the foreman or not. All these men were asked by the foreman to be present.

The chairman then asked each man what was the proportion of first-aid men to the number of employees in the companies that they represented. Dr. Rountree said 1 man to 10, Dr. Halberstadt, 1 man to 70; Dr. Young, 1 man to 80; C. G. Brehm, 2 men to 25; Dr. Knoefel, 1 man to 50; Dr. McKee, 1 man to 25; E. E. Judd, 1 man to 20.

CLOSING SESSION OF CONFERENCE.[a]

The closing session of the conference was called to order at 10 a. m., September 25, 1912, by the chairman.

The CHAIRMAN. The several committees have met and completed their work. The action of each committee has been referred to the resolutions committee, the membership of which is as follows: Dr. F. L. McKee, chairman; Messrs. B. J. Matteson and A. M. Ogle, Dr. W. S. Rountree, and Mr. J. W. Paul, secretary. Will Dr. McKee report for the resolutions committee?

Dr. F. L. MCKEE. The committee on resolutions has met and has reviewed the reports of all committees and transmits them to this general session with the recommendation that they be passed upon separately.

On motion of J. P. Reese it was agreed that the report of the resolutions committee be adopted, with the understanding that in the reading of committee reports if no objection was raised to any section the chair was to declare it adopted to avoid debate on each question.

The chairman then directed the general secretary to proceed with the reading of the resolutions recommended for adoption.

Only these resolutions are reported and entered in the record at this point which were discussed or amended. The others are recorded as originally drafted. (See pp. 12–17.)

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 1, RESCUE APPARATUS AND RESCUE TRAINING.

J. P. Reese asked a definition of the word "station" in resolution 3, which read as follows:

"The committee recommends that all mine rescue stations should be equipped with at least five breathing apparatus and the necessary

[a] In connection with the report of this session frequent reference is made to the resolutions presented on pp. 12–17

accessories for the continuous operation of the apparatus for 24 hours, and at remote stations 48 hours."

J. W. PAUL. A rescue station is one equipped with certain paraphernalia and apparatus suitable for mine-rescue work and mine-recovery work, and the committee recommends what this equipment should be for a regular rescue station.

J. P. REESE. The establishment of rescue stations is voluntary on the part of any company, and we do not want to discourage the establishment of stations with even two rescue apparatus. If a company has several mines within a radius of a few miles, we do not want to discourage the establishment of a rescue station at each mine, even if it is equipped with only two helmets, providing the company has a car or a central station or additional small stations from which to draw in case of accident. The company does not wish to go to the great expense of having a fully equipped rescue station at each of its mines, and I think the specification of five helmets should not apply to substations.

G. S. RICE. We should not have so few breathing apparatus that there will be danger of losing men. If we have only two sets of apparatus and some emergency occurs, the men who are near go in, and there would be hardly any hope of their being rescued if themselves endangered. There would be the danger of inducing these men to do something they should not undertake, and personally I think we ought to pass a resolution calling for not less than five helmets to a station or none at all.

J. C. ROBERTS. I believe Mr. Reese's suggestion if carried out would be a positive menace. Every life lost when helmets are used has been because there were only two men equipped with them, and there have been a number of such instances, although I know of one case where two men so equipped went in and saved a man's life. I think it is better to have no helmets at all than only two or three, and that the whole force should be combined at one station.

G. H. HAWES. Our company has seven stations with three helmets at each, and we feel that we can respond with three helmets at any time and can procure another three helmets within two hours. I believe with Mr. Reese that a limitation of five at each station is unnecessary, as we could have three helmets on the scene at the time of the accident and three more within two hours, and possibly more.

J. W. PAUL. I have outlined an amendment that might possibly cover the question raised by Mr. Reese: "Such equipment should be so located as to admit of its assembly in one hour at a central point for emergency use."

J. P. REESE. I would accept that as covering the point. I wish to point out in defense of our position that the rescue workers don't have to bother with cost sheets, and some of us managers do; and there is something besides rescuing life that we do with these breathing apparatus. For instance, we expect to save the price of our equipment by putting out coal fires with them and thus prevent the sealing of a part of the mine, as has been customary for years. Now when our men find a coal fire and it is too far for them to take the chemical extinguisher without breathing apparatus, if we keep two or three helmets at each mine we think the men can don the helmets, take in the chemical tank, and put out the fire. We do not want to go against the regulations of this conference in order to provide for that contingency, which in dollars and cents would amount to a great deal in the course of a year, but the amendment by Mr. Paul would permit us to be in harmony with this conference and yet keep only two helmets at each mine. I think we have nine helmets for our three mines, and we would not want to have five at each mine

when we can get all nine assembled in half an hour if the roads permit of automobile travel, and in a hour if a team of mules must be used.

J. C. ROBERTS. Mr. Reese was speaking of mine fires. I happened to be present at one mine where if the company had had more than two helmets it could have put the fire out. The men went down to the fire with two helmets, the oxygen in the cylinders gave out, they had to go to the surface for more oxygen, so that before they got back the fire was beyond their control and the mine had to be flooded. That is one of the bad features about two helmets. I did not arrive at the mine until after the lower workings had been flooded. I know of a number of cases where after a fire occurred the apparatus was carried to the fire in an automobile and in an hour's time the fire was out, and the apparatus more than repaid the company for the money expended for it.

AUSTIN KING. In the Connellsville, Pa., field we have large companies that have 30 to 40 collieries, and a resolution of this kind would probably embarrass them. We don't want to lose sight of the fact that the resolutions made here will be taken as a guide to work by, and any company that does not follow them would be open to censure. The practice of two of the large companies in our field is to have two apparatus at each mine, and the president and the vice president of the company told me that the purpose of those apparatus is to guarantee a sense of security to miners just as the safety lamp does at the present time. As Mr. Reese said, incipient fires can be put out if such apparatus is available, but nearly all our collieries are so situated that they are within 30 minutes' ride by wagon, and in the case of a recent fire the apparatus was brought 13 miles in 20 minutes; we had eight apparatus on the ground to reenforce two that were there from the first. So I think Mr. Paul's amendment is a good one.

I therefore move the adoption of the amendment of Mr. Paul. Anyone familiar with the regulations of Great Britain, Belgium, and, I believe, France, knows that they require but two helmets, not for the purpose of having a station, but just for the purposes that Mr. Reese mentioned.

The amendment was adopted.

The secretary read resolution 4, "The keeping of birds and mice at rescue stations for the purpose of detecting noxious gases is desirable."

AUSTIN KING. I would amend that resolution to read "carbon-monoxide gas" instead of "noxious gases," as that is the only gas for which birds are used to detect.

The motion to amend was put and adopted.

G. H. HAWES. Wouldn't carbon dioxide also be a dangerous gas that could be detected by the use of birds?

The CHAIRMAN. It is the opinion of the chemists of the bureau that it is impractical to test for carbon-dioxide gas by the use of birds and mice.

J. P. REESE. What purpose do birds and mice serve in ordinary rescue work?

The CHAIRMAN. The purpose of the use of birds and mice in rescue work is to detect the presence of carbon-monoxide gas in small percentages. They are more easily affected than men, and the fact that they topple over much more quickly than a man in an atmosphere that would be deadly to man if breathed for a long period of time makes them most valuable as a guide to the presence of this dangerous gas. As soon as a bird topples over the rescue men know that it is dangerous to proceed beyond this point without the use of breathing apparatus. By the use of birds in this way we believe we have prevented many

serious accidents from men rushing into deadly percentages of carbon monoxide unknown to themselves.

J. J. RUTLEDGE. You will find a great many men past middle age who seriously object to wearing the breathing apparatus. They do not object, however, to taking a bird with them into a questionable atmosphere, and since these men are very valuable assistants in the way of erecting brattices and restoring ventilation following a disaster, you can understand that the bird is in such instances a valuable safeguard to their lives. I believe every one who has made use of the birds at recent disasters will agree with me that they have taken a very important place in the saving of the lives of the rescuers.

G. S. RICE. The bird is of great value in closing off fire areas. At such times you all know from experience it is always found necessary for men to do work in bad air. By the use of a bird a man with a breathing apparatus can go in to the point where the work must be done, test the atmosphere with the bird, and determine its safety or danger. Besides, the bird can be retained by the men so doing the work, and any change of the atmosphere may be quickly noted by the effects on the bird.

The secretary announced that question No. 2 and question No. 4 of Section F of the preliminary program had been referred to the general conference.

Dr. A. F. KNOEFEL. In regard to the program subjects 2 and 4, "Physiological effect of pressure on the head due to wearing helmet; physiological effect of pressure of nose clip," and the "Diet of men doing training work," we might talk all morning and arrive at no conclusion. In a matter of this kind only definite information based upon careful experiment is of any value. Therefore, I move you that the Chair appoint a committee of three doctors and three rescue men to report at the next meeting of this conference upon the physiological effect of the pressure of the helmet and the proper diet for mine rescue men.

The motion was seconded and carried unanimously.

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 2, RESCUE OPERATIONS.

The CHAIRMAN. Before proceeding with the reading of the startling array of details contained in the resolutions of this committee, I call your attention to the fact that the members of this committee are men of wide experience in mining operations, and they have undoubtedly adopted only such resolutions as their practical experience would seem to commend.

G. S. RICE. I believe it was Napoleon who said, "An army travels on its stomach," and since resolution 9,[a] as offered by the committee, is so complete I would suggest that it be made to cover the provision of a satisfactory commissary at mines where disasters have occurred. I myself have often seen ill effects of the failure to provide proper food for those who are engaged in rescue work.

I have in mind a recent disaster where no provision was made for food and shelter for the men, and besides the overwhelming conditions they confronted in the mine they were more seriously handicapped by this item of subsistence. After some time the Red Cross appeared on the scene and furnished relief in this matter, and later it was strengthened by some local organizations. I believe that this matter is so important that it should receive special consideration, and one of the things which occurs to my mind is the satisfactory

[a] See p. 13.

transportation of foodstuffs from the outside to those who are working in the mine.

ATHERTON BOWEN. I believe that the committee's action on resolution 9 is very good as far as it goes, but I have read Mr. Garforth's "Recovery of Mines after Fires and Explosions," and many of the things of value contained therein are omitted in this report of the committee. I should think a report of this kind should receive more deliberation and that Garforth as well as other literature on the matter should be consulted before such a report is made.

AUSTIN KING. I have read Mr. Garforth's work and from my experience many of his rules do not apply to American conditions. I call especial attention to article 2 of the ninth resolution, which reads as follows: "There should be a man in charge of outside arrangements who should see that the fan is put in readiness for operation when required." I suggest that instead of the words "the fan is" we change to "ventilation appliances are." In regard to Mr. Rice's suggestion, I suggest that section 6, which is as follows: "Proper provision to be made to take care of parties engaged in rescue work," be made to read, "Proper food and shelter should be provided for parties engaged in rescue work." Under "Inside Organization" I would reverse the order of the last two squads, making the material squad follow immediately after the temporary-ventilation squad, which it seems to me is the practical order. As reported by the committee this portion of the resolution reads, "The squads are to advance in the following order: (*a*) Helmet or advance squad, (*b*) stretcher squads, (*c*) temporary ventilation squad, (*d*) more permanent ventilation squad, (*e*) material squad."

ATHERTON BOWEN. I did not mean to say that Mr. Garforth's book was to be accepted as a whole, but it does seem to me that we are laying down a set of rules here with too little deliberation—only two days' time.

The CHAIRMAN. I assume that practically all of the members of the committee are familiar with Mr. Garforth's book and that after a sifting process have recommended only those things which they think are of importance to our conditions.

J. P. REESE. The committee did not consider that they were writing the last word on this subject; they simply attempted to get a starting point. Everything we do here is embryonic. We realize that if we go into details we could create an encyclopedia on this subject and then in the event of a disaster occurring we wouldn't know where to find the book of rules. The only idea of these few simple rules is to create an interest among mining officials and mine workers in this work. If these resolutions are read by a man he will certainly remember that in the event of a disaster the first thing to do is to organize his top work and protect his openings and be ready for the prosecution of the inside recovery work as soon as volunteers or his neighbors arrive.

I sympathize with Mr. Rice in the position he has taken in regard to subsistence. The best we have usually around a mining camp is a fourth-rate boarding house, but to one who has read these rules it would certainly occur to his mind that he would advise this boarding house to lay in a list of supplies to take care of the emergency. These rules are intended to be only a starting point and it is undoubtedly true that within the next year investigation will serve to prove that we are wrong in many of the things that we have already suggested. It seems to me that there is a danger in suggesting too much and that if we publish only a few simple rules that are proven by practice this work will do its best service to the mining public. I now move you that the three corrections suggested by Mr. King be incorporated in the report on resolution 9.

The motion was seconded and carried unanimously.

J. W. PAUL. In section *a* of the second article under "Inside Organization," which reads "Helmet or advance squad," I would suggest that "breathing apparatus" be substituted for the word "helmet," which is more or less misleading.

CHARLES ENZIAN. I have noticed frequently in these proceedings that the word "helmet" is used when "breathing apparatus" is intended and in order to avoid confusion I move you that "breathing apparatus" be accepted by this conference as the proper designation for mine-rescue apparatus. In this way we shall avoid any confusion and the word "helmet" may be retained as it was originally intended, as that part of the apparatus which is worn on the head.

The amendment was carried unanimously and the secretary was instructed to make the necessary change in the resolution.

Resolution 10 was read, as follows:

"The maximum distance rescue crews should proceed beyond fresh air: We recommend that owing to the different conditions in different mines and the hazardous work undertaken, this question should be left to the decision of the captain in charge, in conjunction with the mine officials and the probability of being able to save human life, using the time limit on all explorations."

AUSTIN KING. I suggest that in resolution 10 the word "captain," which is not generally understood, be replaced by the word "official," and this be made to read "official in immediate charge."

The secretary was directed to make the change as suggested.

Dr. A. F. KNOEFEL. I move you that consideration of the program subjects G, 5 and 6, "Cumulative Effect of Inhaling Poisonous Gases" and "Use of Stimulants," which have not been reported on by this committee, be referred to the executive committee for action.

The motion was adopted unanimously.

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 3, SAFETY LAMPS AND ELECTRIC LAMPS.

The secretary read resolution 13, as follows: "Only such safety lamps and electric lamps as have passed the tests of the United States Bureau of Mines should be used."

J. W. PAUL. I would suggest the insertion of the word "types," so as to make this resolution read "only such types of safety lamps."

The secretary was ordered to make such change.

G. H. HAWES. I suggest that this resolution does not necessarily apply to metal mines, where we are not troubled with explosive gases.

AUSTIN KING. Mr. Hawes should read of the experience of Sir Le Neve Foster and Dr. Haldane in regard to some fires in English metal mines. As I remember it, a large part of these reports was made up of their investigations in regard to the carbon monoxide present.

G. H. HAWES. Weren't those mines sulphide mines?

AUSTIN KING. I do not remember as to the class of ore, but the report I speak of I know concerned largely the tin mines of Cornwall and the lead mines at Sneafell, Isle of Man.

G. S. RICE. The only trouble we have had in our western mines is from the fires in the sulphide ores, which of course do not create an explosive gas. So far as I know, no explosions have ever occurred from the products of a timber fire.

The CHAIRMAN. The question involved is that of safety lamps, and it seems to me that, as Mr. Hawes suggests, in metal mines this resolution should not prevail.

AUSTIN KING. It might meet the objection to strike out the word "and" after "safety lamps" and substitute the word "or."

J. W. PAUL. This is being considered under the heading of "Use of lamps in mine rescue and recovery work." To provide for the metal mines it could be amended by starting out with the insertion of the words "in coal mines."

AUSTIN KING. In view of Mr. Paul's suggested change I withdraw my objection in regard to the substitution of the word "or" after "safety lamps." I also second Mr. Paul's motion in regard to the change in this resolution.

The motion was passed unanimously.

G. H. HAWES. I should like to know whether sulphur dioxide in certain quantities is explosive.

G. S. RICE. It is my opinion that sulphur dioxide is not explosive, but that a certain quantity of hydrogen sulphide might be formed from sulphide ores which would be explosive under certain conditions. I suggest that our chemist, G. A. Burrell, be asked as to the explosibility of the gases in question.

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 4, FIRST-AID METHODS.

The secretary read resolution 18, as follows:

"Be it further resolved that it is the concensus of opinion of this committee that a man injured with a broken back should be handled with as little movement as possible. If found in any other than a recumbent position he should be kept in that position; if found in a recumbent position apply posterior splints extending from head to feet or lay upon rolled blankets."

After some discussion by the doctors it was agreed that the rolled blankets referred to in this resolution were to be laid parallel to the spinal column to prevent the contact of the spinal column with any external material in case the patient was found in a recumbent position; in case the patient was found in any other than a recumbent position the use of rolled blankets was not to apply. In case splints were not at hand the blankets were to be rolled upon some such object as a drill bit, the patient to be laid thereon, placed on the stretcher, and firmly bound to the stretcher.

Dr. A. F. KNOEFEL. I move that the latter part of resolution 18 be changed to read: "A patient with a broken back should be handled with as little movement as possible. If found in any other than a recumbent position he should be kept in that position. If found in a recumbent position, posterior splints, well padded, extending from head to feet, should be applied, or the patient should be laid upon rolled blankets extending along either side of the spinal column, and the patient should be firmly fixed to the stretcher.

The amendment was carried.

The secretary read resolution 19, as follows:

"Be it further resolved that it is the consensus of opinion of this committee that in the treatment of all fractures of all long bones it is necessary to apply splints long enough to fix the joint above and below the fracture. For example, if there is a fracture of the tibia you have to apply the splints so that they extend below the ankle and above the knee. Be it further resolved that long splints are to be recommended in the fractures of the lower limbs."

Dr. R. F. McHENRY. I suggest that the word "tibia" be replaced by the word "leg."

Dr. W. S. ROUNTREE. We came to the conclusion at our committee meeting that a first-aid man ought to know what the tibia is, and if he does not he is perhaps incapable of doing first-aid work.

Dr. A. F. KNOEFEL. A certain education in this work is needed, and a man who does not know the forearm from the arm or the leg from the thigh is, in my opinion, absolutely incompetent for first-aid work; but I am willing to accept Dr. McHenry's suggestion to call it a leg.

There being no objection, the secretary was ordered to make this correction.

The secretary read resolution 21, as follows: "The triangular bandage should be used in preference to the roller bandage."

Dr. W. S. ROUNTREE. We have always taught the use of both the triangular and the roller bandage. We often find a case in the mine where roller bandages are at hand but there are no triangulars. In such an event a first-aid man trained in the use of the triangular only is at a loss to know how to apply the proper dressing.

Dr. A. F. KNOEFEL. The idea in adopting this resolution was that it would be a guide in our work in contests. It does not mean that a first-aid man should not be taught the correct use of the roller bandage, but this instruction should not be given until after he has shown sufficient skill in the use of the elementary triangular bandage. For the first course in bandaging, I believe that the triangular is to be preferred.

The CHAIRMAN. We should bear in mind that we are considering the matter of first-aid methods and not of first-aid contests.

Dr. M. J. SHIELDS. In making the rules which have been adopted rather generally for contests, there is one which reads like this: "Equal credit will be given for the correct use of either the roller or the triangular bandage." This rule has been very generally accepted.

Dr. W. S. ROUNTREE. If this resolution is not to affect first-aid contests I heartily agree with Dr. Knoefel that the triangular bandage is much more easily applied by those who know but little of first aid.

Dr. R. T. McHENRY. We should keep in mind the man who is injured in the mine. The preference for the triangular bandage is based on its simplicity and efficiency, and if we do not believe that this bandage should be given preference on account of its simplicity and efficiency for the immediate help of a man who is injured, we have no right to recommend it.

The CHAIRMAN. If no amendments are offered to this resolution I shall instruct the secretary to read them as read in the permanent report of the committee.

The secretary read resolution 26, as follows:

"Be it further resolved that it is the opinion of this committee that in moving an injured man he should be handled by the first-aid corps on the same side as his injury; in other words, the injured side should be next to the man lifting the injured patient. Be it further resolved that the injured man should have the right of way from the place where he received the injury to the top of the shaft, or the mouth of the slope, in all cases."

W. D. ROBERTS. Some mines do not have a shaft or a slope; they are drift mines; and I suggest that this be made to read "to the surface" instead of "to the shaft or mouth of the slope."

There being no objection, the secretary was directed to make the change.

H. R. OWENS. In the event of injury to several men it might be necessary to bring rescue appliances and rescue men from the surface, and in this event I do not believe it would do any harm to allow the injured to wait until such reenforcements arrive.

AUSTIN KING. I believe that "a bird in the hand is worth two in the bush," and that we ought to take care of the one we have and give him the right of way.

Resolution 26 was passed without further objection.

The secretary read resolution 27:

"Be it further resolved that this committee would recommend, if this organization is perfected, that a committee of seven persons—two first-aid men, two operators, two physicians, and one representative of the Bureau of Mines—be appointed to act as an advisory board or as an executive board. This committee will have the power to accept or reject any new dressings that may be offered in any field contest."

Dr. A. F. KNOEFEL. I was chairman of this committee, and resolution 27 is to be effective only in the event of the establishment of a permanent organization. The allotment of this committee among men with special training in various lines of mining may be changed if our allotment does not meet the approval of this conference. It will be the duty of this committee to accept or reject any new ideas or dressings that may originate in any field contest or in the ordinary course of training for first aid.

The CHAIRMAN. Would it be agreeable to the chairman and to the members of committee 4 if the resolution (No. 27) be changed so that it may be referred to the executive committee of the permanent organization?

Dr. A. F. KNOEFEL. I scarcely believe it policy to burden the executive committee with the work designated in resolution 27. The executive committee will enter upon its duties immediately, but the committee referred to in resolution 27 should be appointed only after the permanent organization has been established.

J. W. PAUL. I make a motion that resolution 27 be referred to the committee on permanent organization for its consideration.

The motion was seconded by C. G. Brahm and carried.

Dr. R. F. McHENRY. I call attention again to resolution 20, which reads as follows: "A first-aid man should not be allowed to reduce a dislocation." I want to amend that to read, "except dislocations of the lower jaw or a finger."

Dr. M. J. SHIELDS. I would suggest a change in the text of the resolution as it stands, in that it should read, "It should not be the duty of a first-aid man to reduce a dislocation."

Dr. W. S. ROUNTREE. I still believe that the motion as it now stands should prevail. In this day of enlightenment you can get a physician in most any mining camp in from 15 minutes to an hour's time. The first-aid man does not know how to diagnose the symptoms of a dislocation, and it is my experience that he will oftentimes mutilate the ligaments and leave the injury in far worse condition than it would have been if he had done nothing at all with it.

T. B. DILTS. I think with Dr. Shields that the words, "It should not be the duty of" would cover that, instead of "A first-aid man should not be allowed to." Then in the event of a first-aid man being competent to reduce a dislocation he would feel free to do so, and thus relieve the suffering at once. If, on the other hand, he should feel incompetent through lack of experience he would fix the joint in position and allow the dislocation to be reduced by the physician.

Dr. R. F. McHENRY. I move you that the resolution be made to read, "It should not be the duty of the first-aid man to reduce a dislocation except of the lower jaw or a finger."

The motion was seconded by Mr. Reese.

The CHAIRMAN. With the permission of Dr. McHenry I shall first put a motion to amend the resolution as it stands to read, "It should not be the duty of a first-aid man to reduce a dislocation," instead of "A first-aid man should not be allowed to reduce a dislocation."

The motion was carried unanimously.

The CHAIRMAN. I shall now put a motion to amend the resolution still further to read, "It should not be the duty of a first-aid man to reduce a dislocation except of the lower jaw or a finger."

The motion was put, with the result that 16 voted in the affirmative, and 16 in the negative.

Dr. A. F. KNOEFEL. If it meets with Dr. McHenry's approval, I should like to add the word "simple," making his amendment read, "Except in the case of a simple dislocation of the lower jaw or of a finger." It is easy for first-aid men to identify a simple or a compound dislocation, and it is my opinion that he should reduce the simple dislocation and do nothing with the compound dislocation except to apply the compress dressing.

Dr. W. S. ROUNTREE. I still insist that the ordinary first-aid man is incompetent to judge the difference between a compound and a simple dislocation. Consequently it is better to advise that it is not his duty to reduce any dislocation; then in the event of a simple dislocation there will not be much cumulative effect due to its nontreatment, and in the event of a compound dislocation it will be very much better and more easily treated when the patient gets in a doctor's hands.

Dr. R. F. McHENRY. The diagnosis of a dislocation is very simple indeed. Most any first-aid man knows that in a compound fracture you have a hole extending from the outside down to the fractured bone, and that in a simple

fracture you do not. Probably no dislocation is so easy to identify as a dislocation of the lower jaw, and none is so easily reduced if it is attended to promptly. There is, however, no dislocation so painful as that of the lower jaw if it is not treated at once; and because of the simplicity of diagnosis and of treatment, I believe it should be within the province of the first-aid man to reduce a simple dislocation.

The CHAIRMAN. Will some of the first-aid miners debate the motion?

C. O. ROBERTS. I was down in West Virginia last winter in some isolated mining camps, places at which the services of the physician could not be obtained quicker than from one to three hours, and in conversation with mining surgeons I found that they all agreed that the reduction of a simple fracture of the lower jaw is a simple matter, and that the first-aid man should be taught to reduce it.

W. D. ROBERTS. I am very much in favor of permitting those first-aid men who have superior intelligence to reduce a simple dislocation of the lower jaw or of a finger. Dr. Rountree has, perhaps, had experience in teaching the work of first aid to colored and to foreign laborers, and with that type of men I believe the teaching should advise against the treatment.

The amendment was passed by a vote of 19 to 13.

It was then moved and voted unanimously that the resolutions of the committee as amended be adopted.

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 5, FIRST-AID TRAINING.

CLARENCE HALL. Before we proceed further I should like to report from G. A. Burrell, the gas chemist of the Bureau of Mines, as to the explosibility of gases given off from sulphide ores. Sulphur dioxide (SO_2) is of course nonexplosive, but a certain amount of hydrogen sulphide (H_2S) may be generated from sulphide ores, and this is an explosive gas, forming H_2O and SO_2 upon combustion. However, it is usually found in a small quantity only and the amendment of resolution 13 as to the electric and safety lamps for use in metal mines should stand as it is at present.

J. J. RUTLEDGE. I suggest that in adopting the resolution which Mr. Hall mentions, as it stands, we are excepting one class of mining where all the precautions necessary in coal mining must be taken—that is, asphalt mining, where inflammable gas and dust occur and where already one great disaster has happened.

The chairman announced that without objection resolution 13 would stand adopted without further amendment.

The secretary read resolution 30 as follows:

"Successful first-aid work at mines must have the personal interest of the company officials, the financial support of the mining company, and the cooperation of the mine physician, surgeons, and employees."

AUSTIN KING. I should like to ask what is intended by "financial support of the mining company."

Dr. A. F. KNOEFEL. There are various little expenses connected with first-aid work, such as the purchase of the necessary supplies to be used in training, the purchase of first-aid materials for the first-aid stations underground, the payment of expenses of the first-aid team to and from the points of the contests.

This is the financial support which the results of first-aid work justify the company in giving, and without this financial support first-aid work will never be a success at any mining center.

The secretary was directed to read resolution 31, as follows:

"Every mine should have a sufficient number of first-aid men on duty to take care of any injured persons throughout the 24 hours of the day."

AUSTIN KING. I believe that some modification of the phraseology of the resolution should be made to suit the condition where only a very few men are employed on the night shift. In the event of large repair gangs being employed at night the instructions of this resolution would be practical, but where only two or three men are employed underground at night I doubt the practicability of the resolution.

Dr. A. F. KNOEFEL. The idea of this resolution was not to fix any definite number of first-aid men required to a certain definite number of men. The intention was that each operator should judge his own conditions and make his own decision as to the number of first-aid men he would require. We have so framed this resolution that it is liberal in this respect. If we should have named a definite number of first-aid men as being desirable among each 100 employees, for instance, a mining company would be open to censure if, in the event of a disaster, it could be determined that such a number of first-aid men had not been provided. We already have too many of that undesirable class, known as "ambulance chasers," and it is our desire to give them as little food for scandal as is possible.

The resolutions presented by committee were passed unanimously as amended.

The SECRETARY. At the bottom of the report of committee 5 I find a notation to the effect that the report on hospitals, which was to be made by committee 7, is the result of joint action by committees 5 and 7, and since that result is attached hereto I believe it would be well to consider the resolution which pertains to hospitals at this time.

The secretary then read resolution 36, as follows:

"Underground surgical hospitals are unnecessary, but there should be deposited at different points in the mine a sufficient number of first-aid packets properly equipped with first-aid emergency dressing. In addition there should be located a sufficient number of first-aid dressing stations at the bottom and immediate surface opening of the mine."

AUSTIN KING. I think the word "and" in the last sentence should be made "or."

Dr. A. F. KNOEFEL. As chairman of this committee I wish to say that we anticipated the suggestion of this change, but we do not agree to it. Many men are injured on the top, and they require immediate attention, and we should not be compelled to bring first-aid materials from the mine and interrupt operations in order to give such men proper attention. Also many men are injured in the immediate vicinity of the shaft bottom, which is generally accepted as one of the busiest points in a mine. It is very necessary to have supplies immediately at hand to take care of the accidents that are bound to occur at this point.

AUSTIN KING. The difference between the bottom of the shaft and the surface is only one-half minute. I am not pleading for my own company, for in most instances we have complete hospital rooms, steam heated and supplied with hot and cold water, both at the bottom and at the top; but I do believe that it is an injustice to ask a small operation to prepare suitable conveniences at both the top and the bottom where there is only a half minute's time between the two.

Dr. W. S. ROUNTREE. I heartily agree with Mr. King. Ordinarily, if a man is injured in our mines first-aid materials are brought to the scene of the injury and he is skillfully treated by the first-aid man, placed on an ambulance car, which is promptly taken to the surface, and in the dressing room on the surface he awaits the arrival of the ambulance.

G. S. RICE. I believe it is a good plan to have a small station at the bottom and a more complete station on the top. It is not always possible to get the cage quickly when you want it, and the injured man is compelled to wait in a strong draft of cold air. A very happy arrangement is to combine the underground office and the hospital in one room.

J. P. REESE. I have found the underground hospital at the shaft bottom to be very important. In the case of many men injured below, when a quantity of supplies is needed on any particular entry it forms a base of supplies from which materials can be quickly dispatched with the minimum amount of confusion.

Dr. A. F. KNOEFEL. The resolution was framed so as to be lenient with the mining company in the way of expense. You note that we do not recommend extensive underground hospitals, but all that we do ask is a room at the bottom where the man may be placed upon a cot, removed from the excitement of mules, motors, and men.

W. D. ROBERTS. I remember where several men were injured underground when the cage rope broke. The first-aid men descended by means of ladders and took care of the injured men, but there was no available underground station and the injured men suffered greatly because they could not be hoisted for several hours.

JESSE HENSON. The anthracite law requires that there be a hospital situated underground and another at the surface.

AUSTIN KING. What we are trying to recommend is a resolution adapted to the great bulk of operations.

Dr. R. F. MCHENRY. It has been reported to this committee that there is in this immediate district a very complete underground hospital, equipped with everything but surgical instruments. Now, this is the thing we want to condemn, for it is, perhaps, an unnecessary expense; but what we do ask for is not merely a hole in the wall but a room properly lighted and heated, with hot and cold water—a brick or cement-lined first-aid station. This can be constructed at a very reasonable expense, and its value is equal to that of the elaborately equipped underground hospital.

CHARLES ENZIAN. I move that the resolution be amended to read that "if practicable" first-aid stations should be installed at the bottom of the mines.

The motion was not seconded.

J. W. PAUL. I move that the word "surgical" be inserted previous to the word "hospital."

Mr. Paul's motion was put and carried.

The original resolution as amended by Mr. Paul was passed.

W. D. ROBERTS. I would like to amend the resolution to read, "First-aid rooms properly equipped should be placed at the bottom and at the top."

"Equipment" would include blankets and stretchers, and it would not be necessary to have stretchers all over the plant.

The CHAIRMAN. It is the practice of some companies to deposit at first-aid stations—not dressing rooms, but mere stations, far away from the bottom of the shaft—first-aid boxes or canisters containing blankets and other first-aid necessities.

J. W. PAUL. These are recommendations made by this conference. If any coal company wishes to act upon these recommendations it will confer with some person conversant with the equipment of these stations and will properly provide them with the appliances and the dressings needed. If the legislatures ever enact laws specifying what these stations should contain I think that those who pass on these suggestions will see that they are properly equipped.

The CHAIRMAN. The motion stands as passed, without further modification.

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 6, FIRST-AID CONTESTS AND EXHIBITIONS.

The SECRETARY. With the permission of the chairman I shall ask J. C. Roberts, secretary of committee 6, to read its resolutions, as they are in his own handwriting.

Mr. Roberts read resolution 34, as follows:

"The judges should be of sufficient number so that one judge should handle not more than three teams, preferably less, and these judges should rotate. These judges should be first-aid surgeons and practical first-aid men (not surgeons). Each contest should consist of not more than five events."

Mr. Roberts proceeded to explain that the words "first-aid surgeons" were included for the reason that not all surgeons are familiar with first-aid methods, a fact that was brought to his attention in the West.

CHARLES ENZIAN. There has been a suggestion of an element of professionalism in the anthracite district of Pennsylvania in these contests, and an attempt is being made to eliminate this by substituting the name "exhibition." It has been experienced that when a man is specially capable in first-aid work the captains of other first-aid teams will go far in their efforts to procure him for their teams. I believe contests should be limited to interstate affairs and exhibitions should be held as intermine or intercolliery affairs. A number of companies in the anthracite region have adopted this distinction.

The CHAIRMAN. The condition described by Mr. Enzian has been recognized by certain of the big companies who now oppose contests, and the experience of the anthracite-mine people in this respect may be your experience very shortly.

CHARLES ENZIAN. I am in favor of making these affairs an exhibition of skill rather than a contest. Some of our companies now invite their salaried men to attend these exhibitions at the company's expense, to note what is being done by the company for the purpose of insuring greater safety to life. This develops a valuable esprit de corps.

RESOLUTIONS OF COMMITTEE 7, HOSPITALS AND SAFETY STATIONS.

Committee 7 presented no resolutions, as its business had been transacted in the joint sectional meeting of committees 5, 6, and 7.

DISCUSSION ON RESOLUTIONS OFFERED BY COMMITTEE 8, PERMANENT ORGANIZATION.

Resolution 37 was read by the secretary as follows:

"*Resolved*, That this conference be made a permanent organization; that the presiding chairman of this conference, H. M. Wilson, be elected the president of a temporary committee to be composed of seven persons; that there be elected a vice president; that C. S. Stevenson be elected secretary, and that the other members of the committee be appointed by the president; that the purpose of the temporary committee shall be to draw up a constitution and by-laws and otherwise complete the organization; and that until there be such permanent organization all details in connection with first aid and other matters be passed over."

Dr. A. F. KNOEFEL. In explanation of the last clause of resolution 37 I wish to explain that it was the sense of the committee that it should simply lay the groundwork, and that the details, such as first-aid dressings and appliances, should be left to the permanent organization.

After some desultory debate the committee's resolution was rephrased and adopted.

The CHAIRMAN. I shall now appoint the temporary executive committee provided for in the last resolution. This committee is apportioned in accordance with geographical position and also among mine officials and doctors, as follows: Drs. F. L. McKee for the East, W. S. Rountree for the South, and A. F. Knoefel for the Middle West, mine official E. H. Weitzel for the Far West, Austin King for the bituminous region of this part of the country, John P. Reese for the central and western coal fields, G. H. Hawes for the northern iron and copper regions, and R. A. Phillips for the anthracite coal fields of eastern Pennsylvania.

The preliminary meeting of the executive committee will be convened at 2 p. m. to-day.

Before a motion to adjourn is entertained I wish to express to you the sincere appreciation of the Director of the Bureau of Mines and of the employees of the bureau for the manner in which you have come from all parts of the United States and remained with the conference during three long days. We did not know in advance whether or not much would be accomplished, but I think everyone must admit that this is a most representative gathering, even if it is not very large numerically. You have done splendid work, and a great deal of it, in a short time, and I think that later you will all be proud of your part in this preliminary meeting, which I believe will mean a great deal for the mining people of the United States.

In the past we had gone through the period of litigation following accidents, followed for some years by employers' liability legislation, but in the last year a tremendous impetus has been given to the enactment of legislation—Federal and State—providing for workingmen's compensation. In the year 1911 ten States enacted laws providing compensation for injuries received by workmen. It will therefore be wise for the operators, in the interest of economy as well as for humanitarian reasons, to adopt the slogan originated at the first national mine-safety demonstration a year ago—"Safety First." I think this conference is the beginning of a big movement. I thank you heartily for your attendance.

Dr. M. J. SHIELDS. Before we adjourn I should like to have permission to express the thanks and appreciation of the Red Cross for the work of the representatives of this conference.

Dr. A. F. KNOEFEL. I second the sentiment of Dr. Shields and especially mention Mr. Wilson, who has been to us like a kind father with a bunch of unruly children, and I think that in support of this resolution we ought to have a rising vote of thanks.

J. P. REESE. Before the vote of thanks—I think we will all vote for it very willingly—according to the decision regarding permanent organization this body should appoint a vice president.

On motion duly seconded J. P. Reese was unanimously elected vice president.

J. P. REESE. I wish to thank you for the unexpected and unsolicited honor, but I earnestly hope that the president will continue in good health. I now put the motion of the doctor to thank the members of this conference, and especially our untiring chairman.

The motion was passed unanimously by a standing vote.

On motion, the conference adjourned at 1.30 p. m., with the understanding that the temporary executive committee would meet immediately after lunch.

PROCEEDINGS OF THE TEMPORARY EXECUTIVE COMMITTEE.

The members present were: H. M. Wilson, president; J. P. Reese, vice president; C. S. Stevenson, secretary; Dr. W. S. Rountree, Dr. F. L. McKee, G. H. Hawes.

The chairman outlined the duties of the committee, laying emphasis on the duty of adopting a constitution and by-laws, and naming the time of meetings.

Dr. A. F. Knoefel suggested that a subcommittee be appointed by the chair to draw up a skeleton constitution and by-laws, copies to be mailed to all members of the committee for correction; that upon receipt of the corrected copies the subcommittee should complete its work, and mail to all members copies of the revised constitution and by-laws for final correction.

G. H. Hawes moved that the chairman appoint a committee of three to act as suggested by Dr. Knoefel, and that the chairman be one of this subcommittee. The motion was carried unanimously.

The chairman appointed Dr. F. L. McKee and Austin King as a subcommittee to act with himself in preparing a constitution and by-laws.

The chairman announced the appointment of G. H. Hawes as a member of the temporary committee on permanent organization to replace J. P. Reese, who had been elected vice president.

Dr. W. S. Rountree moved that the conference meet annually, and that the executive committee announce the date of these meetings.

The motion was carried unanimously.

Austin King stated that the purpose of the organization should be to promote safety in mines by means of the adoption of first-aid measures and logical methods of procedure in rescue and recovery work.

The chairman, after discussion, advised all members of the committee to suggest a name for the organization within 30 days.

A discussion that remained unsettled at adjournment was as to what should constitute membership in the organization. Two suggestions were offered, as follows:

(1) Members should consist of those persons who by occupation or interest are qualified to consider the issues for which the association is organized.

(2) Each company might become a member and have one associate nonvoting member for each 2,000 men or fraction thereof employed, the membership to be extended to those organizations having allied interests.

After a discussion of the question of dues, on which no definite action was taken, the meeting adjourned.

PROPOSED CONSTITUTION FOR A PERMANENT NATIONAL MINE-RESCUE AND FIRST-AID ASSOCIATION.

After the adjournment of the conference the temporary executive committee adopted the following constitution, which will be recommended to the next meeting of the conference, to be held in September, 1913, in accordance with article 3 of the constitution. The draft is presented here for the information of persons concerned in the safety of mining operations.

ARTICLE I.

NAME.

SECTION 1. This organization shall be known as the American Mine-Safety Association.

ARTICLE II.

OBJECT.

SECTION 1. The object of the association shall be to promote the science of safety in mines and mining by the adoption of improved first-aid methods, and of logical methods of procedure in rescue and recovery work; to recommend the adoption of approved types of first-aid and mine rescue and recovery appliances; to obtain and circulate information on these subjects; and to obtain the cooperation of its members in establishing proper safeguards against loss of life and property by explosions or fires or from other causes.

ARTICLE III.

MEMBERSHIP AND DUES.

SECTION 1. Memberhip shall consist of (*a*) active, (*b*) associate, (*c*) life, and (*d*) honorary members. It is understood that membership pledges no one to any given course of action.

SEC. 2. Active members shall be persons who, by occupation, affiliation, or interest, are qualified to consider the issues and forward the aims for which the association is organized. Annual dues shall be $3.

SEC. 3. Associate members shall be national institutes, societies, and associations; National and State departments and bureaus; and firms and corporations concerned in the mining industry or whose principal object is the reduction of the loss of life and property in mines. Annual dues shall be $10, except that the associate membership is hereby granted to the Federal Bureau of Mines without payment of dues, because of the existence of a Federal statute that "prohibits the payment of membership fees or dues in societies or associations." Associate members shall be entitled to representation by three persons, each of whom shall be entitled to all of the privileges of active members.

SEC. 4. Active members may obtain a life membership by the payment of $100, thereby exempting them from further payment for life; associate members may obtain a life membership by the payment of $250, thereby exempting them from further payment for 25 years.

SEC. 5. Honorary membership may be conferred upon persons who for more than fifteen (15) years have rendered exceptional service in the work of mine safety. A favorable report by the executive committee of the association and a two-thirds majority vote by the members of the association present at an annual meeting shall be necessary to elect an honorary member. Such membership shall carry with it all the privileges of active membership, without dues.

ARTICLE IV.

OFFICERS.

SECTION 1. The officers shall be a president, a vice president, a secretary-treasurer, and an executive committee of six, of whom the president and the vice president shall act as ex-officio members.

ARTICLE V.

ELECTION OF OFFICERS.

SECTION 1. At each annual meeting the president and the vice president shall be elected for a term of one year, or until their successors are elected, and two members of the executive committee shall be elected for three years; the executive committee shall elect its own chairman immediately after the general election.

SEC. 2. The secretary-treasurer shall be appointed by the executive committee from the active membership, and shall hold office during the pleasure of said committee.

SEC. 3. Any candidate for an office shall be nominated in writing by at least 10 members, nominations to be submitted to the secretary at least four weeks before the annual meeting.

SEC. 4. The candidate for any office receiving a majority of the votes of the members present at the annual meeting shall be declared elected.

ARTICLE VI.

DUTIES OF OFFICERS.

SECTION 1. The president shall perform the duties of the presiding officer and chairman of the association. He shall also be ex officio a member of the

executive committee and of all other committees, and may appoint thereon as his proxy any other officer of the association. He shall also sign all orders for the payment of money.

SEC. 2. The vice president shall perform all the duties prescribed for the president, in his absence. The vice president shall also be ex officio a member of the executive committee.

SEC. 3. The secretary-treasurer shall prepare a program for and keep a record of each meeting, countersign all orders for money that have been signed by the president, keep a true record of all cash received and disbursed by him on account of the association, and publish such proceedings of the association as the executive committee may authorize. He shall also act as secretary of the executive committee.

SEC. 4. The secretary-treasurer shall receive a salary to be fixed by the executive committee, and his annual dues shall be remitted during office.

SEC. 5. The executive committee shall pass on new members, audit the accounts of the treasurer, and approve the programs of meetings and all papers to be read before or published by the association.

SEC. 6. At any meeting of the executive committee, five members of the committee shall constitute a quorum for the transaction of business.

ARTICLE VII.

COMMITTEES.

SECTION 1. The technical business of the association, or such as relates to the consideration of methods of first-aid or rescue-training work, or appliances used therein, shall be transacted by regular and special committees, the chairmen and members of which shall be appointed by the president, with the approval of the executive committee, at least within thirty (30) days following the holding of the annual meeting. Said committee shall meet on the day preceding the annual meeting, or at any regular meeting that may be called for the consideration of business in which such committee or committees may be concerned.

ARTICLE VIII.

ANNUAL AND SPECIAL MEETINGS.

SEC. 1. The annual meeting of the association shall be held in September of each year, the place of meeting to be determined by the executive committee not less than 60 days in advance of the meeting.

SEC. 2. Special meetings may be called by the executive committee and shall be called by them upon written application of twenty (20) active members. Notice of such meetings shall be sent to all members at least twenty (20) days in advance. The notice shall state the business to be transacted, and no other business shall be entertained.

ARTICLE IX.

LOCAL SECTIONS.

SEC. 1. When, in the judgment of the executive committee, a sufficient number of members and associates shall petition in writing, its members may form, subject to the constitution and other regulations governing this association, a local section for the purpose of more effectively carrying out the aims of this association. Each local section may adopt such by-laws as it may deem expedient.

SEC. 2. Each local section shall select some place as headquarters and a definite territory to be especially benefited by said local section and within which its members must reside. Both headquarters and territory are subject to the approval of the executive committee, and may be changed by the executive committee as occasion may require.

SEC. 3. All members of the association in good standing who reside in the territory set apart by the executive committee to be tributary to any local section shall be considered members of that local section and shall be so enrolled; and they shall be entitled to all the privileges that such local section may under the constitution provide. A member may vote or hold office in one local section only.

SEC. 4. The officers of each local section shall consist of a chairman, a secretary, and such committees as each section may find desirable. These officers shall be elected by the votes of the members of a section in the manner provided by the section by-laws. The election of any member as an officer of a local section shall not debar him from election or appointment to any other office in the association.

ARTICLE X.

BUSINESS YEAR.

SEC. 1. The calendar year shall be the business year of the association, and no member shall receive a copy of the proceedings of the association nor be permitted to vote at any election who shall be in arrears for dues for the current year on the first day of September of that year.

ARTICLE XI.

APPOINTMENT OF DELEGATES.

SEC. 1. In response to proper invitation the president may appoint a delegate or delegates to represent the association at a meeting of any organization represented in the association membership, and such delegate or delegates shall report the substance of the proceedings at the next succeeding annual meeting of the association.

ARTICLE XII.

STANDARD METHODS AND APPLIANCES.

SEC. 1. A proposed standard method of instruction in first aid to the injured or in rescue operations, or in training or instruction relative thereto; or in the holding of contests or other procedure relative thereto; or a proposed standard specification for approval or appliances or equipment for use in first-aid or rescue work must be presented to the executive committee, in writing, at least sixty (60) days prior to the holding of the annual meeting, at which time it must be referred to the appropriate committee and reported therefrom to the meeting, which may amend it by a majority vote. A two-thirds affirmative vote of those voting shall be required to refer the resolution to letter ballot of the association. A two-thirds affirmative vote of those voting in a letter ballot shall be required for the adoption of the standard resolution or specification.

ARTICLE XIII.

ORDER OF BUSINESS.

SEC. 1. At all meetings the following shall be the order of business:

1. Reading of minutes of preceding meeting.
2. Report of the executive committee.

3. Report of officers.
4. Report of auditing committee.
5. Report of other committees.
6. Election of new members.
7. Unfinished business.
8. New business.
9. Program.
10. Adjournment.

ARTICLE XIV.

AMENDMENTS.

SEC. 1. This constitution may be altered or amended at any stated meeting by a two-thirds vote of the members present, provided notice has been given at a previous annual meeting of the proposed change, alteration, or amendment.

PUBLICATIONS ON MINE ACCIDENTS AND METHODS OF MINING.

The following Bureau of Mines publications may be obtained free by applying to the Director, Bureau of Mines, Washington, D. C.:

BULLETIN 10. The use of permissible explosives, by J. J. Rutledge and Clarence Hall. 1912. 34 pp., 5 pls., 4 figs.

BULLETIN 17. A primer on explosives for coal miners, by C. E. Munroe and Clarence Hall. 61 pp., 10 pls., 12 figs. Reprint of United States Geological Survey Bulletin 423.

BULLETIN 20. The explosibility of coal dust, by G. S. Rice, with chapters by J. C. W. Frazer, Axel Larsen, Frank Haas, and Carl Scholz. 204 pp., 14 pls., 28 figs. Reprint of United States Geological Survey Bulletin 425.

BULLETIN 44. First national mine-safety demonstration, Pittsburgh, Pa., October 30 and 31, 1911, by H. M. Wilson and A. H. Fay, with a chapter on the explosion at the experimental mine by G. S. Rice. 1912. 75 pp., 7 pls., 4 figs.

BULLETIN 45. Sand available for filling mine workings in the Northern Anthracite Coal Basin of Pennsylvania, by N. H. Darton. 1913. 33 pp., 8 pls., 5 figs.

BULLETIN 46. An investigation of explosion-proof mine motors, by H. H. Clark. 1912. 44 pp., 6 pls., 14 figs.

BULLETIN 52. Ignition of mine gases by the filaments of incandescent electric lamps, by H. H. Clark and L. C. Ilsley. 1913. 31 pp.

TECHNICAL PAPER 11. The use of mice and birds for detecting carbon monoxide after mine fires and explosions, by G. A. Burrell. 1912. 15 pp.

TECHNICAL PAPER 13. Gas analysis as an aid in fighting mine fires, by G. A. Burrell and F. M. Seibert. 1912. 16 pp., 1 fig.

TECHNICAL PAPER 14. Apparatus for gas-analysis laboratories at coal mines, by G. A. Burrell and F. M. Seibert. 1913. — pp., — pls., — figs.

TECHNICAL PAPER 19. The factor of safety in mine electrical installations, by H. H. Clark. 1912. 14 pp.

TECHNICAL PAPER 21. The prevention of mine explosions; report and recommendations, by Victor Watteyne, Carl Meissner, and Arthur Desborough. 12 pp. Reprint of United States Geological Survey Bulletin 369.

TECHNICAL PAPER 22. Electrical symbols for mine maps, by H. H. Clark. 1912. 11 pp., 8 figs.

TECHNICAL PAPER 24. Mine fires, a preliminary study, by G. S. Rice. 1912. 51 pp., 1 fig.

TECHNICAL PAPER 28. Ignition of mine gas by standard incandescent lamps, by H. H. Clark. 1912. 6 pp.

TECHNICAL PAPER 29. Training with mine-rescue breathing apparatus, by J. W. Paul. 1912. 16 pp.

MINERS' CIRCULAR 3. Coal-dust explosions, by G. S. Rice. 1911. 22 pp.

MINERS' CIRCULAR 4. The use and care of mine-rescue breathing apparatus, by J. W. Paul. 1911. 24 pp., 5 figs.

MINERS' CIRCULAR 5. Electrical accidents in mines; their causes and prevention, by H. H. Clark, W. D. Roberts, L. C. Ilsley, and H. F. Randolph. 1911. 10 pp., 3 pls.

MINERS' CIRCULAR 6. Permissible explosives tested prior to January 1, 1912, and precautions to be taken in their use, by Clarence Hall. 1912. 20 pp.

MINERS' CIRCULAR 9. Accidents from falls of roof and coal, by G. S. Rice. 1912. 16 pp.

MINERS' CIRCULAR 10. Mine fires and how to fight them, by J. W. Paul. 1912. 14 pp.

MINERS' CIRCULAR 11. Accidents from mine cars and locomotives, by L. M. Jones. 1912. 16 pp.

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