TRANSACTIONS

OF THE

AMERICAN SOCIETY

OF

MECHANICAL ENGINEERS.

VOL. XXIV.

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OFFICERS

OF THE

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

1902–1903,

FORMING THE STATUTORY COUNCIL.

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S. T. WELLMAN	1900—1901	Cleveland, O.
EDWIN REYNOLDS	1901—1903	Milwaukee, Wis.

[NOTE.—The former Presidents of the Society are members of the Council for life or during their retention of active membership in the Society.]

* Unexpired term of E. F. C. Davis.

NOTE.

The considerable bulk of the volume of Transactions has induced the Publication Committee to direct the insertion of a summary of the Society membership in place of the complete list of members which was published in the earlier volumes. The summary attaching to this issue is that which appears in the catalogue of the Society issued with corrections to July 1st, 1903. Reference for the complete list should be made to the twenty-fourth catalogue (second edition).

The summary is as follows :

FOREIGN COUNTRIES.

	Membership.		Membership.
Africa	19	Holland	1
Australia	4	India	2
Belgium	3	Jamaica, W. I.	1
Canada	30	Japan	6
Central America	1	Mexico	6
China	2	Norway	1
Cuba	2	Russia	4
France	7	South America	7
Germany	7	Sweden	4
Great Britain (England)	48	Switzerland	1
Great Britain (Scotland)	3		

Total foreign membership 159

UNITED STATES.

	Membership.		Membership.
Alabama	6	Nebraska	2
Alaska	1	New Hampshire	15
Arkansas	2	New Jersey	127
California	29	New Mexico	1
Colorado	23	New York	786
Connecticut	103	North Carolina	6
Delaware	15	North Dakota	1
District of Columbia	30	Ohio	172
Georgia	9	Oklahoma	1
Hawaii	1	Oregon	4
Illinois	156	Pennsylvania	354
Indiana	30	Porto Rico	1
Iowa	5	Rhode Island	49
Kansas	3	South Carolina	3
Kentucky	3	Tennessee	3
Louisiana	10	Texas	6
Maine	13	Utah	3
Maryland	83	Vermont	10
Massachusetts	285	Virginia	28
Michigan	61	Washington	5
Minnesota	12	West Virginia	6
Missouri	37	Wisconsin	49
Montana	11	Wyoming	1

Total membership in the United States.....2,411

Total foreign membership	159
Total membership in United States	2,411
Present address unknown *	3
Total membership	2,573

SUMMARY OF MEMBERSHIP BY GRADES.

Honorary members	18
Members	1,750
Associate members	202
Junior members	603
Total membership	2,573

* These are J. M. Ewen, C. R. Johnston and J. W. Snyder, and if any member knows their present addresses, he will confer a favor by advising the Secretary of them.

CONTENTS OF VOLUME XXIV.

PAPERS

OF THE

NEW YORK MEETING

(XLVIth)

OF THE

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

DECEMBER 2d TO 5th, 1902.

BEING ALSO THE TWENTY-THIRD ANNUAL MEETING OF THE SOCIETY.

No. 977.*

REPORT ON MEETING OF NATIONAL CONFERENCE ON STANDARD ELECTRIC LIGHTING RULES.

To the Council of the American Society of Mechanical Engineers:

Gentlemen: The undersigned as a delegate of the American Society of Mechanical Engineers to the National Conference on Standard Electrical Rules, which was held at New York, March 18–19, 1895, and which prepared the rules for the installation of electrical apparatus known as the National Electrical Code, submitted a report which is contained in the *Transactions* of the American Society of Mechanical Engineers, Volume XIX., pages 33 and 984.

This code of rules was accepted and promulgated by the National Board of Fire Underwriters, and has continued in force, with such amendments being made at the annual meetings of the Underwriters' National Electric Association, as might be necessary to conform to the state of the art of the applications of electricity for lighting, transmission of power and signalling.

The rapid growth of electrical transmission of power was a subject of such importance, that the underwriters referred the matter to the code committee of the American Institute of Electrical Engineers, of which the writer is a member, but this code committee after preparing a draft of provisions intending to provide for the construction of these lines, especially in places where they approached to other classes of electrical lines or to buildings, considered the subject of too great importance to be settled by such a small number, and the National Conference on Standard Electrical Rules was assembled and held their meeting in Boston, March 24, 1903, at which the undersigned was a delegate representing the American Society of Mechanical Engineers.

At this meeting were representatives of the principal electrical and other technical societies, and also representatives of all types of electrical manufactures having an interest in this subject.

The following amendments to the National Electrical Code

* Appendix No. 2 to the Proceedings.

were adopted and have been accepted by the electrical committee of the underwriters and added to the 1903 edition of the Rules, which was issued June 1, 1903:

AMENDMENTS TO THE NATIONAL ELECTRICAL CODE.

12 A. Constant-Potential Pole Lines, Over 5,000 Volts.

(Overhead lines of this class unless properly arranged, may increase the fire loss from the following causes:

Accidental crosses between such lines and low-potential lines may allow the high-voltage current to enter buildings over a large section of adjoining country. Moreover, such high voltage-lines, if carried close to buildings, hamper the work of firemen in case of fire in the building. The object of these rules is so to direct this class of construction that no increase in fire hazard will result, while at the same time care has been taken to avoid restrictions which would unreasonably impede progress in electrical development.

It is fully understood that it is impossible to frame rules which will cover all conceivable cases that may arise in construction work of such an extended and varied nature, and it is advised that the Inspection Department having jurisdiction be freely consulted as to any modification of the rules in particular cases.)

(*a*) Every reasonable precaution must be taken in arranging routes so as to avoid exposures to contacts with other electric circuits. On existing lines, where there is a liability to contact, the route should be changed by mutual agreement between the parties in interest wherever possible.

(*b*) Such lines should not approach other pole lines nearer than a distance equal to the height of the taller pole line, and such lines should not be on the same poles with other wires, except that signalling wires used by the Company operating the high-pressure system, and which do not enter property other than that owned or occupied by such Company, may be carried over the same poles.

(*c*) Where such lines must necessarily be carried nearer to other pole lines than is specified in Section *b* above, or where they must necessarily be carried on the same poles with other wires, extra precautions to reduce the liability of a breakdown to a minimum must be taken, such as the use of wires of ample mechanical strength, widely spaced cross-arms, short spans, double or extra heavy cross-arms, extra heavy pins, insulators, and poles thoroughly supported. If carried on the same poles with other wires, the high-pressure wires must be carried at least three feet above the other wires.

(*d*) Where such lines cross other lines, the poles of both lines must be of heavy and substantial construction.

Whenever it is feasible, end-insulator guards should be placed on the cross-arms of the upper line. If the high-pressure wires cross below the other lines, the wires of the upper line should be dead-ended at each end of the span to double-grooved, or to standard transposition insulators, and the line completed by loops.

One of the following forms of construction must then be adopted:

(1) The height and length of the cross-over span may be such that the shortest distance between the lower cross-arms of the upper line and any wire of the lower line will be greater than the length of the cross-over span, so that a

wire breaking near one of the upper pins would not be long enough to reach any wire of the lower line. The high-pressure wires should preferably be above the other wires.

(2) A joint pole may be erected at the crossing point, the high-pressure wires being supported on this pole at least three feet above the other wires. Mechanical guards or supports must then be provided, so that in case of the breaking of any upper wire, it will be impossible for it to come into contact with any of the lower wires.

Such liability of contact may be prevented by the use of suspension wires, similar to those employed for suspending aerial telephone cables, which will prevent the high-pressure wires from falling, in case they break. The suspension wires should be supported on high potential insulators, should have ample mechanical strength, and should be carried over the high-pressure wires for one span on each side of the joint pole, or, where suspension wires are not desired, guard wires may be carried above and below the lower wires for one span on each side of the joint pole, and so spread that a falling high-pressure wire would be held out of contact with the lower wires.

Such guard wires should be supported on high-potential insulators or should be grounded. When grounded, they must be of such size, and so connected and earthed, that they can surely carry to ground any current which may be delivered by any of the high-pressure wires. Further, the construction must be such that the guard wires will not be destroyed by any arcing at the point of contact likely to occur under the conditions existing.

(3) Whenever neither of the above methods is feasible, a screen of wires should be interposed between the lines at the cross-over. This screen should be supported on high-tension insulators or grounded, and should be of such construction and strength as to prevent the upper wires from coming into contact with the lower ones. If the screen is grounded, each wire of the screen, and especially its ground connection, should have a current-carrying capacity greater than the current which may be delivered by any wire of the upper line, must be of such size and so connected and earthed that it can surely carry to ground any current which may be delivered by any of the high-pressure wires. Further, the construction must be such that the wires of screen will not be destroyed by any arcing at the point of contact likely to occur under the conditions existing.

(*e*) When it is necessary to carry such lines near buildings, they must be at such height and distance from the building as not to interfere with firemen in event of fire; therefore, if within twenty-five feet of a building, they must be carried at a height not less than that of the front cornice, and the height must be greater than that of the cornice as the wires come nearer to the building in accordance with the following table:—

Distance of wire from building.	Elevation of wire above cornice of building.
Feet.	Feet.
25	0
20	2
15	4
10	6
5	8
2½	9

It is evident that where the roof of the building continues nearly in line with the walls, as in Mansard roofs, the height and distance of the line must be reckoned from some part of the roof instead of from the cornice.

[AMENDMENT TO 13 A (b).]

(13 A) Grounding Low-Potential Circuits.

(*b*) Transforming secondaries of distributing systems should preferably be grounded, and when grounded, the following rules must be complied with:

(1) The grounding must be made at the neutral point or wire, whenever a neutral point or wire is accessible.

(2) When no neutral point or wire is accessible, one side of the secondary circuit may be grounded, provided, the maximum difference of potential between the grounded point and any other point in the circuit does not exceed 250 volts.

(3) The ground connection must be at the transformer as provided in sections *d*, *e*, *f*, *g*, and when transformers feed systems with a neutral wire, the neutral wire must also be grounded at least every 250 feet for overhead systems, and every 500 feet for underground systems.

Inspection Departments having jurisdiction may *require* grounding if they deem it necessary.

(AMENDMENT TO 64.)

(64) Signalling Systems.

(*a*) Outside wires should be run in underground ducts, or strung on poles, and as far as possible kept off of buildings, and must not be placed on the same cross-arms with electric light or power wires. *They * should not occupy the same duct, manhole or handhole of conduit systems with electric light or power wires.*

Single manholes, or handholes, may be separated into sections by means of partitions of brick or tile so as to be considered as conforming with the above rule.

Respectfully submitted,

C. J. H. WOODBURY.

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* The Amendment consists of the words italicised.