W. M. HYMAN.

ELECTRIC SWITCHBOARD.

APPLICATION FILED JULY 8, 1905. RENEWED JUNE 5, 1909.

953,466. Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

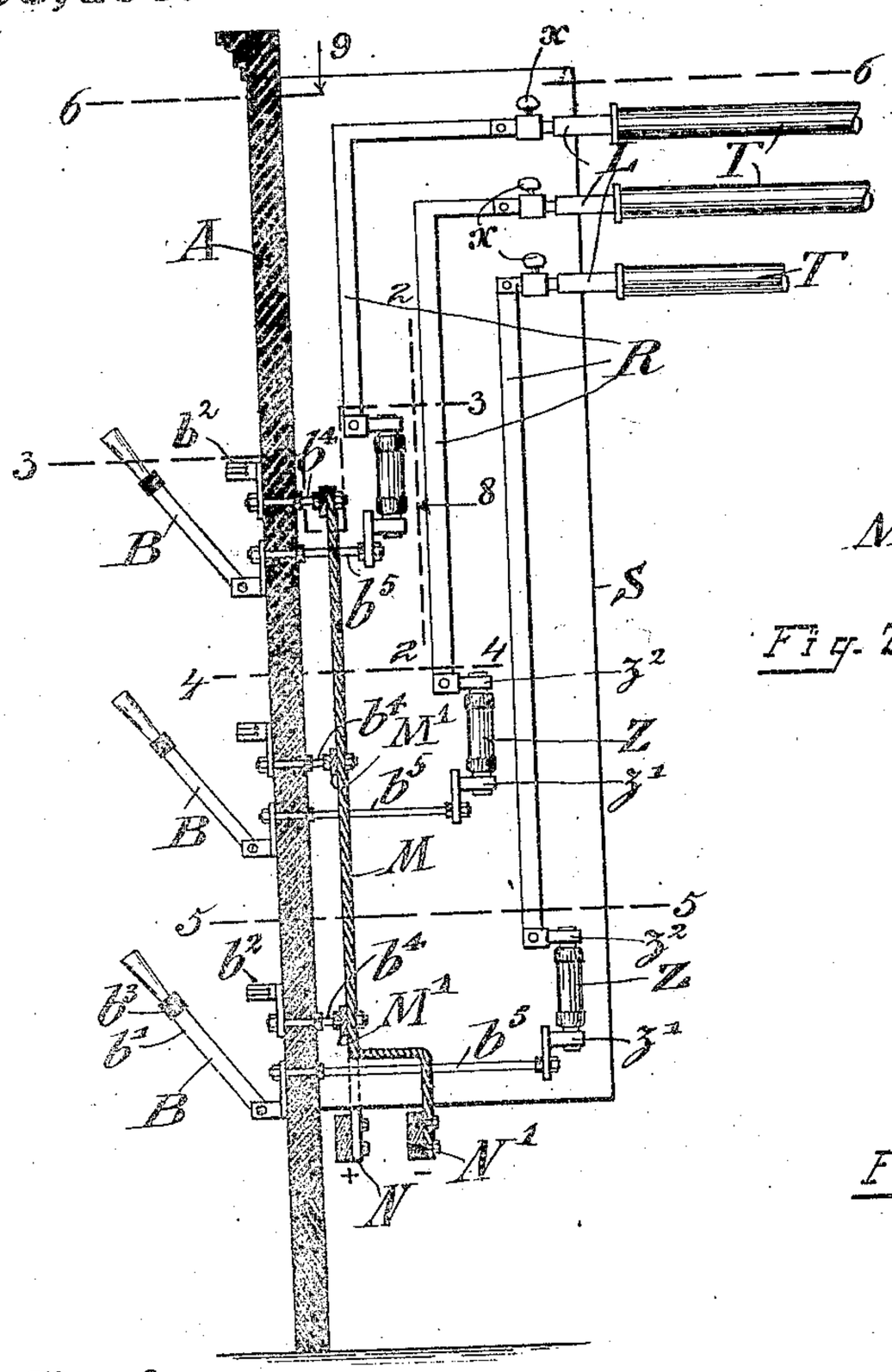

Fig. 1

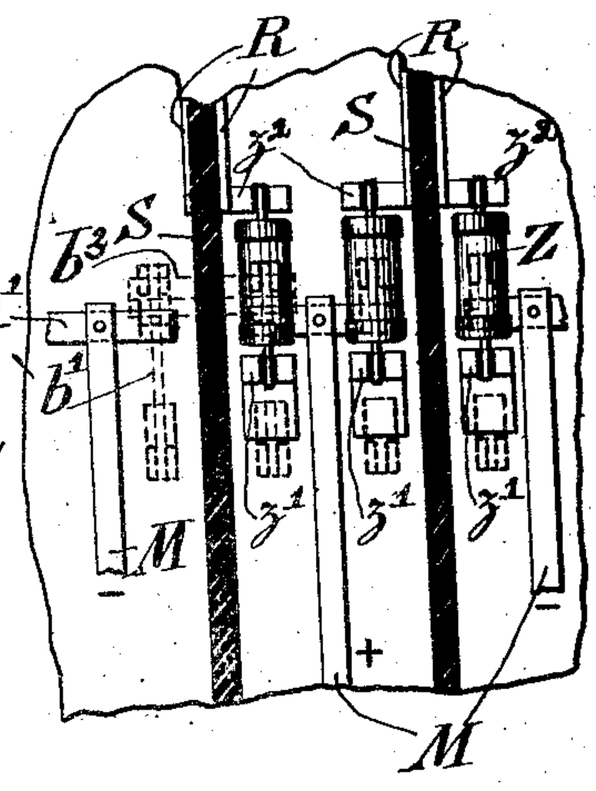

Fig. 2

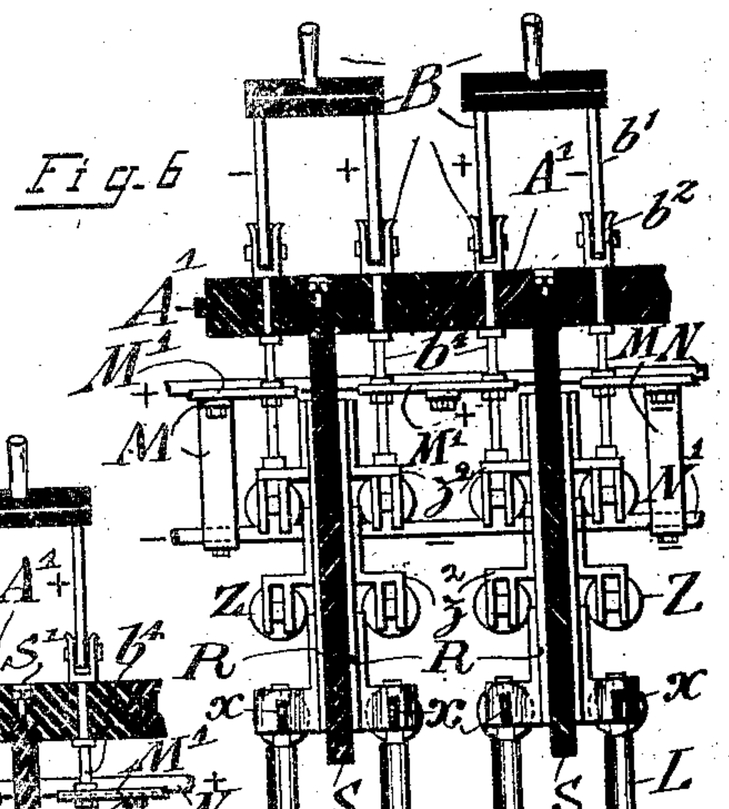

Fig. 6

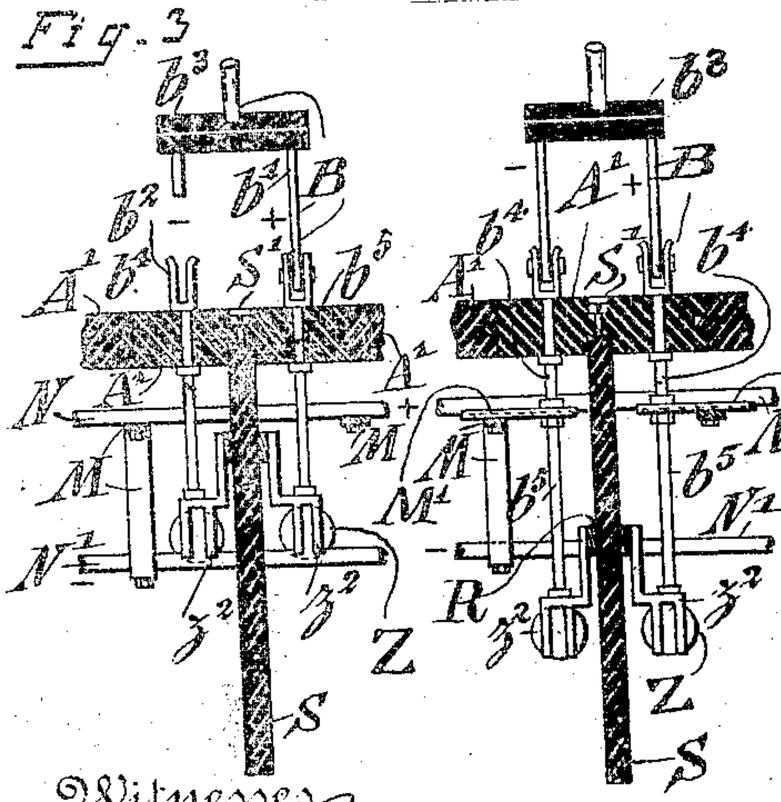

Fig. 3

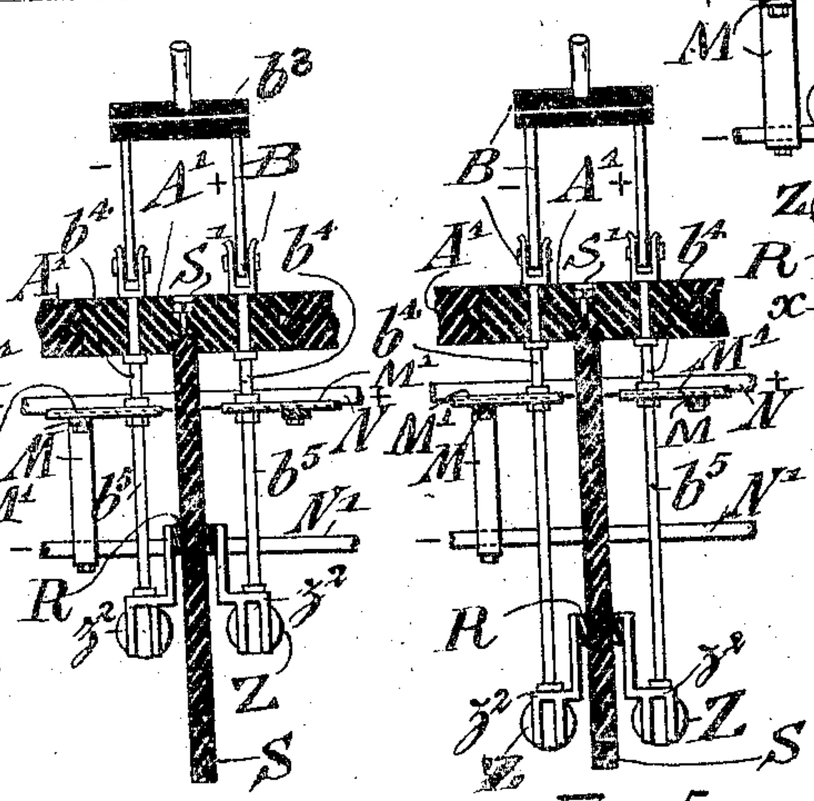

Fig. 4

Fig. 5

Witnesses

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2 SHEETS—SHEET 2.

Fig: 8.

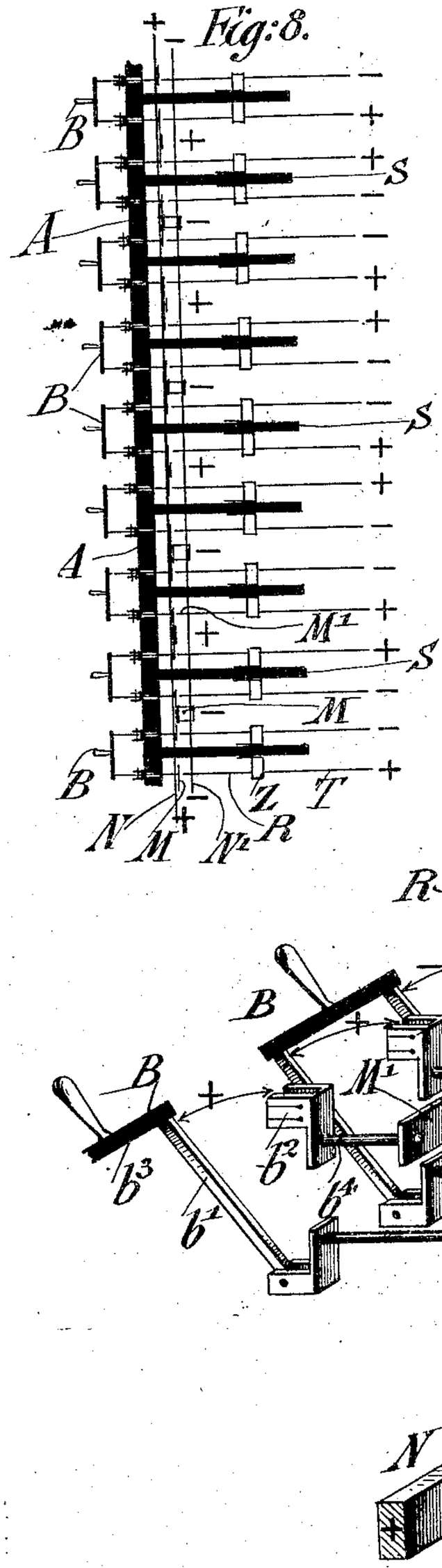
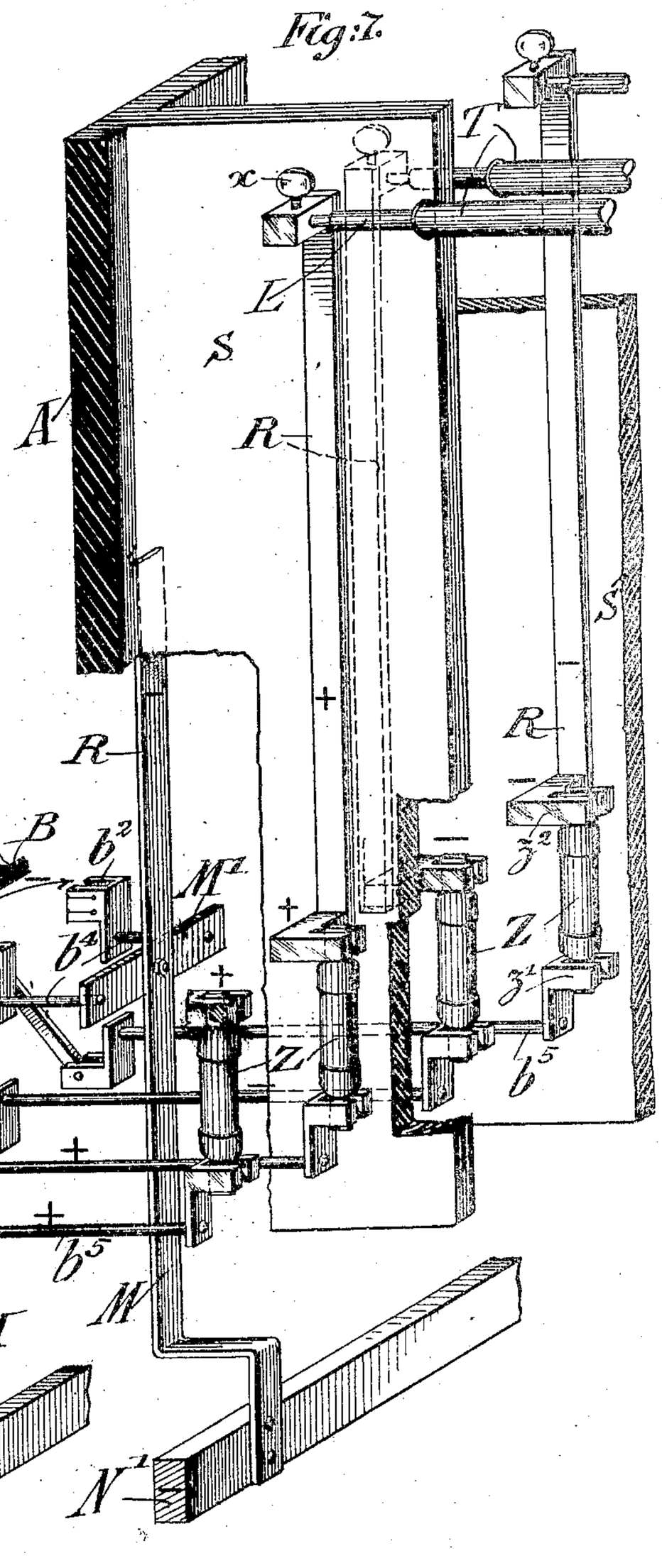


Fig: 7.



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ELECTRIC SWITCHBOARD.

953,466. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed July 8, 1905, Serial No. 268,776. Renewed June 5, 1909. Serial No. 500,407.

To all whom it may concern:

Be it known that I, WALLACE M. HYMAN, a citizen of the United States, residing in New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Electric Switchboards, of which the following is a specification.

This invention relates to improvements in electric switchboards, and more particularly those used for the distribution of current from main bus-bars to the feeders, which convey electric current to locations where used, and has for its object to provide a switchboard, first, in which the fuses are located at a point distant from the point of connection of the switchboard with the feeders for the purpose of obviating the objectionable interference of the fuses and feeders incident to the switchboards ordinarily in use; secondly, in which the auxiliary bus-bars leading from the main bus-bars through switches, fuses and other devices to the feeders are supported and isolated from each other, so that bus-bars of one polarity are protected against accidental contact or connection with bus-bars of opposite polarity; thirdly, in which the fuses which protect the feeders are located and supported in such a manner that there is no danger to an attendant who removes and replaces them of accidental contact with bus-bars of opposite polarity.

For this purpose the invention consists of an improved electric switchboard comprising a face-wall or continuous upright board, a plurality of vertical panels perpendicular to said face-wall or board at the rear thereof, and a plurality of bus-bars supported by said panels on either side thereof, the bus-bars on one side being of one polarity and the bus-bars on the other side of opposite polarity.

The invention consists further of certain novel features which will be more fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical transverse section of my improved switchboard, Fig. 2 shows an enlarged detail view, partly in section, of a portion of my improved switchboard as indicated by line 2, 2 of Fig. 1, and the arrow 8, Figs. 3, 4 and 5 are detail horizontal sections taken on lines 3, 3, 4, 4, and 5, 5, of Fig. 1, Fig. 6 is a horizontal section of my improved switchboard taken on line 6, 6 of Fig. 1, seen in the direction of the arrow 9, Fig. 7 is a perspective view of only a few of the switches, properly connected, and showing only a part of the upright board and parts of two of the panels or partitions, and Fig. 8 is a plan-view of a plurality of panels or partitions as arranged perpendicularly to the upright board and showing some of the connections diagrammatically.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, the face-wall or continuous upright board A of my improved switchboard is composed of any desired number of separate vertical, laterally abutting slabs or panels of suitable insulating material suitably fastened to the floor of the power-house or operating-room. At the front of said face-wall or board A are arranged a plurality of double-pole switches B composed of two single switches, and at the rear thereof are arranged a plurality of vertical partitions or panels S, each perpendicular to the face-wall or board A, and intermediate to the two single switches of each double-pole switch B, which, as said, are on the front of the board. The partitions S are spaced some distance apart, and support, on either side thereof, feeder bus-bars R. Preferably below the partitions or panels S, main bus-bars N and N^1 are arranged, from which auxiliary bus-bars M extend vertically upward, one between each two partitions. One auxiliary bus-bar M, connected with the negative main bus-bar N^1, and hence of negative polarity, is located between one set of two of the partitions, and one auxiliary bus-bar M, connected with the positive main bus-bar N, and hence of positive polarity, is located between the next set of two partitions, then a negative auxiliary bus-bar is arranged between the next set of two partitions, and then a positive auxiliary bus-bar is arranged between the next set of two partitions, and so on, there being one auxiliary bus-bar between the two facing sides of each two partitions, but alternately of opposite polarity.

Referring more particularly to the drawings, the double-pole switches consist each of two single blade- or knife-switches b^1 hinged at one end and adapted to engage

the clips b^2 when closed. The blades b^1 have their free ends connected by insulated handles b^3, as is well known. The clips b^2 are electrically connected with the auxiliary bus-bars M located between each of the partitions by means of studs b^4 and bars M^1, and the blades b^1 are connected with the feeder bus-bars R, on either side of one partition by means of studs b^5.

The partitions, panels or separating-walls S, which may be made of any suitable insulating material, are secured to the rear of the face-wall or board A by screws S^1, or in any other suitable manner, so as to be perpendicular to said face-wall, as before said, and are located so as to be in a position at the rear of the face-wall intermediately between the two single blade-switches of each of the double-pole switches. On each side of each panel S are supported the feeder bus-bars R. The feeder bus-bars R on one side of the panels or partitions are connected through fuses Z with those single blades b^1 of the double-pole switches B, the corresponding clips of which are connected with the positive auxiliary bus-bars M, while the feeder bus-bars on the other side of the same panel or partition are connected through fuses Z with those blades b^1 of the same double-pole switches, the corresponding clips of which are connected with the negative auxiliary bus-bar M. The studs b^5, perpendicular to the face-wall or board, vary in length, depending on the distance of the respective feeder bus-bars R from the face-wall or board. Fuses Z, as said, are interposed in the feeder bus-bars, the lower ends of which fuses are supported by clamps z^1 connected with the studs b^5, while the upper end of each are held by clamps z^2 connected with the feeder bus-bars R. The clamps z^1, z^2 are arranged parallel with and are supported by the panels S so as to project toward the rear end of the same, in order to permit the ready removal of the fuses from the rear of the switchboard. The feeder bus-bars R, separated by the panels, have their upper ends connected by thumb-screws x, or other suitable means, with conductors or insulated wires L which comprise the feeders serving to distribute the electrical current to the points where it is used, said wires being shown in the drawings protected by suitable tubes T.

In Fig. 8 is shown a plurality of partitions S, each of which is perpendicular to the upright board A at the front of which the switches B, and at the rear of which the main bus-bars N and N^1, auxiliary bus-bars M, and feeder bus-bars R are arranged, while in Fig. 7 a perspective view of several switches as properly connected is shown, together with parts of the upright wall A and panels or partitions S. Hence, as seen from above, those two sides of those two neighboring partitions between which the positive auxiliary bus-bars are arranged, support feeder bus-bars adapted to be electrically connected with the positive auxiliary bus-bars, when the switches are closed, while those two sides of those two adjacent partitions between which the negative auxiliary bus-bars are arranged, support feeder bus-bars adapted to be electrically connected with the negative auxiliary bus-bars, when the switches are closed. Hence, the partitions support feeder bus-bars on both sides thereof, those on one side being of positive polarity and those on the other being of negative polarity. Also, as has been said, the double-pole switches, located at the front of the face-wall or board, are in such position, as to, so to say, straddle the partitions located at the rear of the face-wall, or, in other words, each of the panels is located so as to be midway between the two component single switches of each double switch. That is, one of the single switches of one double-pole switch is located on one side of the vertical plane of a partition, while the other of the single switches of that double-pole switch is located on the other side of that plane, both single switches being at the front of the face-wall. And, the single switch on one side of that vertical partition plane is connected with the feeder bus-bars on the partition and on the same side of that partition plane, and the other single switch is connected with the feeder bus-bars on the other side of that partition.

One method of manufacturing my improved switchboard is to divide the face-wall or board A into sections, each of which consists of a sectional face-board A^1 having dovetailed ends adapted to engage the dovetailed ends of the adjacent sectional face-boards, and having one of my improved panels or partitions at the rear thereof and vertical thereto, which supports the feeder bus-bars thereon, as hereinbefore described. The switchboard is installed by connecting together the separate sections A^1 at their dovetailed ends, and the proper electrical connections are then made with the main and auxiliary bus-bars.

The switches at the front of the board are preferably double-pole knife-switches, but I do not wish to limit myself thereto as any other switch mechanism may be used instead thereof. Any number of switches of any number of poles and of any approved construction may be arranged on said face-board. Nor do I wish to limit myself to the specific arrangement shown in the drawings as such may be modified, without departing from the spirit of my invention.

Among the advantages of my improved switchboard may be mentioned the systematic distribution of bus-bars at the rear of the board, in that the positive and negative

auxiliary and feeder bus-bars are isolated and separated from each other, so that all danger of short circuits between these bars is obviated. Furthermore, bus-bars of only one polarity being arranged between two adjacent panels or partitions, repairs are very much facilitated as the parts are much more accessible than with the boards hitherto in use, also because, as mentioned above, there is practically no danger of short circuits attendant on the use of a metal tool employed in the making of such repairs. By the arrangement of the fuses and bus-bars on the panels, the fuses and bus-bars may be placed closer together and therefore more switches may be employed on the same size of board than hitherto. The fuses which require frequent renewal are also far more accessible and may be readily replaced. On account of the location of fuses and bus-bars of one polarity only between two adjacent partitions, the fuses may be removed or replaced without any danger to the attendant of coming in contact with conductors of opposite polarity. Lastly, the obstruction of the rear of the switchboard by an objectionable mass of wiring, which prevents access to the fuses and bus-bars, as is usual in switchboards as ordinarily used, is avoided by the connection of all the feeders with the switchboard, distant from the location of the fuses.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An electrical switchboard, comprising a face-wall or continuous upright board, a plurality of vertical panels perpendicular to said face-wall or board at the rear thereof, and a plurality of bus-bars supported by said panels on either side thereof, the bus-bars on one side being of one polarity and the bus-bars on the other side of opposite polarity, each of said bus-bars having one of its ends terminating at the front of the upright board.

2. An electrical switchboard, comprising a face-wall or continuous upright board, a plurality of vertical panels perpendicular to said face-wall or board and spaced some distance apart, a plurality of feeder bus-bars supported by said panels on either side thereof, the bus-bars of one side being of one polarity and those on the other side of opposite polarity, switches at the front of said face-wall or board, each connected with the feeder bus-bars on one side of a panel, and with the feeder bus-bars on the other side of that panel, and auxiliary bus-bars arranged between the panels alternately of opposite polarity, and connected with the switches.

3. An electrical switchboard, comprising a face-wall or continuous upright board, a plurality of vertical panels perpendicular to said face-wall or board and spaced some distance apart, a plurality of feeder bus-bars supported by said panels on either side thereof, the bus-bars on one side being of one polarity and those on the other side of opposite polarity, double-pole switches, having blades and clips, at the front of said face-wall or board, having one of their blades connected with the feeder bus-bars on one side of the panels and the other of their blades connected with the feeder bus-bars on the other side of the panels, and auxiliary bus-bars arranged between the panels alternately of opposite polarity and connected with the clips of the switches.

4. An electrical switchboard, comprising a face-wall or continuous upright board, a plurality of vertical panels perpendicular to said face-wall or board and spaced some distance apart, a plurality of feeder bus-bars supported by said panels on either side thereof, the bus-bars on one side being of one polarity and those on the other side of opposite polarity, switches at the front of said face-wall or board, each connected with the feeder bus-bars on both sides of a panel, auxiliary bus-bars arranged between the panels alternately of opposite polarity and connected with the switches, and fuses interposed in said feeder bus-bars and supported by the panels.

5. An electrical switchboard, comprising a face-wall or continuous upright board, a plurality of vertical panels perpendicular to said face-wall or board and spaced some distance apart, a plurality of feeder bus-bars supported by said panels on either side thereof, the bus-bars on one side being of one polarity and those on the other side of opposite polarity, switches at the front of said face-wall or board, each connected with the feeder bus-bars on both sides of a panel, auxiliary bus-bars arranged between the panels alternately of opposite polarity, feeders connected with the feeder bus-bars, and fuses supported by the panels and interposed in the bus-bars at a point distant from the point of connection of the feeders with the feeder bus-bars.

6. In an electrical switchboard, having a face-wall or continuous upright board, a plurality of panels perpendicular thereto, a plurality of feeder bus-bars arranged on both sides of the panels, each bus-bar having one of its ends terminating at the front of the upright board on the same side of the panel on which it is located, and fuses supported by said panels on either side thereof and interposed in the feeder bus-bars.

7. In a switch-board, the combination of a series of spaced insulating panels, switches having terminals at opposite faces of each of said panels, means for electrically connecting together respectively one terminal of all of the switches, in the alternate spaces

between said panels, and conducting means connected to the other terminal of each of said switches.

8. In a switch-board, the combination of a series of spaced insulating panels, switches having terminals at opposite faces of each of said panels, means for electrically connecting together respectively one terminal of all of the switches, in the alternate spaces between said panels, and conducting means connected to the other terminal of each of said switches, said conducting means being of only that polarity as the terminals between the respective pair of partitions.

9. In a switch-board, the combination of a series of spaced insulating panels, switches having terminals at opposite faces of each of said panels, means for electrically connecting together respectively one terminal of all of the switches, in the alternate spaces between said panels, conducting means connected in the other terminal of each of said switches, and means for simultaneously operating the switches having terminals near the opposite sides of each of said panels.

10. In a switch-board, a series of spaced insulating panels, switches having terminals near opposite faces of each of said panels, a pair of bus-bars, conductors connecting one terminal of both switches in the alternate spaces between said panels with said bus-bars respectively, feeders connected with the other terminal of each of said switches, and means for simultaneously operating the switches having terminals near the opposite faces of each of said panels.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

WALLACE M. HYMAN.

Witnesses:

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N. C. BARNETT.