

April 9, 1940.

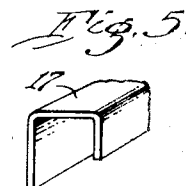
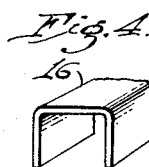
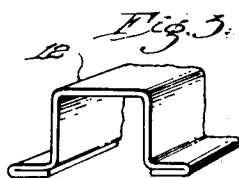
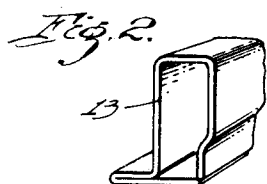
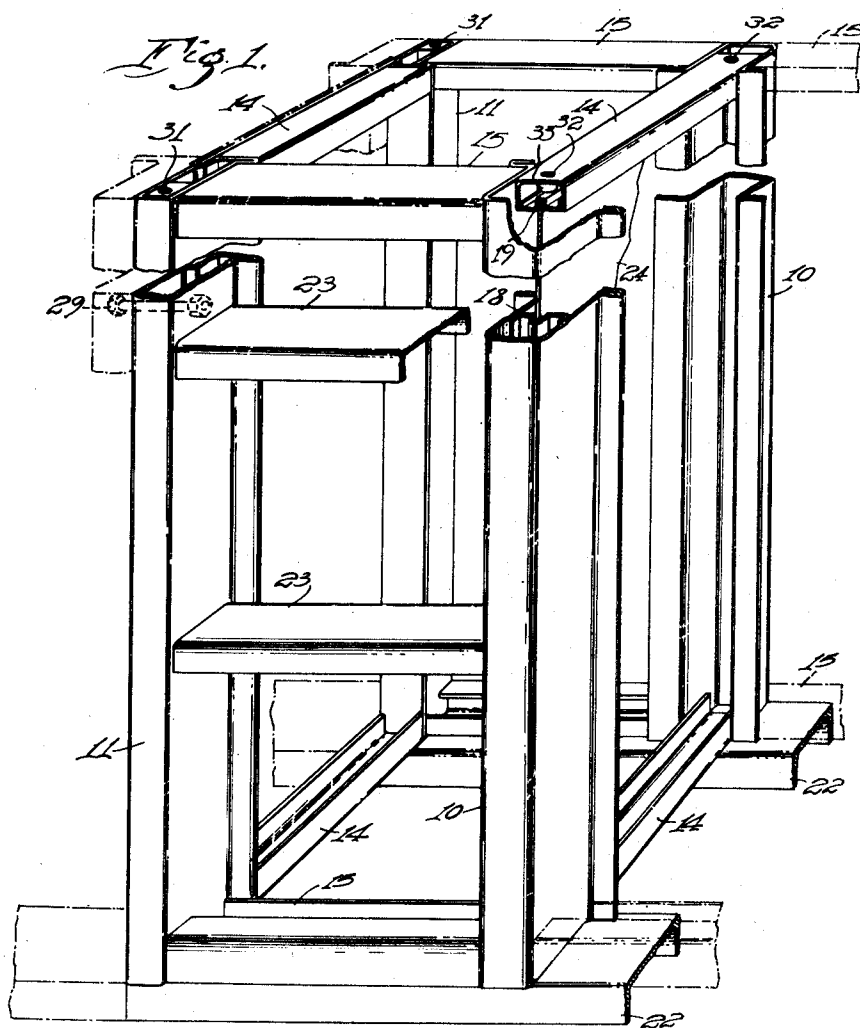
M. J. RUBEL

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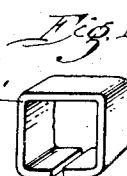
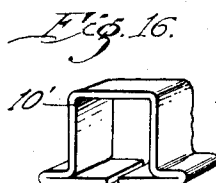
SWITCHBOARD CONSTRUCTION

Filed Nov. 24, 1937

5 Sheets-Sheet 1



WITNESSES:
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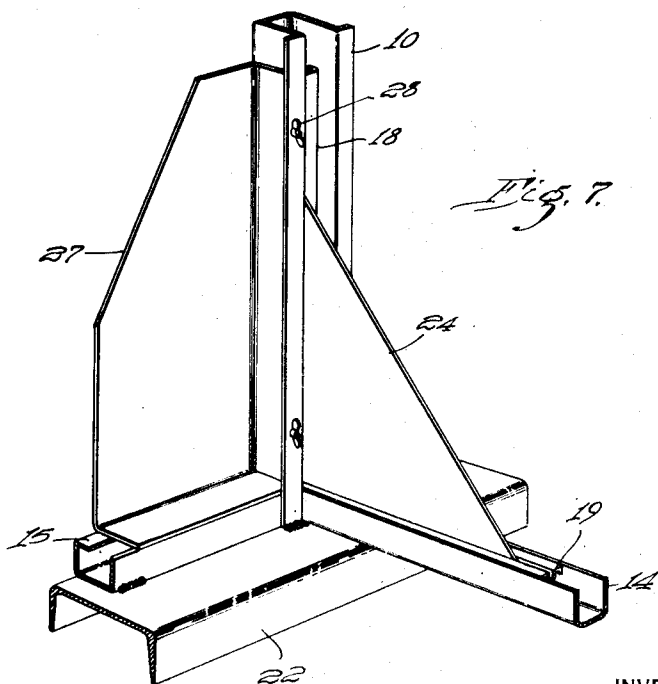
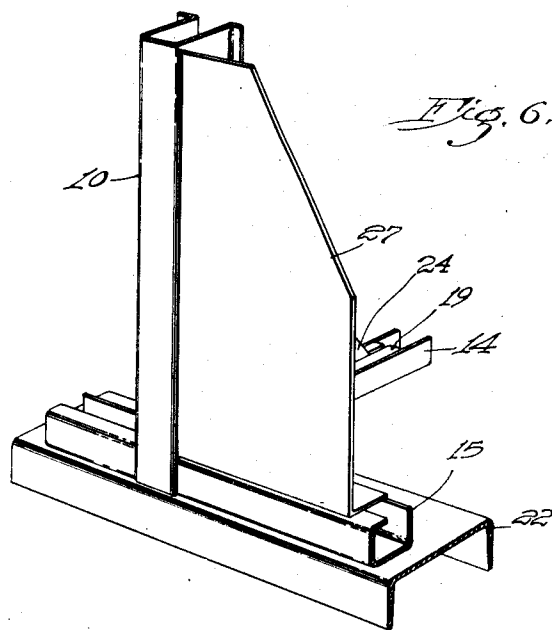
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SWITCHBOARD CONSTRUCTION

Filed Nov. 24, 1937

5 Sheets-Sheet 2



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SWITCHBOARD CONSTRUCTION

Filed Nov. 24, 1937

5 Sheets-Sheet 3

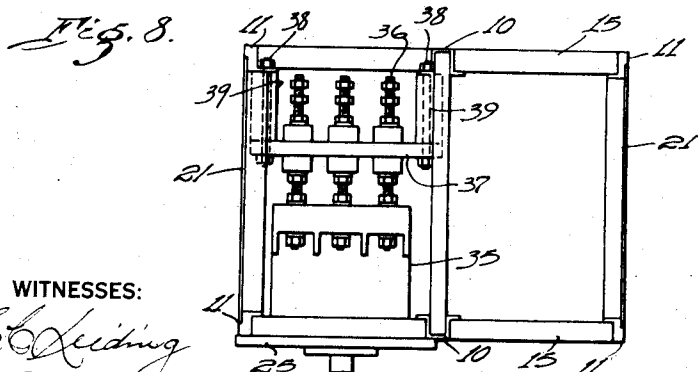
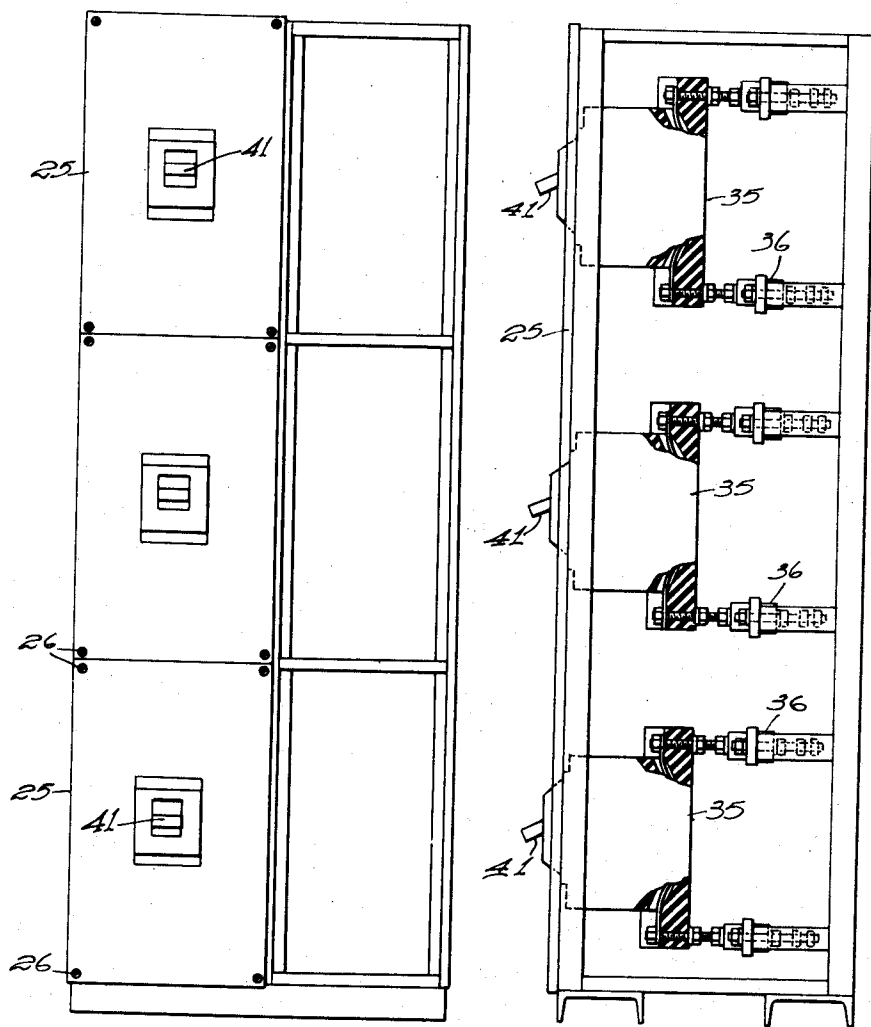


Fig. 9.

Fig. 10.

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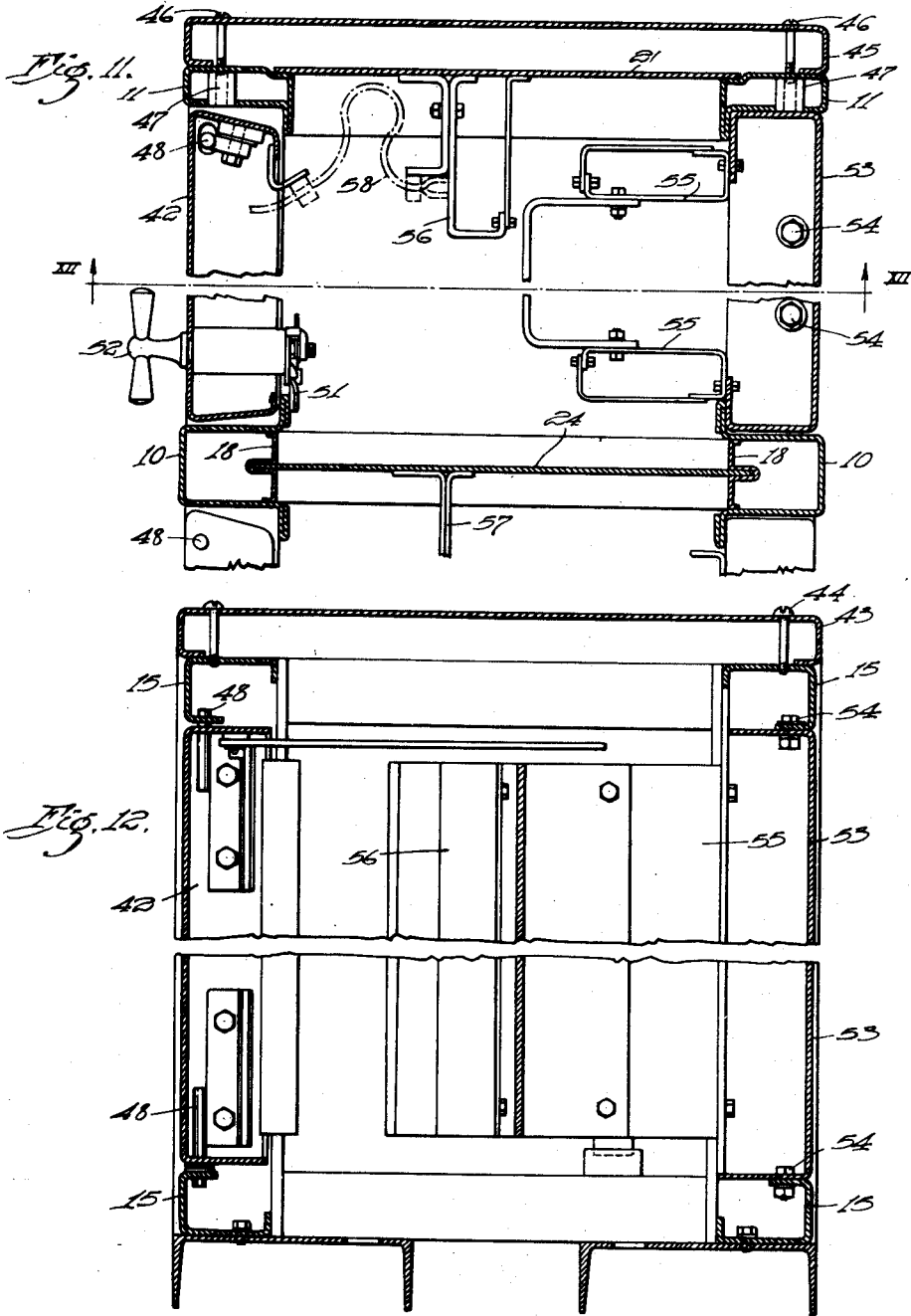
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SWITCHBOARD CONSTRUCTION

Filed Nov. 24, 1937

5 Sheets-Sheet 4



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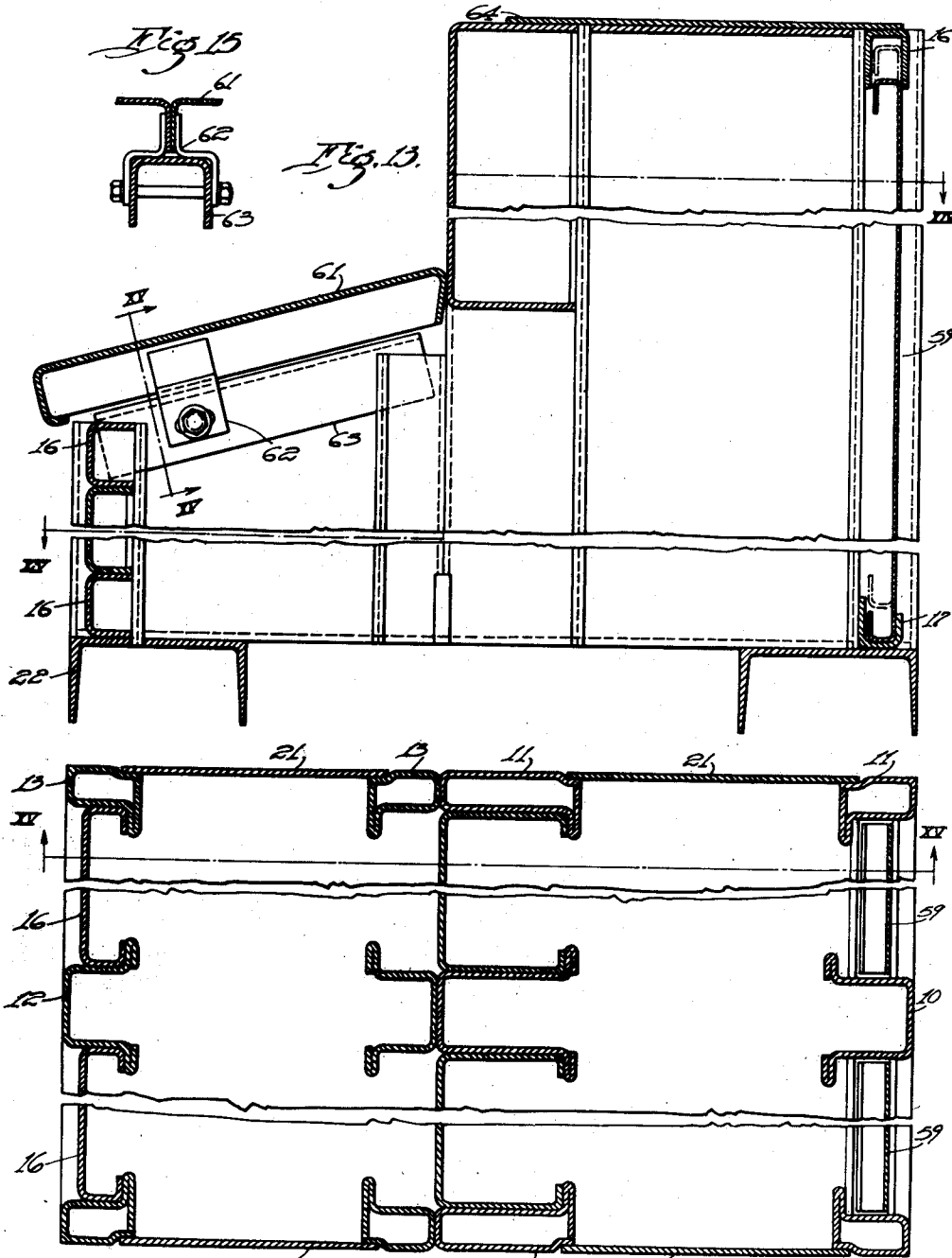
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SWITCHBOARD CONSTRUCTION

Filed Nov. 24, 1937

5 Sheets-Sheet 5



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Fig. 14.

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UNITED STATES PATENT OFFICE

2,196,399

SWITCHBOARD CONSTRUCTION

Max J. Rubel, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application November 24, 1937, Serial No. 176,310

7 Claims. (Cl. 175—307)

My invention relates, generally, to switchboards and more particularly to enclosed switchboards of the cubicle type which are constructed principally of steel or other suitable metal.

Many prior attempts have been made to provide steel switchboards of the cubicle type which are of a standard construction. However, a majority of the prior attempts at standardization have been unsuccessful because of the failure to reduce the various types of switchboards to certain standard elements which always remain the same regardless of the physical dimensions of the switchboard or cubicle. As a result of the failure to utilize standard elements in the construction of steel switchboards, it has been necessary for the switchboard manufacturers to make a complete set of drawings for each job in order that the units can be assembled in the shop. It is apparent that such a procedure requires the expenditure of large amounts of money for the making of drawings for each order received for a new switchboard or cubicle, even though it may be of a type previously constructed but of different dimensions.

An object of my invention, generally stated, is to provide a metal enclosed switchboard or cubicle which may be economically designed and readily manufactured and installed.

A more specific object of my invention is to provide a switchboard which may be constructed principally from standard metal elements.

Another object of my invention is to provide a number of standard elements of different shapes which may be utilized to construct switchboards of various types.

Other objects of my invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with my invention, a number of standard or universal formed sheet metal shapes are provided which are so designed that they can be readily interlocked or fitted together and welded in place to form a switchboard structure. These standard shapes may be combined in a great many different ways to form a number of switchboards, or cubicles, of different types, certain of the standard shapes reoccurring in the various types of switchboards.

For a fuller understanding of the nature and objects of my invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, in perspective, of a portion

of a switchboard structure constructed in accordance with my invention;

Figs. 2, 3, 4 and 5 are views, in perspective, of certain of the standard shapes utilized in the switchboard structures;

Figs. 6 and 7 are also views in perspective, showing certain of the standard shapes fitted together;

Figs. 8 and 9 are views, in front and side elevation, respectively, of a switchboard of the distribution type constructed in accordance with my invention;

Fig. 10 is a top plan view of the switchboard illustrated in Figs. 8 and 9, showing a method of supporting switching apparatus in the switchboard structure;

Figs. 11 and 12 are sectional views, in plan and elevation, respectively, of a metal-enclosed switchboard embodying my invention; Fig. 12 being taken along the line XII—XII of Fig. 11;

Figs. 13 and 14 are sectional views, in elevation and plan, respectively, of a switchboard of the desk type embodying my invention; Fig. 14 being taken along the line XIV—XIV of Fig. 13;

Fig. 15 is a view, in section, taken along the line XV—XV of Fig. 13; and

Figs. 16 and 17 are views in perspective, of modified forms of certain of the standard shapes which may be utilized in switchboard structures.

Referring now to the drawings and particularly to Figure 1, wherein the framework for one cell or cubicle of a multi-cell switchboard is illustrated, the framework shown comprises a pair of center columns 10, one of which is disposed at the front and the other at the rear of the structure, a pair of corner columns 11 also disposed at the front and the rear of the switchboard, cross members 14 extending from the front columns to the rear columns at both the top and the bottom of the structure, also horizontally disposed cross member 15 extending between the two front columns at the top and the bottom of the structure and similar cross members extending between the rear columns as shown, and a pair of additional spacing members 23 which extend horizontally between the two front columns 10 and 11.

It will be seen that the column member 10 is of a U-shape with laterally extending flanges on both legs of the U. The column may be formed readily from sheet metal into the shape illustrated. Likewise, the columns 11, which are substantially rectangular in shape with a flange at one side, may also be formed from sheet metal. Each one of the columns 11 is provided with an

offset portion on the side opposite the flange to permit a sheet metal panel 21 to be inserted flush with the end of the structure as shown more clearly in Figs. 10 and 11, to enclose the switchboard when desired.

As shown, the cross members 14 are of a U-shape and likewise the spacing members 23. These members may also be formed readily from sheet metal. It will be noted that the members 14 are of a proper width to permit their ends to be inserted into the U-shaped columns 10 or to be butted against the flanged edge of the column members 11. Furthermore, the spacing members 23 are of a proper width to be butted against the widest sides of the column members at the front of the switchboard. When desired, spacing members 23 may be provided at the rear of the switchboard.

As shown more clearly in Figs. 6 and 7, the cross members may be welded to the column members at their junction points and, if desired, the framework may be fastened to the usual channel base members 22 which support the entire structure. In this manner, the various members which comprise the framework may be readily assembled and when welded together constitute a rigid structure for supporting the switchboard apparatus.

In order to support a sheet steel barrier 24 between the cell units, barrier supports 18 and 19 are provided. It will be seen that the barrier support 18 is of a proper width to fit inside the U-shaped column members 10 and it may be welded thereto, while the barrier support 19 is slightly narrower in width and may be spot welded inside of the channel member 14, the ends of which are disposed inside of the column members 10.

If desired, the column members 10 and the cross members 14 may be formed as shown in Figs. 16 and 17, respectively, to make practically closed rectangles. In this case the barrier supports 18 and 19 may be omitted and the barrier 24 inserted through the openings left in one side of the members 10' and 14' and spot welded thereto.

When the spacing members 23 are provided for dividing the cell structure into several sections, sheet steel panels 25 may be removably secured to the front of the structure by means of screws 26, as shown in Fig. 8. In the event that it is not desired to utilize the spacing members 23, a sheet steel panel 21 may be removably secured to the flanges of the column members by means of bolts 28, as shown in Fig. 7. Likewise, sheet steel panels may be removably secured to the rear of the panel if desired, thereby completely enclosing the framework of the structure.

As shown in Fig. 1 by the broken lines, the structure may be continued to the right and in a like manner to the left to provide one or more cubicles similar to the one illustrated. In order that the complete switchboard structure may be assembled at the factory and then taken apart in units of a suitable size for shipping, an additional unit may be provided at the left of the cubicle illustrated by placing column members 11 alongside of the ones shown and joining them by means of bolts 29 in the manner shown. In this manner the switchboard may be divided into units suitable for shipping.

As a further aid to the handling of the structure during the shipping operations, nuts 31, having a threaded hole therein, may be welded in the top of the column members 11 into which eye-

bolts may be screwed to permit the unit to be lifted by a crane or other suitable device. Likewise, holes 32 may be drilled in the top of the center cross member 14 for insertion of similar eye-bolts into nuts 33 secured on the under side of the channel member 14.

As shown in Figs. 2 and 3, the column member 13, which is similar to the column member 11 but of a shallower depth, and the column member 12, similar to the member 10 but also shallower in depth, are provided as standard shapes in addition to the elements illustrated in Fig. 1. The shallower columns may be utilized in the structure in place of the ones shown in Fig. 1 when a lighter structure is desired. Likewise, the channel member 16 or 17 may be utilized in place of the channel 15 when it is desired to provide a lighter structure.

It will be seen from the structure shown in Figs. 1 to 7 that the various standard shapes which I have devised may be readily formed from sheet metal and that these shapes are so designed that they may be readily interconnected together to form a compact and rigid structure which is pleasing in appearance. By utilizing sheet steel, the weight of the completed switchboard structure may be materially reduced from the weight of previous structures in which the framework consisted of heavier material.

In order to illustrate some of the different types of switchboards which may be readily constructed by utilizing the standard shapes herein described, various typical designs of switchboards are shown in Figs. 8 to 14, inclusive. However, it is to be understood that the switchboards illustrated are merely typical of the many different types which can be built by utilizing these universal shapes, which are not limited in their utility to the designs shown.

In Figs. 8, 9 and 10, I have shown a typical switchboard of the distribution type in which automatic circuit breakers 35 are mounted in the switchboard structure by means of insulating terminals 36.

As shown in Fig. 10, the framework of the structure comprises the center columns 10, corner columns 11 and cross members 15 herein described. The circuit breakers 35 are supported by the insulating terminals 36 which, in turn, are carried by cross members 37 secured to the columns 10 and 11 by means of bolts 38, spacing members 39 being disposed between the rear columns and the cross members 37 in order to maintain the circuit breakers at the proper distance from the rear of the structure. If desired, the cross members 37 may be secured to the front columns instead of to the rear columns, in which case the bolts 38 are connected to the flanges on the front columns 10 and 11.

As stated hereinbefore, the front panels 25, through which the operating handles 41 of the breaker units project, may be removably secured to the front of the structure by means of screws 26. In this manner the panels 25 may be removed to permit the circuit breaker units to be removed from the front of the structure in case it is desired to replace or inspect one of the units.

The switchboard illustrated in Figs. 11 and 12 is of a type in which a swinging panel or door 42 is provided for one side of the structure to permit ready access to the interior of the cubicle. It will be seen that the framework of this structure comprises a number of the universal shapes hereinbefore described. Thus, the column members 11 are utilized at the corners of the structure and

the members 10 are utilized for the center columns. Also, the channel members 15 are utilized as cross members at both the top and the bottom of the structure. A sheet metal panel 21 may be secured at the end of the structure in the recesses provided in the column members 11, as shown. A sheet metal barrier 24 is also provided between the cubicle units and held in position by means of barrier supports 18 which are disposed inside of the channel column members 10.

If desired, an additional top trim 43 may be secured on top of the structure by screws 44 which are threaded into holes provided in the cross members 15. Also, an end trim 45, similar in shape to the top trim 43, may be secured at the end of the structure by screws 46 which are threaded into nuts 47 provided inside of the column members 11.

As shown, the door 42 may be hinged in the structure by means of pins 48 which extend through holes provided in the cross members 15. The door may be held in the closed position by means of a latch 51 which engages one of the flanges on the center column 10 and is operated from the outside of the door by means of a handle 52.

If desired, the other side of the structure may be closed by means of a sheet metal panel 53 which is removably secured to the cross members 15 by means of bolts 54. In this manner, access may be had to the interior of the structure from both the front and the rear. As shown, numerous bracket members 55, 56 and 57 may be readily mounted on the interior of the structure for supporting switchboard apparatus, not shown. Furthermore, a flexible conductor 58 may be utilized for connecting apparatus, which may be mounted on the swinging door, to equipment mounted inside the cell structure in the usual manner. Thus it will be seen that the universal shapes herein described may be utilized in constructing a switchboard of a type which has previously been considered as being of a complicated design.

As a further illustration of the flexibility of the universal shapes which I have devised, a switchboard of the desk type is shown in Figs. 13 and 14. As in the designs previously described, the rectangularly shaped members 11 are utilized as the corner columns for the main portion of the switchboard and the U-shaped members 10 are utilized as the center columns. However, the smaller members 12 and 13 are utilized as the columns for the desk portion of the switchboard. The U-shaped channel members 16 are provided as cross members at the front of the desk, as shown, and also at the top of the rear of the structure. In order to permit the rear panels 59 to be removed readily, the channel members 17, in which one leg is shorter than the other, is utilized at the bottom of the structure, thereby permitting the rear panel to be raised as indicated by the dotted lines and readily removed from the rear of the board.

The table 61 of the desk is formed from sheet metal and may be held in position by means of clamps 62, which are secured to the channel member 63 in the manner illustrated in Fig. 15. The ends of the structure may be enclosed by means of sheet metal panels 21 disposed in the recesses provided in the corner columns 11 and 13, as shown, and a sheet metal top 64, thereby providing an enclosed structure to which access may be had from the rear in the manner hereinbefore described. If desired, a swinging panel,

similar to the one shown in Figs. 11 and 12, may be utilized in place of the panel 59.

From the foregoing description, it is apparent that the structures described have numerous advantages over previously known switchboard structures. Since it is possible to produce the universal shapes in large quantities, because of their wide application in switchboards of various types, and in view of the general simplification of the manner in which they may be fitted or interlocked together, the cost of producing steel switchboards can be materially reduced. Furthermore, large savings can be realized by the use of coded drawings and typical steel assembly drawings which can be prepared for cubicles of any certain type, but varied as to dimensions, thereby making it unnecessary to prepare complete drawings of the steel assemblies for each individual order as has been the previous practice among switchboard manufacturers.

I do not desire to be restricted to the particular form or arrangement of parts herein shown and described since it is evident that they may be changed and modified without departing from the spirit and scope of my invention as defined in the appended claims.

I claim as my invention:

1. A switchboard structure comprising spaced substantially enclosed formed sheet metal upright frame members having flanges thereon, formed sheet metal channel cross members welded to said upright members at their junction points, and sheet metal panel members mounted on the frame members for enclosing the switchboard structure.

2. A switchboard structure comprising substantially rectangular formed sheet metal upright frame members having flanges thereon, formed sheet metal channel cross members welded to said upright members at their junction points, barrier supports disposed within part of said upright members and said cross members and secured thereto, and sheet metal barriers secured to said barrier supports.

3. A switchboard structure comprising formed metal column members disposed at the outside corners thereof, additional formed metal column members disposed between the corner members, formed metal channel members horizontally disposed between said column members and welded thereto at their junction points, formed metal barrier supports disposed in said intermediate column members, and sheet metal barriers secured to said barrier supports.

4. A switchboard structure comprising formed metal column members disposed at the outside corners thereof, additional formed metal column members disposed between the corner members, said additional members being of a U shape and having laterally extending flanges thereon, formed metal channel members horizontally disposed between said column members and welded thereto at their junction points, and sheet metal panels removably secured to the flanges on said column members.

5. A switchboard structure comprising formed metal column members disposed at the outside corners thereof, additional formed metal column members disposed between the corner members, said additional members being of a U shape and having laterally extending flanges thereon, formed metal channel members horizontally disposed between said column members and welded thereto at their junction points, formed metal barrier supports disposed inside of part of said

channel members, sheet metal barriers secured to said barrier supports, and sheet metal panels removably secured to said columns.

- 5 6. A switchboard structure comprising substantially rectangular formed metal column members disposed at the outside corners thereof, each of said members having a laterally extending flange thereon, additional formed metal column members disposed between the corner
10 members, said additional members being of a U shape and having laterally extending flanges thereon, formed metal channel members horizontally disposed between said column members and welded thereto at their junction points,
15 formed metal barrier supports disposed inside of the U-shaped column members, sheet metal barriers secured to said barrier supports, and sheet

metal panels removably secured to the flanges on said columns.

7. A switchboard structure comprising substantially rectangular formed metal column members disposed at the outside corners thereof, each of said members having a laterally extending flange on one side and an offset portion on the opposite side, additional formed metal column members disposed between the corner
10 members, said additional members being of a U shape and having laterally extending flanges thereon, formed metal channel members horizontally disposed between said column members and welded thereto at their junction points, and
15 sheet metal panels disposed in the offset portions of the column members.

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