

Oct. 8, 1935.

M. J. ARNDT

2,016,475

TELEPHONE EQUIPMENT

Filed Aug. 17, 1932

3 Sheets-Sheet 1

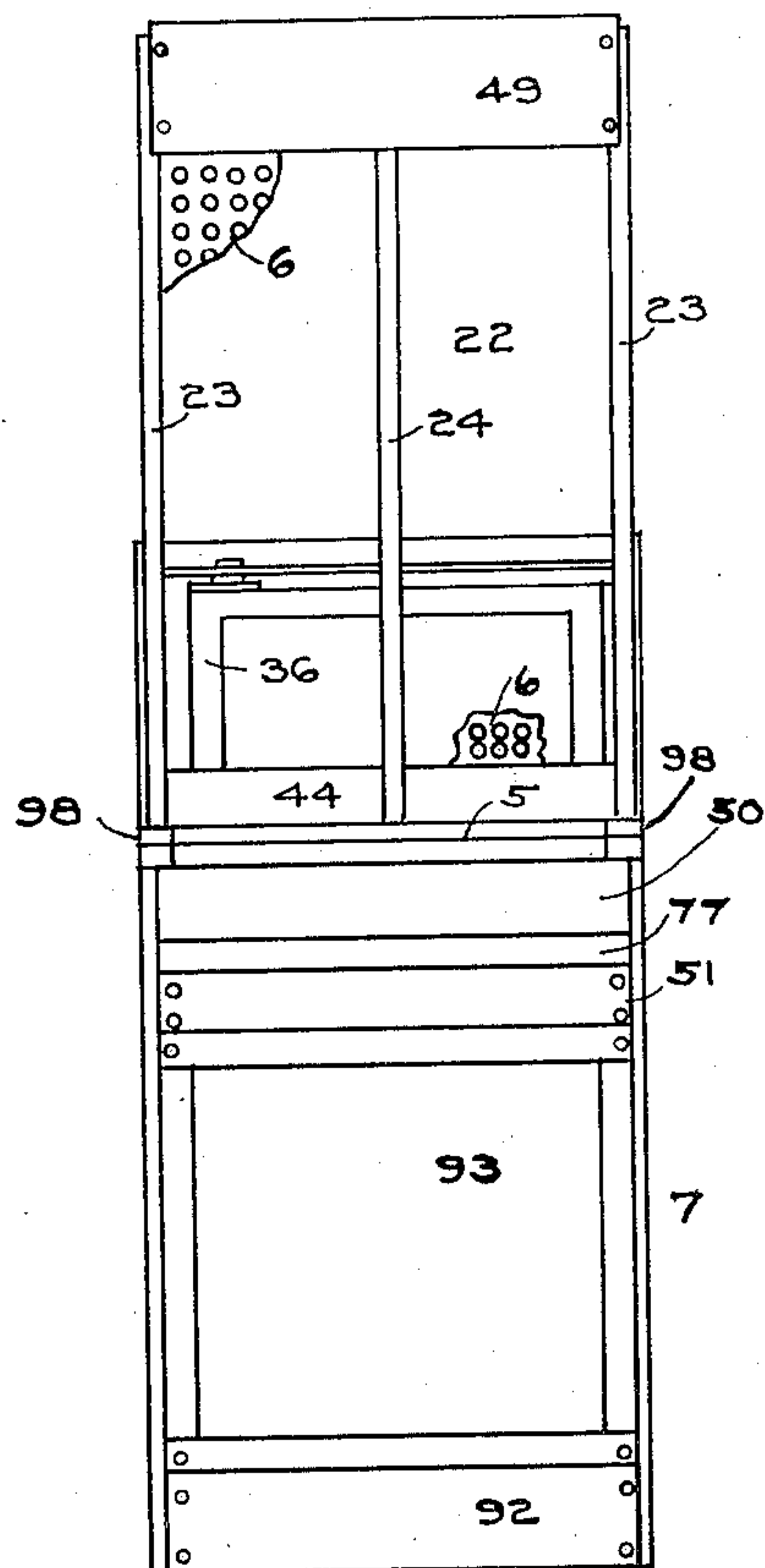


FIG. 1

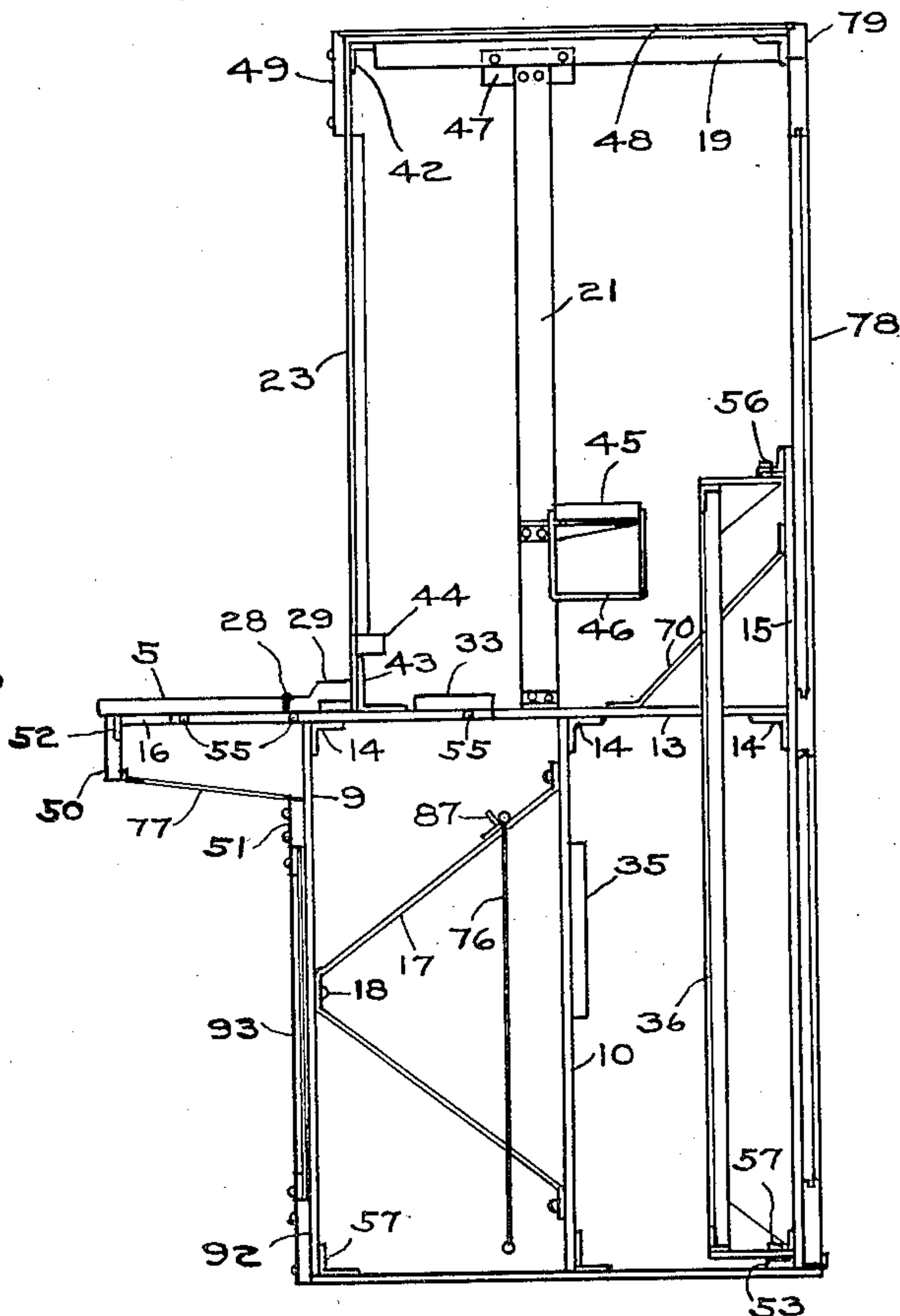


FIG. 2

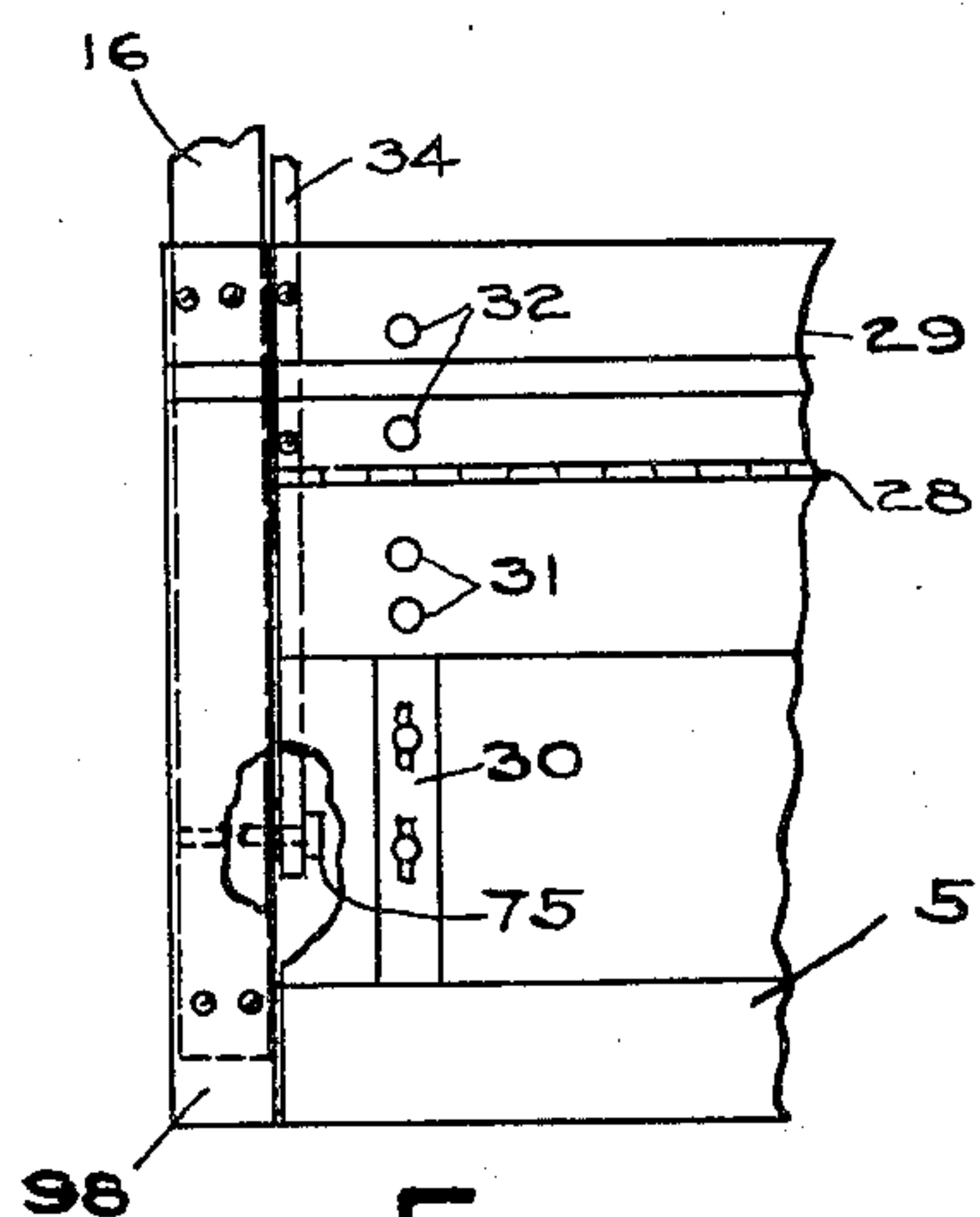


FIG. 3

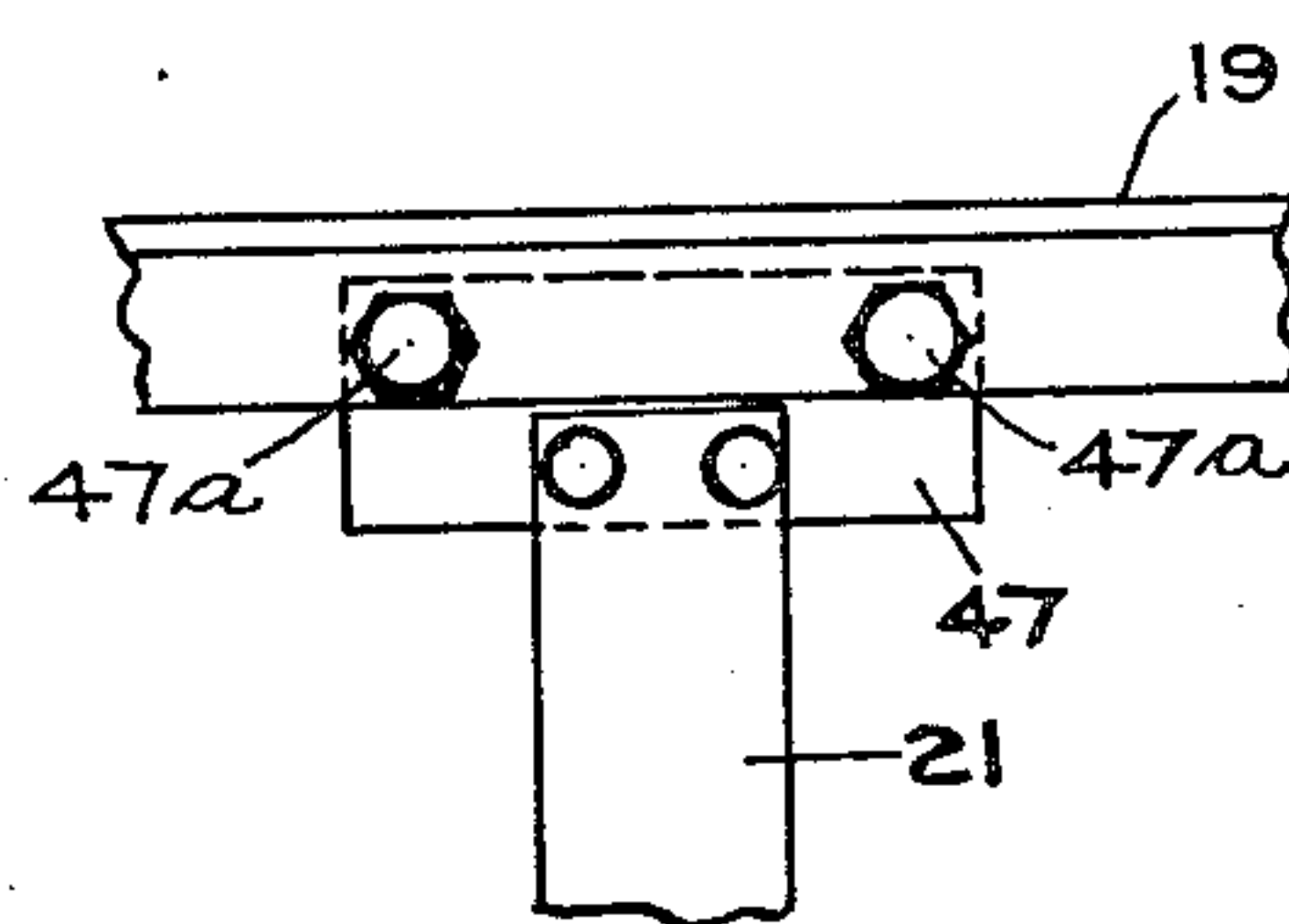


FIG. 4

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3 Sheets-Sheet 2

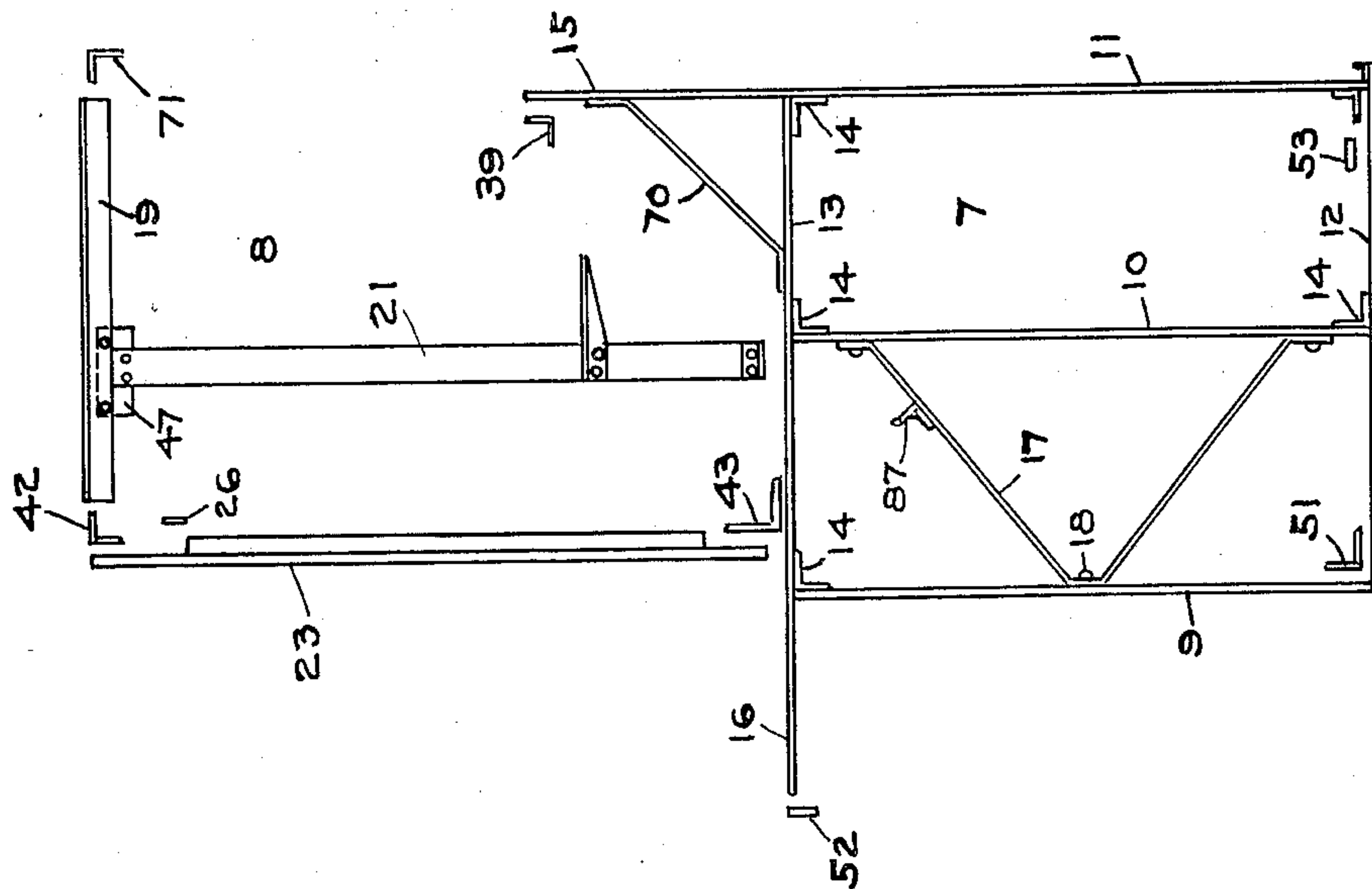


FIG. 6

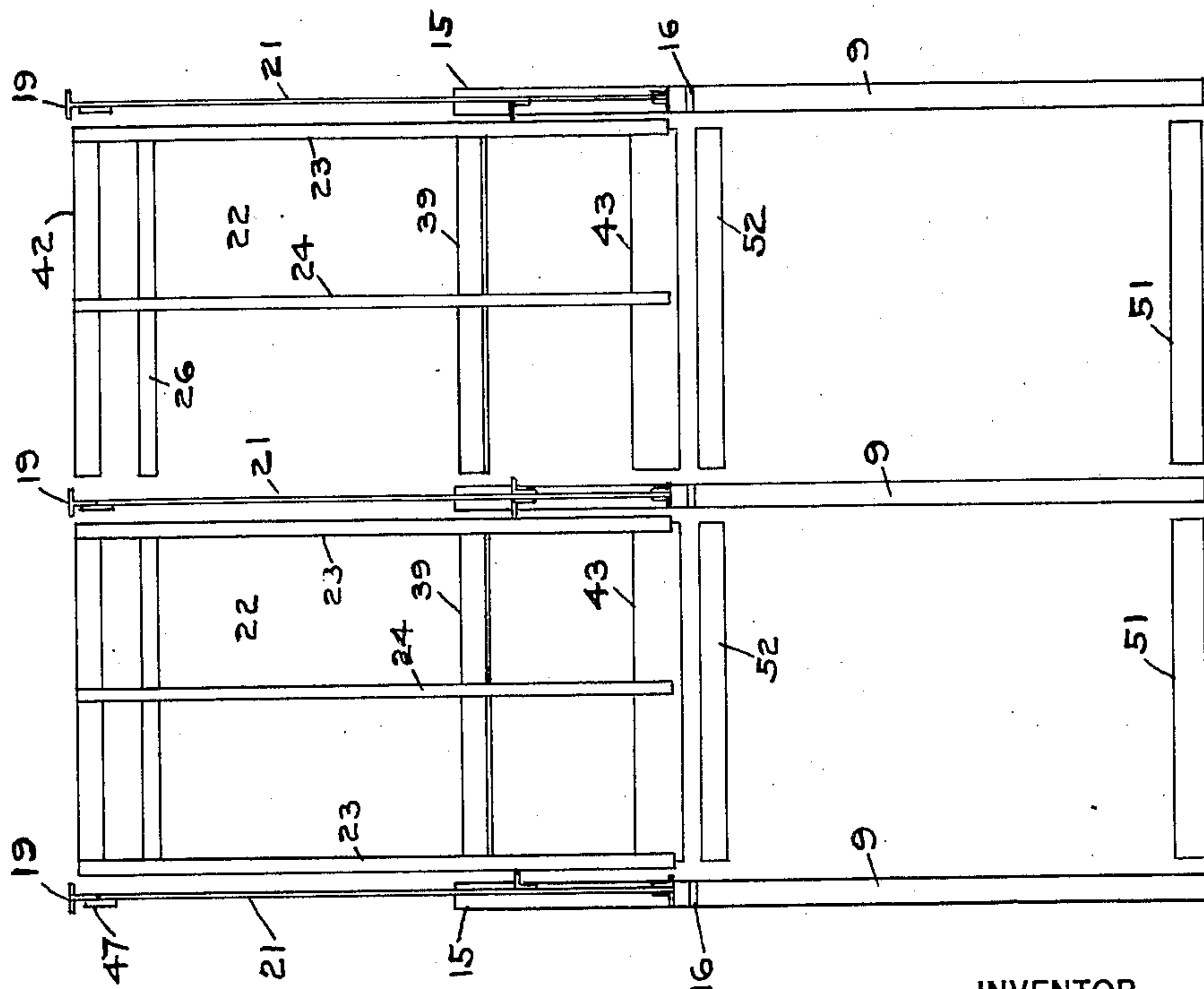


FIG. 5

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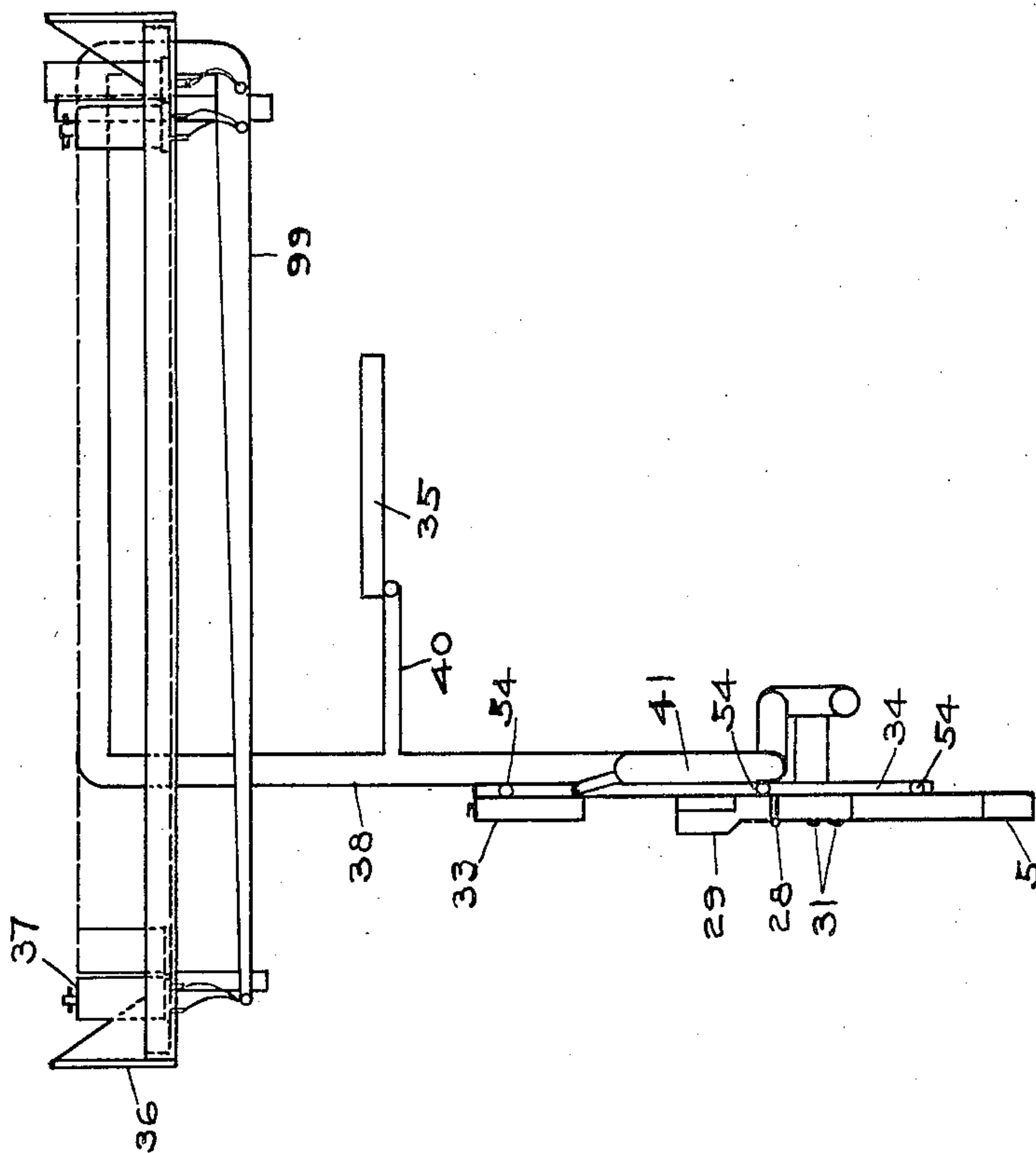
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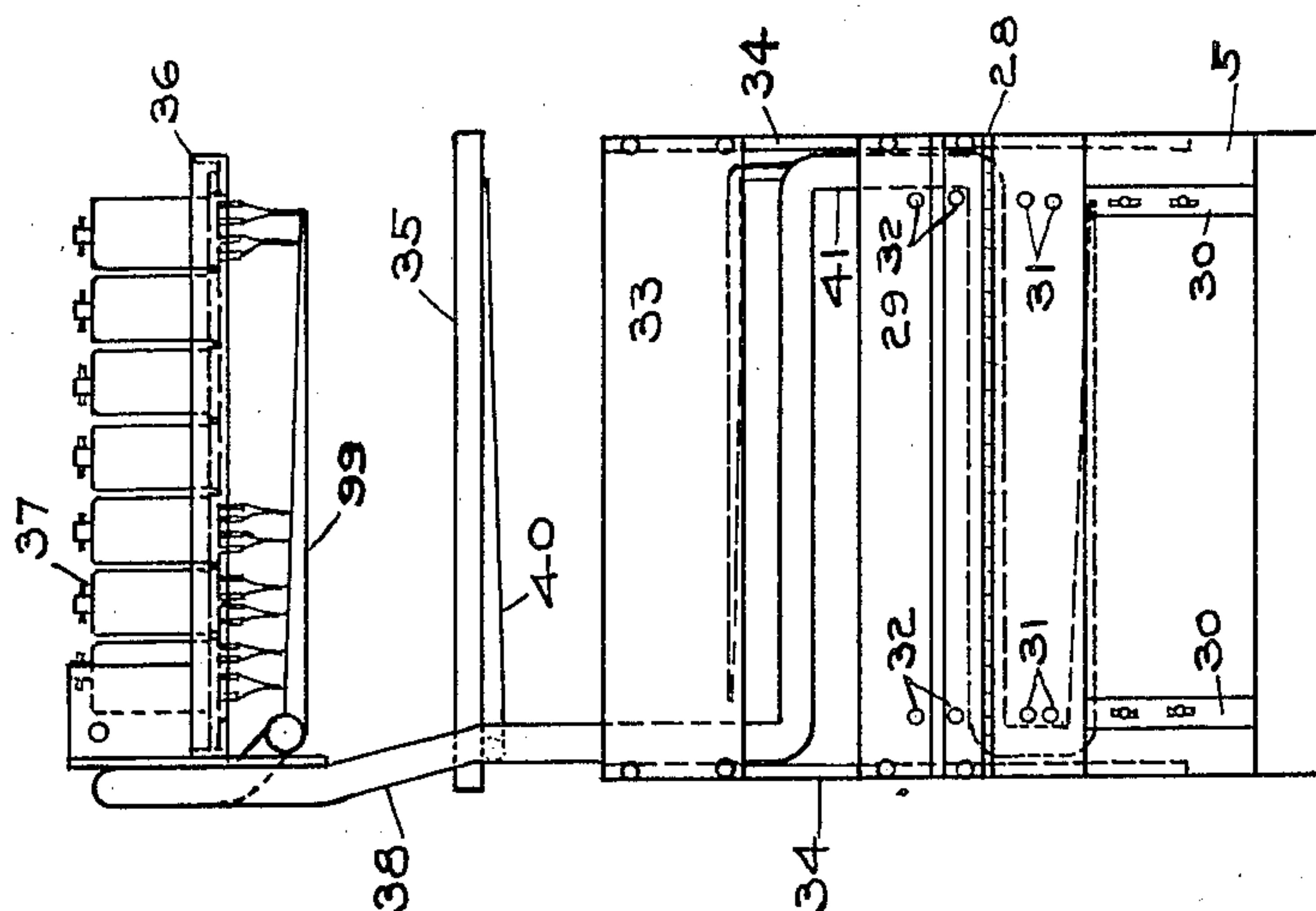
TELEPHONE EQUIPMENT

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UNITED STATES PATENT OFFICE

2,016,475

TELEPHONE EQUIPMENT

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Application August 17, 1932, Serial No. 629,167

5 Claims. (Cl. 179—91)

This invention relates to telephone equipment and more particularly to telephone switchboards.

In the past it has been proposed as shown in the patent to Lowry #1,231,629, granted July 3, 1917, to make the telephone equipment of a switchboard section such as the relay supports, cord circuits and key shelf equipment, easily removable with respect to the multiple jack and cabling portion of the switchboard. It has also been the practice to construct switchboard sections of structural steel strips, and to make the relay racks such as are installed in the terminal room of a telephone exchange of knock-down steel strips which are assembled at the exchange when it is being installed.

The present invention has for its purpose, a knock-down type of construction for switchboard sections which reduces the cost of manufacture, facilitates shipment and reduces the labor of installing a switchboard section or sections in a telephone exchange.

For a clearer understanding of the invention, reference is made to the drawings in which Fig. 1 is a front view of a switchboard section with portions thereof omitted for clearness in disclosure; Fig. 2 is an end view of a section with the wooden end panel and the equipment thereof removed; Fig. 3 is an enlarged detailed view of a portion of Fig. 1 indicating the mounting of the key shelf; Fig. 4 is an enlarged detailed view of Fig. 2 indicating the arrangement whereby the tops or roofs of several switchboard sections may be levelled and brought into desired alinement; Fig. 5 is a front view of the framework of two switchboard sections with the parts of the framework thereof in position ready to be assembled; Fig. 6 is an end view of the iron work of a switchboard section with the parts thereof in approximate position ready for assembling; Fig. 7 is a top view, and Fig. 8 a side view of a key shelf and a related relay gate with a cable electrically connecting the relays to the related equipment, such as supervisory lamps and keys normally mounted on the key shelf.

The switchboard section illustrated in Fig. 1 includes a key shelf 5 on which there is mounted well-known operating equipment (not shown) and a portion of the multiple jack field 6 which is mounted on a skeleton framework of iron or steel, fabricated by the manufacturer so that it may be packed compactly for shipment to the customer, and so that it may be readily assembled by an installer during the course of installing or

erecting the section or sections in the customer's telephone exchange.

As best shown in Fig. 6, the skeleton framework at each end of the section, comprises two parts, such as an end frame 7 and an end frame upright 8. The end frame 7 is made of spaced uprights 9, 10 and 11 formed of cold drawn bar steel of rectangular cross section of uniform dimensions and uniform straightness. These uprights are fastened to horizontal bars 12 and 13 of the same material as the uprights with the widest cross sectional dimensions of the several bars extending in a direction at right angles to the general plane of the end frame. These several bars of the end frame are fastened together at the factory in any suitable manner, such as by spot welding, but it is preferred to employ brackets 14 which are riveted respectively to the uprights and to the horizontal bars. The upright bar 11 is provided with an extension 15 which serves to support one end of a relay gate to be referred to, while the horizontal bar 13 is provided with an extension 16 which serves as a support for the key shelf 5 also to be further described. In order to give rigidity to the end frame, a V-shaped or two-way brace 17 is attached at 18 to the upright 9 and the free ends thereof are riveted to the upright 10, while brace 17 has its ends attached to horizontal bar 13 and to extension 15. It has been found that, in absence of the brace 17, the end frame can be vibrated even in the direction of its principal plane, probably due to its construction of flat bars. With the addition of this brace the erected skeleton framework of the section is rigid even though expensive metal gussets are not used.

The end frame upright 8 is generally T-shaped and is formed of a horizontal T-iron bar 19 having its intermediate portion adjustably mounted on an upright 21 of bar steel. The specific mounting of the T-iron 19 on the bar 21 as best shown in Fig. 4, includes a strip 47 riveted or otherwise fastened to the upper end of the bar 21. The strip 47 has tapped or threaded openings therein in alinement with enlarged openings in the vertical flange of the T-iron 19, and cap screws 47a passing through the openings in the T-iron 19 engage tapped openings in the strip 47. It will be understood that the openings in the T-iron 19 are of sufficient size to permit the T-iron 19 to be adjusted relative to the upright 21 in all directions in the principal plane of the end frame upright for levelling and alining the tops or roofs of several adjoining sections as will be further described, after which the parts are

clamped in the adjusted position. This adjustment also permits the jack stile assembly and the back of the section to be plumbed. In addition to the end frames and the end frame uprights, the skeleton framework includes the cross bars 39, 42, 51, 52, 53 and 71, as well as the jack stile assemblies or frames generally designated 22, which include the uprights 23, the vertical stiles 24, cross bars 42, 26 and 43. It will be noted in Figs. 1 and 5, that the jack stile frame for use in an individual section is provided with two end uprights 23, whereas, the jack stile frame of a second section to be used with an individual section has a single end upright 23, since in the latter case one end upright may be used in common for two jack frame assemblies. While various practices may be followed in fabricating the skeleton framework at the factory, it is preferred to assemble at the factory, the end frames 7, the end frame uprights 8, each as individual units which may be shipped with the several cross bars, as well as the jack frame assembly parts in knocked-down form to the customer in whose exchange the several units may be erected and bolted together to constitute a skeleton framework of a switchboard section or sections.

In addition to the framework there are provided various pieces of wood and wooden panels dressed according to the desired finish of the board, which parts are also packed separately for assembling on the skeleton framework, during the installation of the section or sections. In addition to the various parts just described, there is assembled at the factory, operator's position equipment units, these units include key shelf 5 connected by hinge 28 to a two-level plug shelf 29 on which there are mounted key strips 30 of which only two have been shown in Fig. 7, although it will be understood that a key strip is provided for each operator's cord circuit provided at the section. The key shelf is also provided with supervisory lamps 31 associated with openings 32 in the two level plug shelf to receive the plug ends of various cord circuits (not shown). It will be noted from Fig. 7 that each key strip 30 is placed in alignment with its related supervisory lamps 31, and the openings 32 for the cords of its associated cord circuit in accordance with the usual practice. The plug shelf 29 as well as the cord rack 33 are secured to the bars 34. The unit also includes a terminal board 35 on which there is mounted the usual terminal equipment, also the unit includes a relay gate 36 on which there are mounted the relays 37 and related equipment for the several cord circuits. A cable form generally designated 38 has a portion 99 where its conductors are fanned out for connection to the terminals of the relays 37 and similar equipment mounted on the relay gate. This form also has a branch 40, conductors of which are similarly fanned out for connection to the terminals on the terminal board 35, the form also is made with a loop 41 in accordance with the well-known practice which permits one end of the cable form to be fanned out for connection with terminals of the several key strips, and the lamp jack terminals all in the well-known practice.

In assembling the switchboard section, a pair of end frames 7 after being properly leveled and aligned are fastened together by means of cross bars 39, 51, 52 and 53, which bars are bolted to the respective parts of the end frames. The end frame uprights 8 are then mounted in position on the end frames by having the lower ends of the

uprights 21 bolted to the bars 13. The angle iron cross bars 42, and 71 are attached to the respective ends of the horizontal T-bar 19 and the cross bar 43 is fastened at its ends to the horizontal bars 13 of the end frame section. The jack frame assemblies 22 may have their parts joined together as a unit or the respective parts thereof may be joined to the cross bars 42 and 43 in any manner desired. Thereafter, the piling blocks 44 are mounted in place and the multiple jack strips 10 of the multiple field 6 are placed in superimposed position or piled on the piling blocks. Multiple cables (not shown) but which are supported on the multiple cable shelf 45 carried by a bracket on the upright 21, have their respective conductors connected to the terminals of the multiple jacks in the several strips in accordance with the well-known practice. A cable or cables for the rural and toll lines (not shown) may then be drawn through the brackets 46 also in accordance with the usual practice.

At this time a position cord circuit unit of Figs. 7 and 8 may be mounted in each section by inserting it from the rear of the section to the position shown in Figs. 1 and 2 where cap screws such as 75 passing through openings 54 (Fig. 8) in the bars 34 are screwed into tapped openings 55 in edges of the horizontal bars 13. The terminal board 35 may then be mounted on the uprights 10 and the relay gate 36 is swingingly supported on the pintles 56 and 57, supported at the rear of the section. The pairs of cords (not shown) of the respective cord circuits are supported from the cord rack 33 with the plug ends of these cords supported in the openings 32 of the plug shelf in accordance with the usual practice. The canvas apron 76 supported on the lugs 87 on the brace 17 serves to confine the cord weights of the cords (not shown) to their normal position and also serves to deaden the noise of these weights when they drop into position during the frequent use of the cords.

The roof or roofs 48 of the section or sections may then be screwed to the horizontal flanges 45 of the T-iron 19 and these roofs may be leveled and brought into alignment, while the jack stile assembly and the back of the section can be plumbed by changing the relation between the bars 19 and 21, after which these bars are locked in adjusted position by the cap screws 47a. A wooden frieze board 49, a lock board 50, key pan 77 together with the upper and lower front rails 51 and 92 as well as the rear panel locking strip 79, are likewise fastened into position. The front panel 53 may be mounted in position as shown, after which the wooden end panels (not shown) and the rear wooden panels 78 are mounted in accordance with the usual practice.

As best shown in Figs. 1 and 3 the key shelf 5 is of such length that it will pass between the end frames 7. In order to make the key shelf smooth and to give the board a finished appearance, a wooden block or strip 98 is attached to each of the top faces of the extension bars 16.

It has been found that by making the horizontal bar 13 and its extension 16 integral, as well as by placing the longest cross sectional dimension of the respective bars of the end frame at right angles to the plane of this frame, a rigid skeleton framework is provided which will hold the various parts in alignment even after long periods of use.

It will be understood that the invention is not

limited to the sequence of assembling operations herein described, since the sequence of operations may be varied to fit different installing conditions and in accordance with the convenience of the individual installer. The invention is likewise not limited to the exact details of construction, but includes all variations and modifications of the invention within the scope of the appended claims.

10 What I claim is:

1. In a knock-down switchboard, a pair of end frames each formed of spaced vertical up-
rights, certain of said uprights being of unequal
length, a two-way brace having its intermediate
15 portion attached to one of said uprights and
its free ends fastened to a second upright, a lower
horizontal bar joined to the lower ends of cer-
tain of said uprights, an upper horizontal bar
joined to certain of the upper ends of said up-
rights, said upper horizontal bar having an ex-
20 tension constituting a key shelf support, said
bars being formed of flat stock generally rec-
tangular in cross section, the flat surface of said
bars extending in a direction perpendicular to
25 the plane of the end frame, cross bars joining
a pair of end frames, a relay gate swingingly
supported adjacent the longest upright of one
end frame, a key shelf mounted on said key
shelf support, switchboard mechanism mounted
30 on said key shelf and said relay gate, and a
cable of conductors connecting the mechanism
on said key shelf and on said relay gate.

2. In a knock-down switchboard, a pair of
end frames, each formed of three spaced verti-
35 cal uprights, one of said uprights being of sub-
stantially greater length than the remaining up-
rights, a V-shaped brace having its intermediate
portion fastened to one of said uprights and its
free ends fastened to a second upright, a lower
40 horizontal bar joined to the lower ends of cer-
tain of said uprights, an upper horizontal bar
joined to certain of the upper ends of said up-
rights, said upper horizontal bar having an
extension constituting a key shelf support, said
45 extension having openings in at least one of
its vertical sides, said bars being formed of
flat stock generally rectangular in cross section,
the flat surface of said bars extending in a di-
rection perpendicular to the plane of the end

frame, an end frame upright mounted on each
end frame, cross bars respectively joining a pair
of end frame uprights and each pair of end
frames, a relay gate swingingly supported adja-
cent the longest upright of one end frame, a key
5 shelf mounted in the openings in the sides of the
key shelf support, switchboard mechanism
mounted on said key shelf and said relay gate,
and a cable of conductors connecting the mech-
anism on said key shelf and on said relay gate. 10

3. In a knock-down metal framework for a
switchboard section including a pair of end
frame uprights, each end frame upright includ-
ing a vertical bar and a horizontal bar adjust-
ably mounted at its top to provide a T-shaped
15 construction, said horizontal bar being adjust-
able with respect to the vertical bar in all direc-
tions in the principal plane of the end frame
upright, and cross bars attached to each pair
of end frames. 20

4. In a knock-down metal framework for a
switchboard section, a pair of end frames fabri-
cated from metal bars, a pair of end frame up-
rights, each end frame upright including a ver-
tical bar and a horizontal bar adjustably
25 mounted at its top to provide a T-shaped con-
struction, said horizontal bar being adjustable
with respect to the vertical bar in all directions
in the principal plane of the end frame upright,
and cross bars fastened to each pair of end
30 frames and each pair of end frame uprights.

5. In a framework for a telephone switch-
board, a pair of end frames, each formed of
uprights and horizontal members fabricated from
flat bars of metal having their longest cross
35 sectional dimension perpendicular to the plane
of the end frame, each end frame having a two-
way brace connected at its intermediate point
to one upright and its free ends connected to
another upright, an end frame upright of T-
40 shape formed of a horizontal bar and a vertical
bar for mounting on each end frame, said hori-
zontal bar being adjustable with respect to the
vertical bar in all directions in the principal
plane of the end frame upright, and cross bars
45 joining each pair of end frames and each pair
of end frame uprights.

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