

March 3, 1953

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2,630,364

LOCKING AND RELEASE MECHANISM FOR MULTIPOSITION UNITS

Filed Nov. 25, 1949

4 Sheets-Sheet 1

FIG. 1

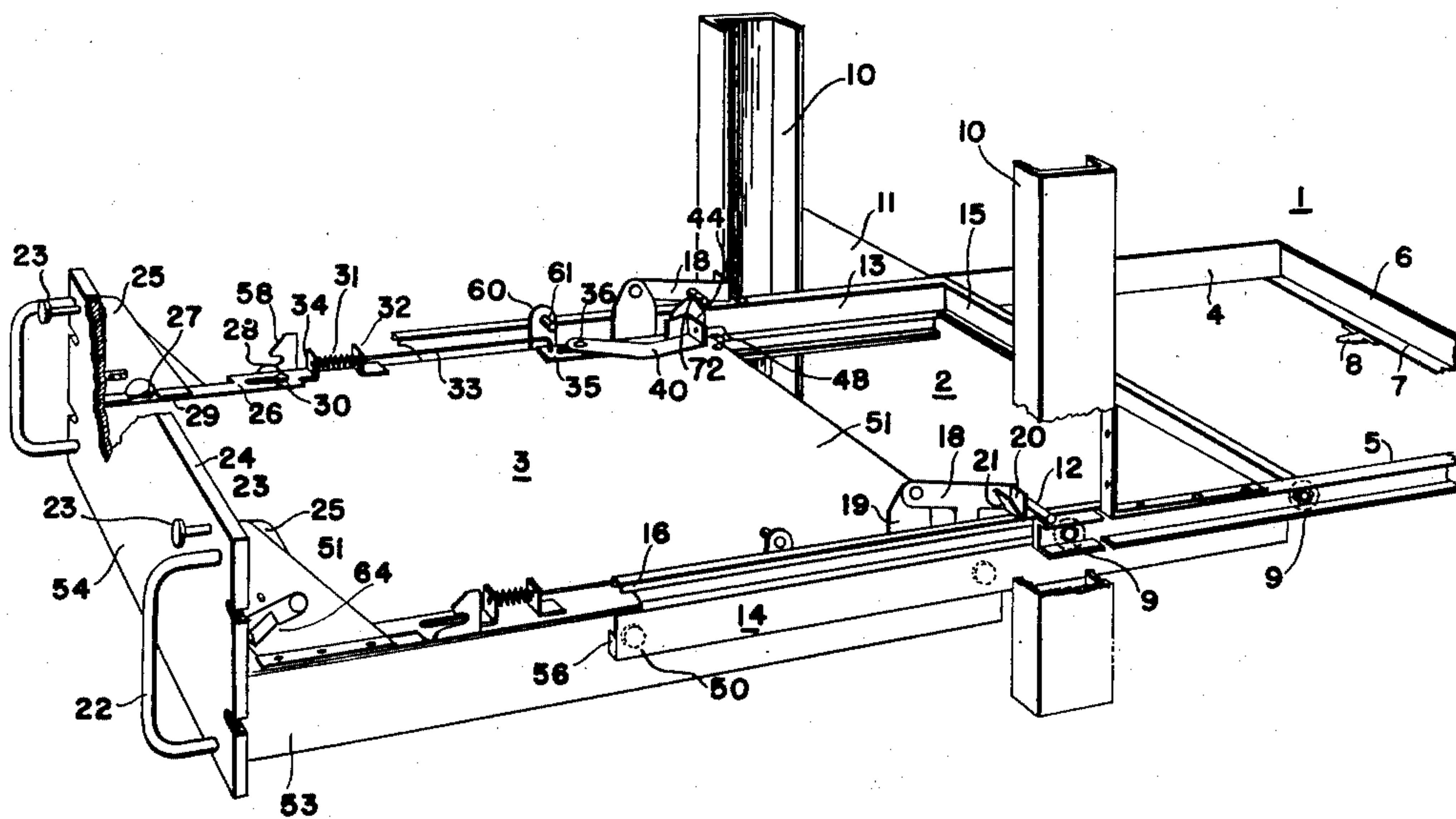
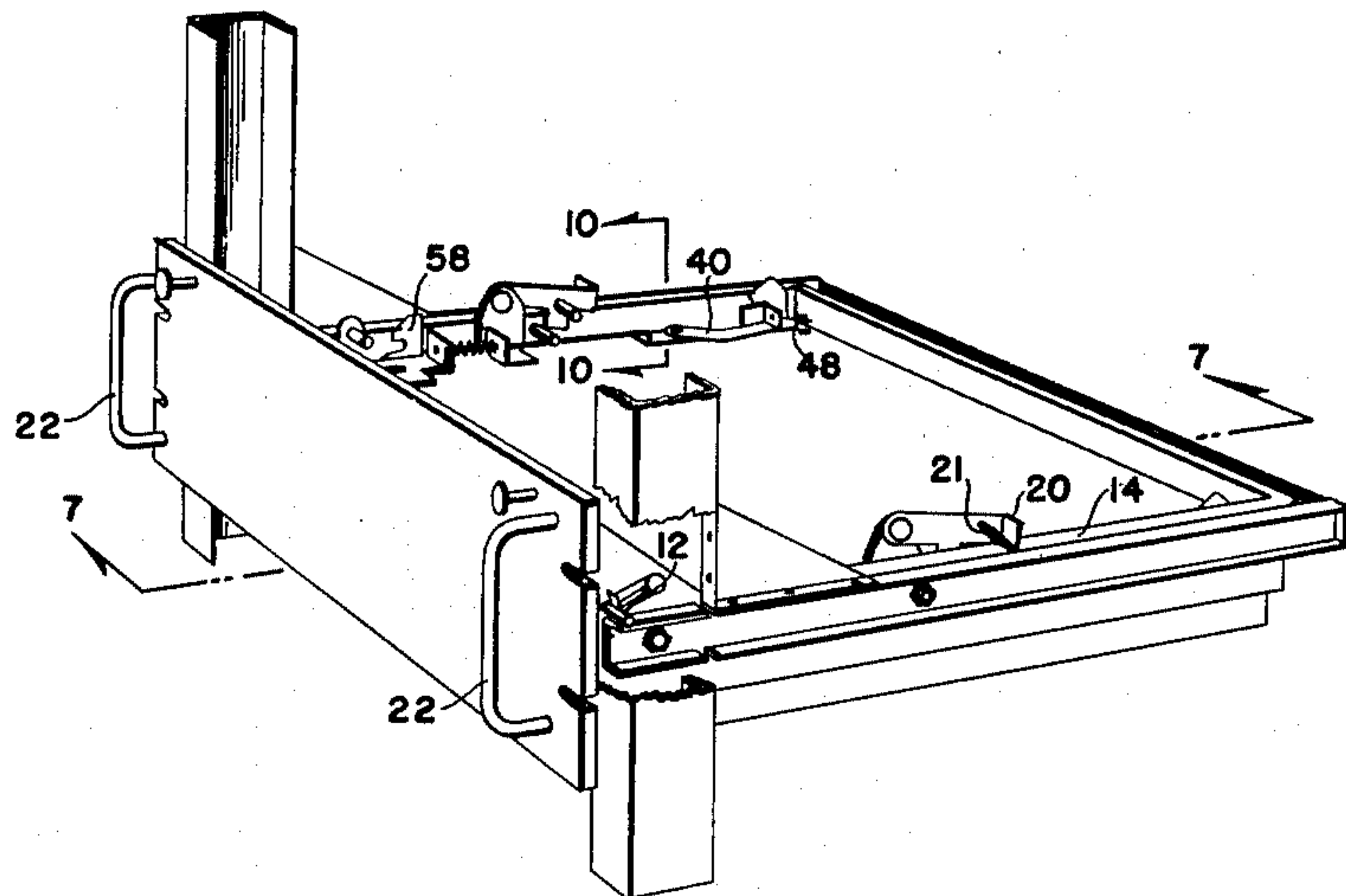


FIG. 2

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FIG. 3

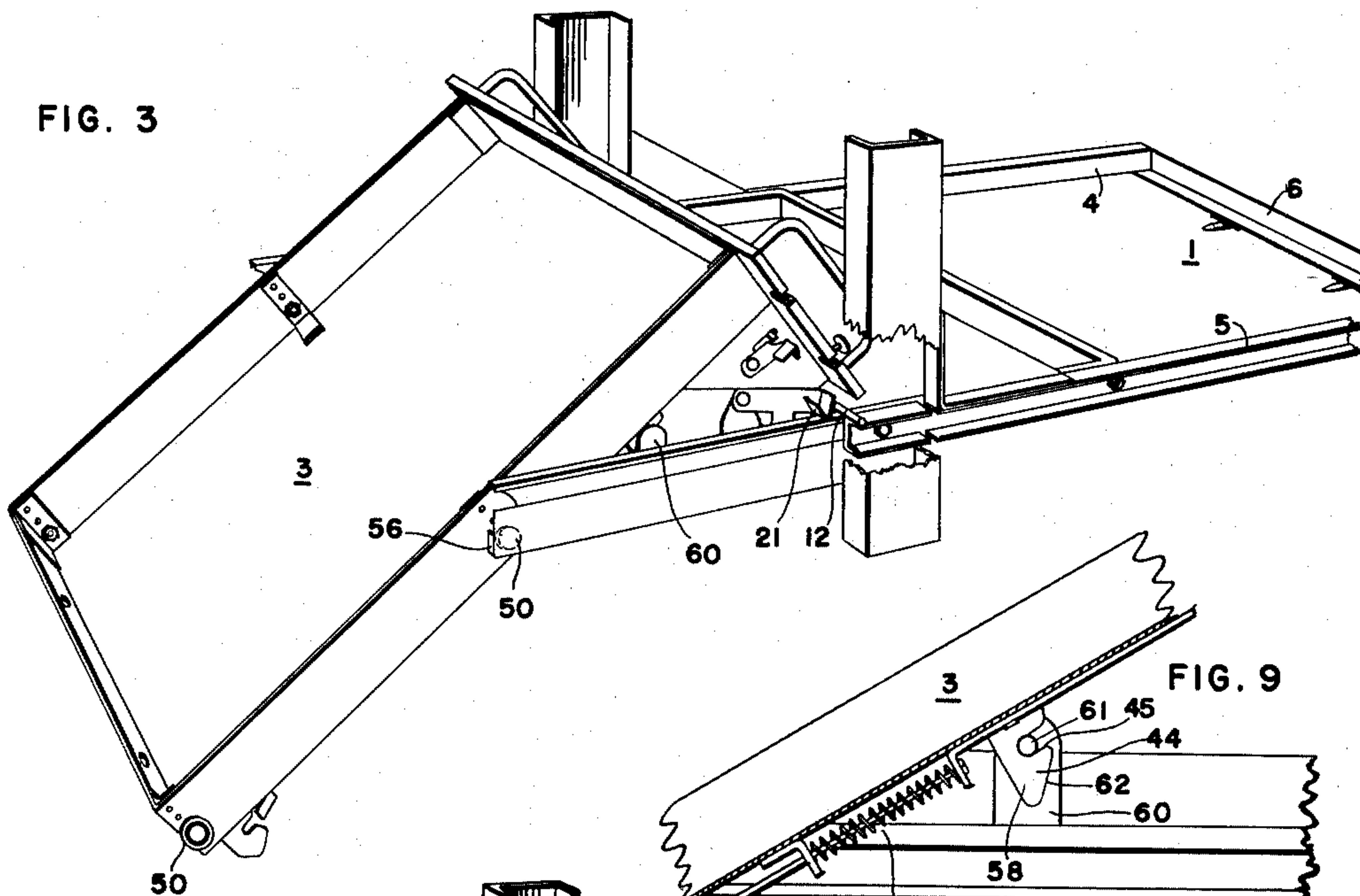


FIG. 9

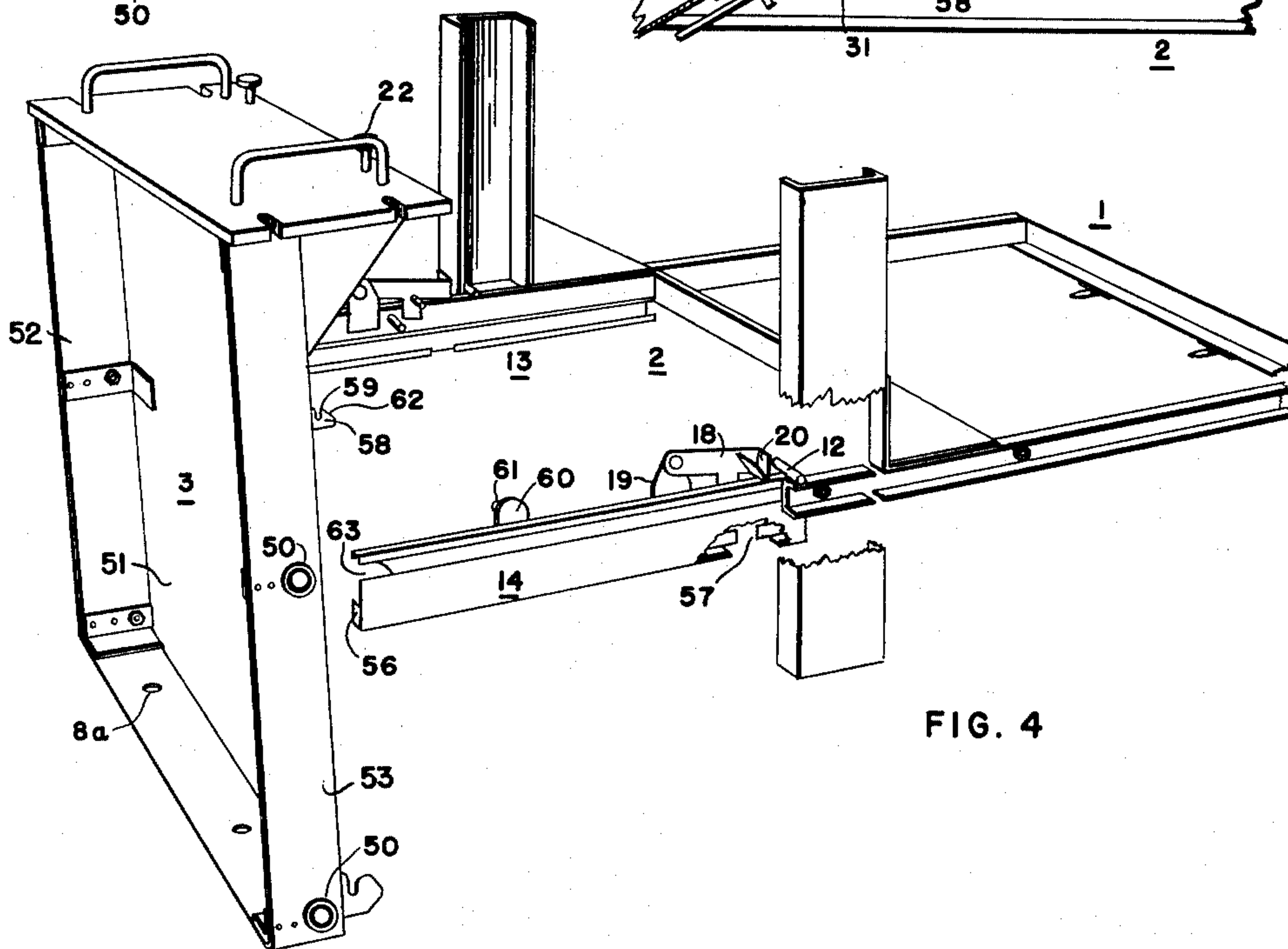
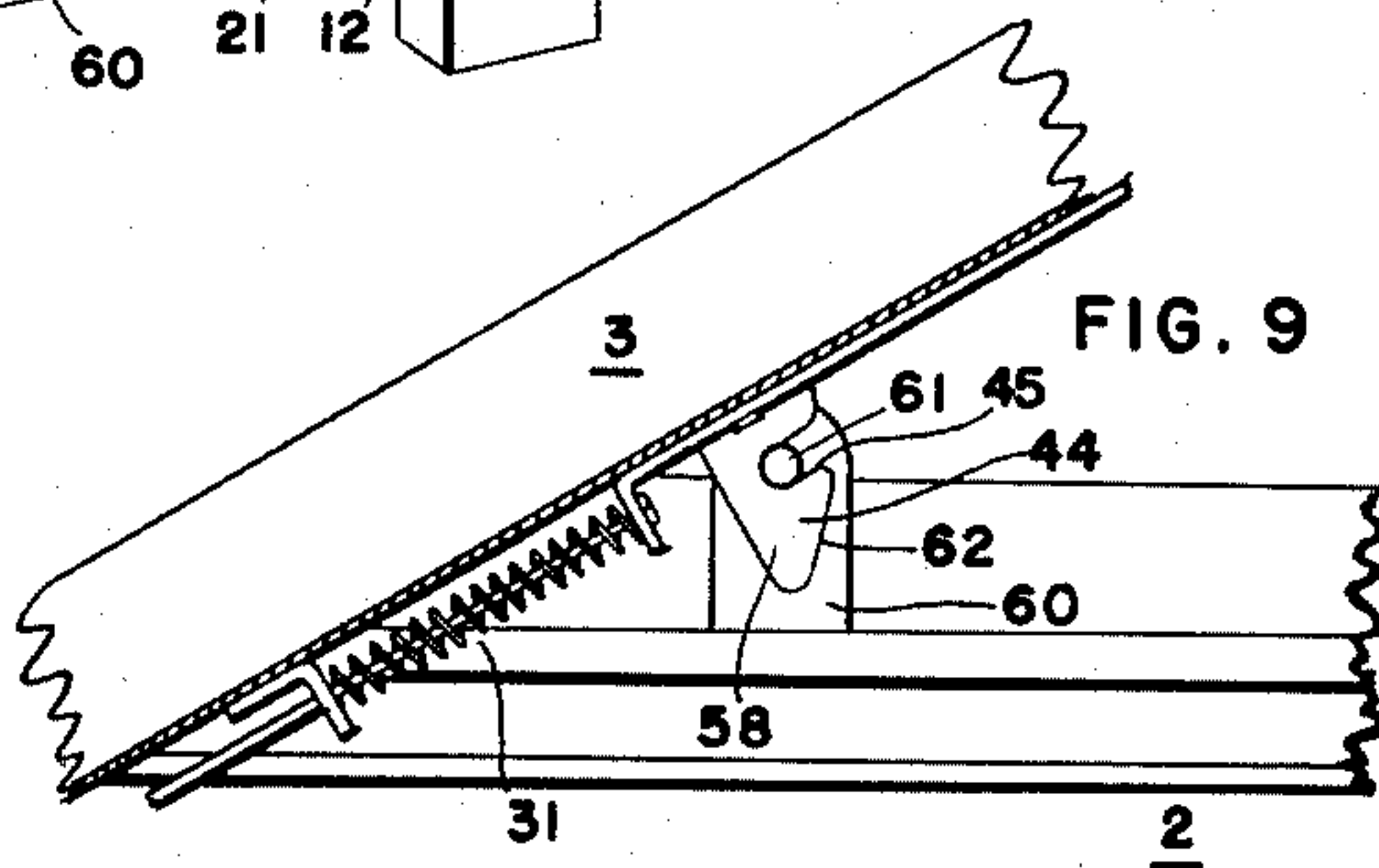


FIG. 4

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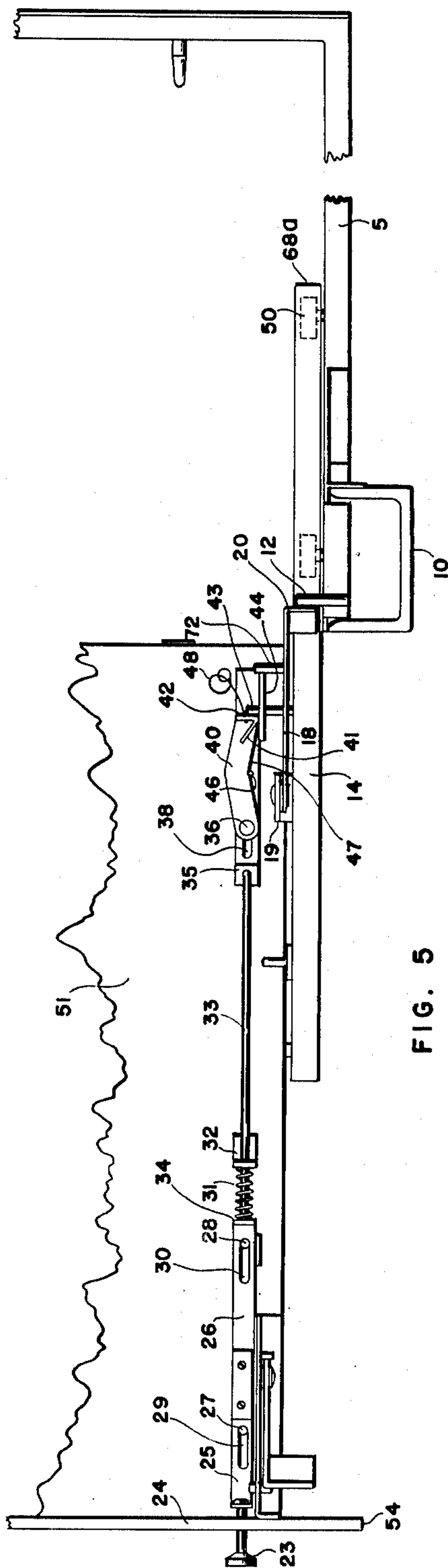


FIG. 5

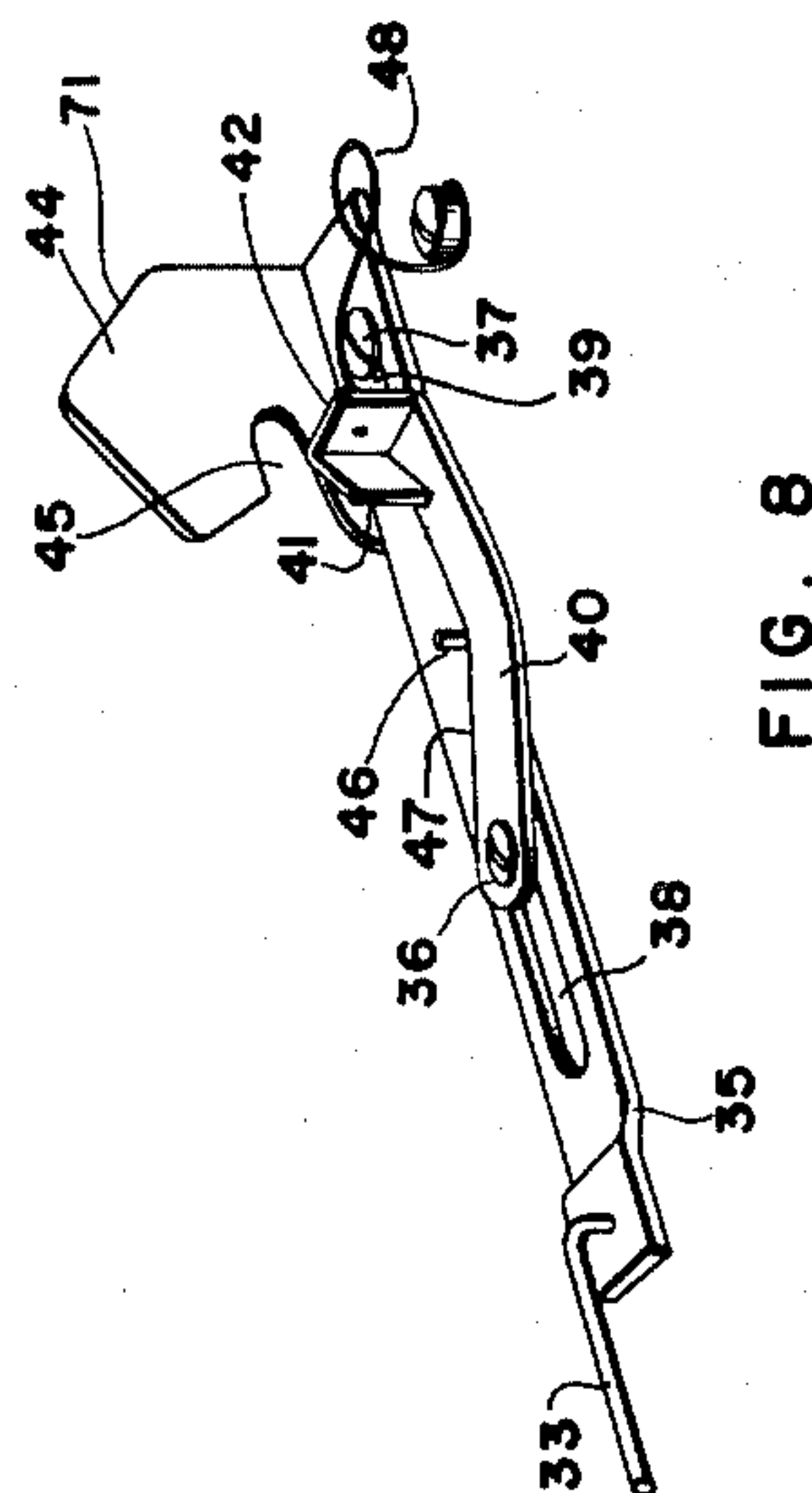


FIG. 8

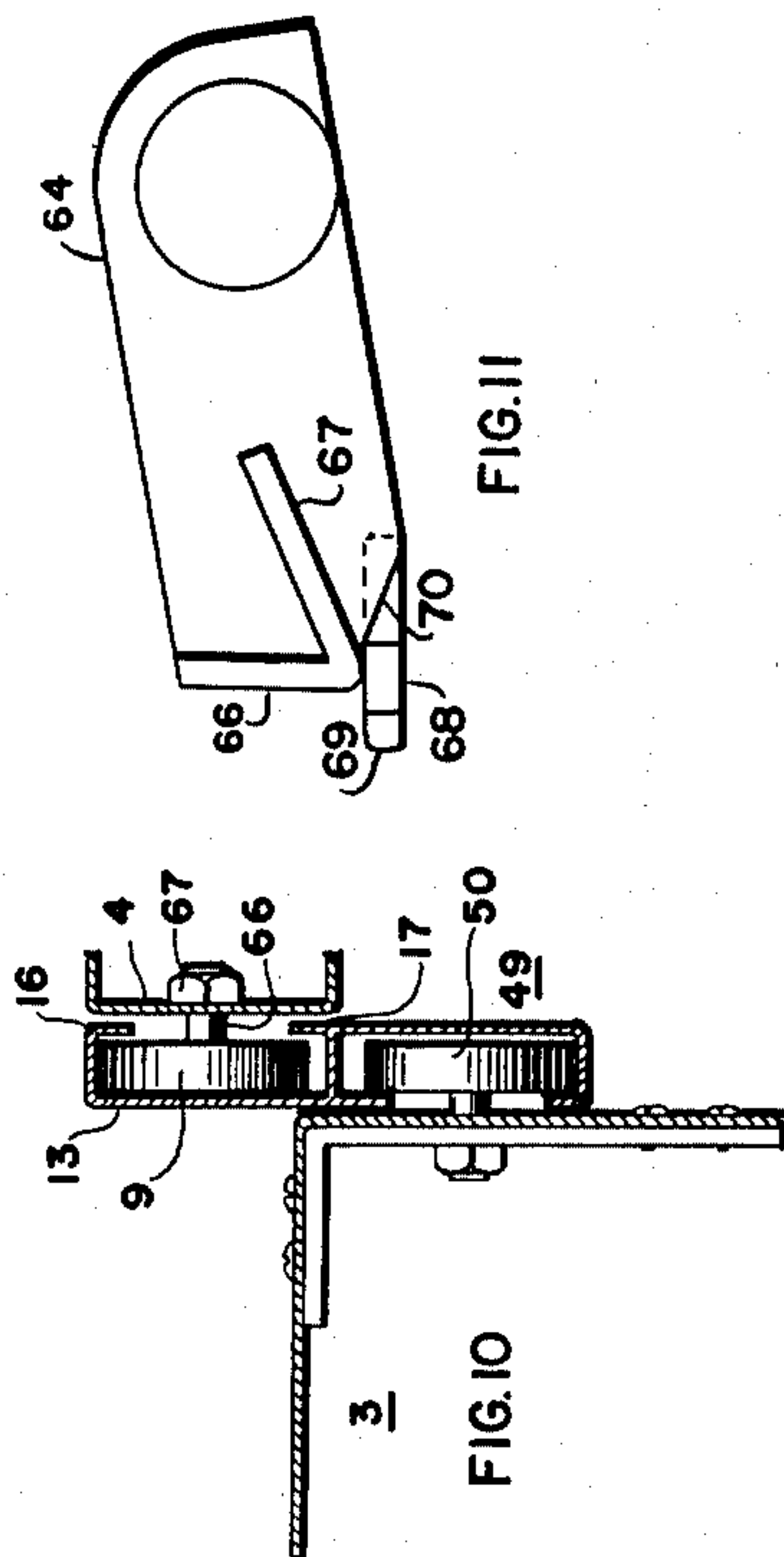


FIG. 10

FIG. 11

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LOCKING AND RELEASE MECHANISM FOR MULTIPOSITION UNITS

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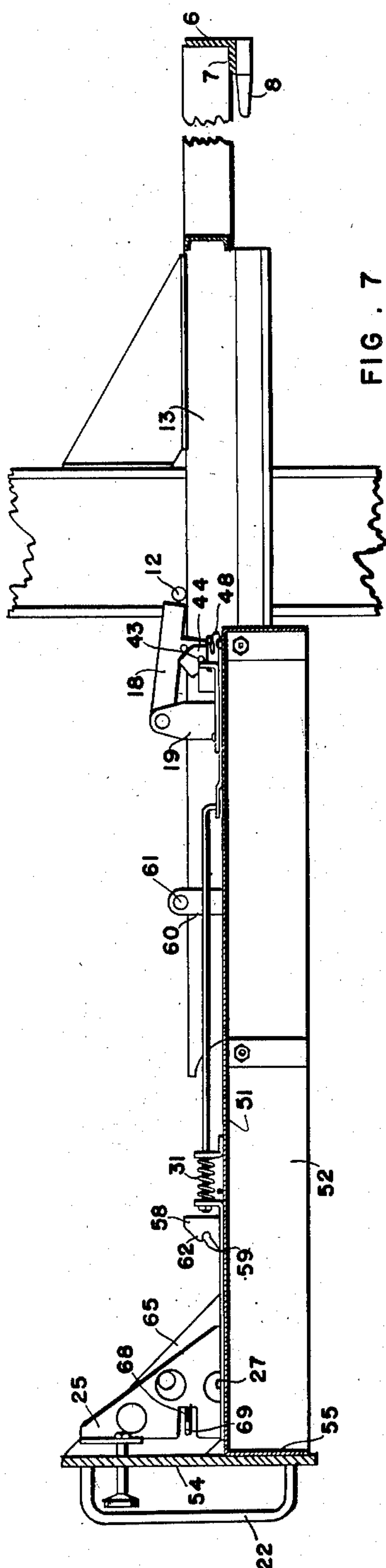
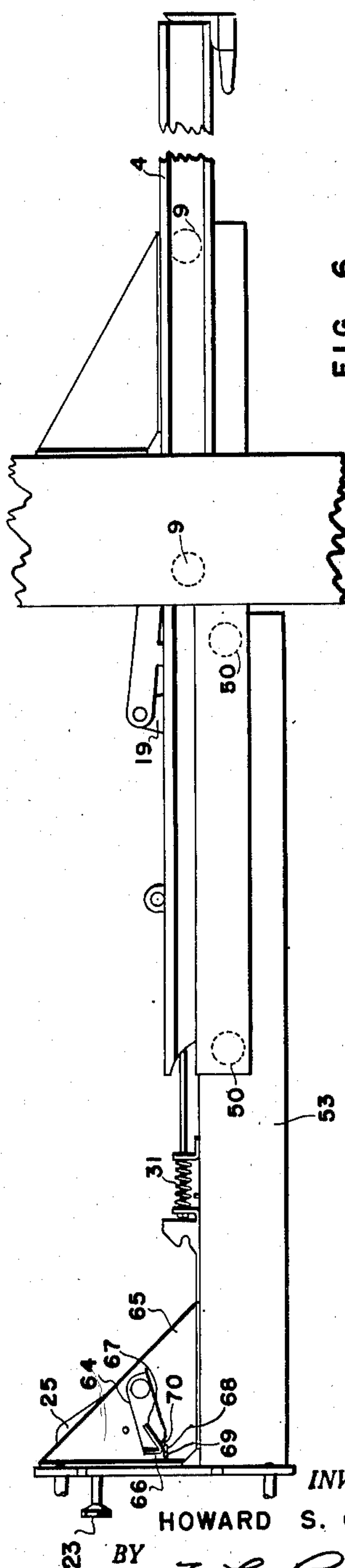


FIG. 7



6-6-11



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UNITED STATES PATENT OFFICE

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LOCKING AND RELEASE MECHANISM FOR
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Application November 25, 1949, Serial No. 129,246

13 Claims. (Cl. 312—323)

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This invention relates to locking and release mechanism for multi-position units and more particularly to locking and release means for electrical component chassis of the rack-mounted type.

Many types of apparatus are arranged for reciprocable movement with respect to a suitable framework. For example, radio or other electronic equipment may be mounted on a plurality of chassis and the chassis may be rack mounted. With such an arrangement, each chassis and accompanying panel or front is preferably reciprocably mounted with respect to the supporting frame or rack in order to permit withdrawal for inspection and maintenance. With such arrangements, it is desirable that the chassis or drawer be provided with means for locking the drawer in one or more positions. It may also be desirable to rotate the chassis sufficiently to enable easy access to wiring or mechanism on the underside of the chassis.

It is an object of my invention to provide a new and improved reciprocable drawer assembly.

It is another object of my invention to provide a new and improved reciprocable drawer assembly in which the drawer or chassis may be locked in a plurality of positions.

Still another object of my invention is to provide a reciprocable drawer assembly which may be locked in one of a plurality of positions and may be released or unlocked from any of the locked positions with a single operation.

A further object of my invention is to provide positive locking means for a reciprocable drawer or chassis assembly in any one of a plurality of positions and means for simultaneously instituting the release of all locking devices.

In the preferred form of my invention, there is provided a chassis member for an electrical assembly as for example, a component part of a radio equipment which may be locked in a plurality of positions as for example, (1) in a fully closed position, (2) in a fully withdrawn position, (3) in a fully withdrawn position in which the chassis is rotated approximately 150 degrees, and which also may be simply and easily removed entirely from the rack or frame assembly. Each locking mechanism is duplicated on each side of the assembly or drawer, and release mechanism is provided for each set of locking means or mechanisms in each of the three locked positions, there being a single operating means for controlling release of all the release mechanisms.

In the preferred embodiment of my invention there are provided three main parts or members,

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a stationary frame or rack, and an intermediate track member which allows for double extension of a third chassis or drawer member. In addition to the above-mentioned three locking positions, means is provided for locking the intermediate member to the frame member.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 is a perspective view in the fully closed position of a chassis drawer made in accordance with my invention; Fig. 2 illustrates the apparatus or mechanism shown in Fig. 1 in the fully withdrawn position of the chassis; Fig. 3 illustrates the chassis drawer in the rotated position; Fig. 4 shows the chassis drawer just after it has been removed from the intermediate frame; Fig. 5 is an enlarged plan view of a portion of the apparatus in the position shown in Fig. 2 illustrating some of the locking mechanism and the release mechanism; Figs. 6 and 7 show elevation views of the locking and release mechanism, Fig. 7 being a cross-sectional view taken along the lines 7—7 of Fig. 1; Fig. 8 is a detail of a portion of the locking means between the chassis and the intermediate member and the release mechanism therefor; Fig. 9 is a partial view of the locking mechanism for the rotated position of the chassis drawer; Fig. 10 is a sectional view along the lines 10—10 of Fig. 1 showing the track arrangement by means of which the chassis drawer and the intermediate frame member are reciprocally arranged, and Fig. 11 is an enlarged view of a portion of Fig. 6.

Referring to the drawings, there is shown a "drawer-type" chassis support comprising a stationary supporting member 1, an intermediate movable member 2 reciprocally supported with respect to member 1, and a chassis or drawer member 3 reciprocally supported by intermediate member 2.

Stationary member 1 as shown comprises a substantially U-shaped frame comprising side channels 4 and 5 and cross or back member 6. The members 4, 5 and 6 may be of any desired cross section, but in the embodiment shown herein, side members 4 and 5 are substantially C-shaped in cross section and are open on the outer sides. Back member 6 is substantially L-shaped in the embodiment shown in the drawings. The

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lower flange 7 of the back member 6 may serve to carry locating pins 8 for engagement with suitable locating openings 3a in chassis member 3 in the fully closed position thereof. Each of side members 4 and 5 is provided with a pair of rollers 9, preferably of the ball-bearing type, pivotally mounted on the inner sides of members 4 and 5 as by means of threaded axle members 66 and threaded fastening members 67 (see Fig. 10) and serve as supports for intermediate member 2 during movement of the intermediate member with respect to stationary member 1.

Stationary member 1 may be suitably supported from frame members 10 in any suitable manner, as by welding, for example. If necessary, flange plates 11 may be used to impart rigidity to the structure. There is provided at the front end of each of side members 4 and 5 suitable locking members 12 which permit the chassis member to lock to the frame member 1 in the closed position of the chassis 3 and to permit the intermediate track 2 to lock to the frame member in the extended or withdrawn position of the chassis member or drawer 3, as is described hereinafter.

The intermediate member or track 2 comprises side members 13 and 14 and rear member 15. The side and rear members of intermediate portion 2 preferably comprise upper and lower portions which are each channel or C-shaped in cross section. The upper portion is preferably provided with oppositely directed flanges 16 and 17 to provide a track for rollers 9 carried by the stationary frame.

Chassis member 3 may comprise a base 51 and the side flanges 52 and 53. A suitable front or panel 54 is provided for chassis member 3 which may be suitably secured as by welding, for example, to a front flange 55 or in any other suitable manner to chassis member 3. Handles 22 assist in moving the drawer.

Means is provided on member 2 for cooperation with locking member or element 12 carried by stationary frame member 1 to lock portion 2 to the frame 1 in the extended position of the intermediate portion 2. For this purpose, there is provided on either side of the intermediate member 2 an arm or element 18 pivotally supported by upstanding ear 19 which in turn is suitably carried by the associated side member as by welding, for example, in such a manner that arm 18 may pivotally move upwardly with respect to the track assembly. Each arm 18 has a locking surface or portion 20 for engagement with locking member or projection 12 as best shown in Fig. 2 and a cam surface or portion 21. Referring to Fig. 1, it is seen that as the chassis member is withdrawn as by pulling on handles 22 of drawer or chassis member 3 the substantially V-shaped member formed by surfaces 20 and 21 rides along the upper surface of the side members 13 and 14, respectively, until the cam surface 21 engages the rearward side of lock pin or member 12 which causes arm 18 to pivot upwardly about its pivot point on ear 19 until it passes over and drops in front of locking pin 12 as the drawer is further withdrawn. The rearward end of each upper track of intermediate member 2 is closed as indicated at 63a (Fig. 5) to engage roller 50 and thereby prevent further withdrawal of member 2.

Means is provided for releasing arm 18 and more particularly to disengage locking faces or portions 20 from engagement with pins 12 when it is desired to move the chassis member 3, or

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more particularly, intermediate member 2, into its fully closed position. This means comprises release mechanism on each side of chassis member 3, there being one release mechanism for each arm 18. Each release mechanism comprises a pushbutton 23 suitably supported on panel 54 of chassis member 3 which is arranged to operate slide member 25 rearwardly of the upper surface of chassis member 3. Slide member 25 has a rearwardly extending portion 26 which is reciprocally retained in position on the upper portion of drawer 3 by pins 27 and 28 projecting upwardly through suitable longitudinally extending slots 29 and 30 in portion 26. Slide member 25 is biased forwardly to its locking position by a suitable compression spring 31 supported on the chassis drawer 3 at one end as by a suitable bracket 32 and at the other end as by a suitable flange or bracket portion 34 which may be integral with slide member 25.

In order to transmit the motion of slide 25 to arm 18, there is provided on either side of drawer 3 a rearwardly extending rod 33. The forward end of rod 33 is suitably fastened at one end to bracket 34 of slide 25 and preferably extends through spring 31 as shown in the drawings. The rear end of rod 33 is suitably attached to a slide member 35 carried by the rear portion of chassis member 3 and reciprocally supported by pins 36 and 37 extending upwardly through suitable longitudinally extending slots 38 and 39, respectively.

Slide 35 carries upwardly directed ear 44 having cam surface 71 disposed for engagement with pin 72 carried by arm 18. When slides 25 and 35 are moved rearwardly by operation of pushbutton 23, pin 72 and arm 18 are moved upwardly until locking surface 20 of locking element 18 clears pin 12.

Means is provided for locking chassis member 3 with respect to member 2 in the fully withdrawn position. There is provided a suitable locking member 40 pivotally carried on the upper surface 51 of member 3 by pin 36. Each member 40 has a cam surface or portion 41 and a lock surface or portion 42 which bears against the forward edge of inwardly directed projection or pin 43 carried by intermediate member 2 in the extended position of the chassis member 3. Locking member 40 is angularly formed as best seen in Fig. 5 and slide 35 carries an upwardly extending pin 46 which engages the inner or concave surfaces of member 40. The slide 35 carries an upwardly directed locking ear 44 which has a forwardly directed recess 45 which receives pin 43 carried by intermediate member 2 in the extended positions of the drawer 3 and the intermediate member 2 so that pin 43 is held between locking surface 42 and the edge of recess 45, thereby locking member 2 with respect to member 3. In order to release locking member 40, pushbuttons or operating members 23 are pressed inwardly thereby causing slide 25, rod 33 and slide 35 to move rearwardly of chassis member 3. As slide 35 is moved rearwardly, pin 46 bears against the inner surface 47 of member 40 and causes it to move laterally with respect to the chassis member 3 until it is free of inwardly directed pin 43. Locking member 40 is normally biased toward its locking position by a suitable spring 48.

The intermediate member 2 has a second track 49 oppositely arranged with respect to the upper track and is generally C-shaped in cross section to receive suitable rollers 50, preferably of

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the ball-bearing type, carried by the side flanges of chassis drawer 3. As indicated in Fig. 10, the roller assemblies operate at different levels but in the same vertical plane.

As best seen in Figs. 7 and 8, means is provided to lock the chassis member 3 against rotation and reciprocation with respect to the intermediate member 2 and frame member 1 in the withdrawn position of chassis 3. This means comprises the cam member or ear 44 which, as previously noted, is provided with a forwardly directed notch or recess 45 for engagement with the inwardly directed pin 43 carried by the intermediate member. The engagement between pin 43 and the upper edge of recess 45 prevents any upward movement of the rearward portion of chassis member 3 in the locked withdrawn position.

Means is provided in the withdrawn position of the chassis member 3 (see Fig. 3) for permitting rotation of chassis 3 approximately 150 degrees to enable convenient inspection and servicing of the underside of the chassis member 3 and also for locking the chassis member 3, in its rotated position, to the intermediate track. When the chassis member 3 is withdrawn until roller 50 engages stop member 56, located at the front end of each of the slides 13 and 14, the rear-most roller 50 is just above recess 57 in the lower flange of each of the slide members 13 and 14 (see Fig. 4). By lifting upwardly on handles 22, rearmost rollers 50 pass downwardly through recesses or openings 57 and the drawer may then be pivoted or rotated clockwise as viewed in Fig. 4.

In order to lock the chassis member 3 in the rotated position, there is carried on each slide 26 upwardly directed ears or lugs 58 having a forwardly directed notch or recess 59. There is suitably positioned on each of the slide members 13 and 14 of intermediate member 2 an upwardly directed ear or lug 60 carrying an inwardly directed pin 61. As chassis member 3 is rotated, cam surface 62 of ear 58 engages pin 61 and directs pin 61 into recess 59.

Means is provided to permit removal of the chassis from intermediate member 2 upon rotation of chassis member 3 approximately 90 degrees as best seen in Fig. 4. The forward end of slide members 13 and 14 is open at the upper end as indicated by numeral 63 to permit roller 50 to pass therethrough. Thus, after rearmost roller 50 passes through opening 57, the chassis member may be lifted upwardly by handles 22 until frontmost rollers 50 may be moved through openings 63.

Means is provided for locking chassis drawer or member 3 to the stationary frame member 1 when the chassis is in its closed position. This means comprises a cam member 64 pivotally carried by angle or flange 65 and having a locking surface 66 and a cam surface 67. As the chassis member 3 is moved from its extended position to its closed position, cam surface or portion 67 rises upon pin 12 and as further movements of chassis member 3 take place, member 64 drops behind pin 12 so that locking surface 66 engages the back edge of pin 12. To release the locked relationship, pushbutton 23 is pushed inwardly to lift or elevate arm 64 above pin 12. Slide member 25 is provided with an inwardly directed ear 68 extending through a suitable slot 69 in flange or support member 65. (See Figs. 6 and 7.) Thus, as pushbutton 23 is moved rearwardly slide 25 and pin or projection 68 moves against the cam surface 70 along the lower edge of pivoted member 64, and

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member 64 is moved upwardly in a clockwise direction. Fig. 11 shows in detail a suitable contour for cam surface 70.

From the foregoing description, it is seen that three principal locking positions are provided. First, means is provided for locking the chassis member 3 to the frame in the fully closed position by reason of the engagement between member or element 64 and pin or locking element 12. Secondly, the intermediate member 2 is locked to the frame 1 when the intermediate member is fully withdrawn with respect to the frame member by engagement of arm or element 18 with pin 12, and the chassis member 3 is locked with respect to the intermediate member 2 when the chassis member is fully withdrawn with respect to the intermediate member by reason of the engagement of slide or locking element 40 with pin or locking element 43. Thirdly, the chassis member 3 is locked with respect to intermediate member 2 in the fully rotated position of chassis member 3 by engagement of member or ear 58 with pin 61.

It is further seen from the foregoing discussion that one operation provides release from any one or more of the locking positions. It is necessary only to press release buttons or pushbuttons 23 for this purpose, pushbuttons 23 comprising single operating means or members for controlling or causing operation of all operated locking means associated with each set thereof, whereby simultaneous release of all engaged or actuated locking means is provided.

While I have shown and described a particular embodiment of my invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from my invention in its broader aspects. I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim is:

1. In combination; a stationary frame member; an intermediate track member reciprocably carried by said stationary frame member; a drawer member reciprocably carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn position of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said drawer member is in said rotated position.

2. In combination; a stationary frame member; an intermediate track member reciprocably carried by said stationary frame member; a drawer member reciprocably carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and

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rotated position when said drawer member is in said rotated position; said means for locking said drawer member to said frame member in the fully closed position thereof comprising a stationary locking member carried by said frame member and a movable locking member carried by said drawer member and having a cam surface to move said movable member sufficiently to permit movement past said stationary locking member as said drawer member is moved past said stationary member, and a locking surface disposed to drop behind said locking member to positively lock said drawer member to said frame member.

8. In combination; a stationary frame member; an intermediate track member reciprocally carried by said stationary frame member; a drawer member reciprocally carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn positions of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said drawer member is in said rotated position; said means for locking said drawer member to said intermediate member comprising a projection carried by said intermediate member, a member carried by said drawer member to engage said projection in the extended position of said drawer member with respect to said intermediate member, and a movable locking member also carried by said drawer member and disposed to engage said stationary locking member on the side thereof opposite said projection.

9. In combination; a stationary frame member; an intermediate track member reciprocally carried by said stationary frame member; a drawer member reciprocally carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn positions of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said

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drawer member is in said rotated position; said means for locking said drawer member to said intermediate member comprising a projection carried by said intermediate member, a member carried by said drawer member to engage said projection in the extended position of said drawer member with respect to said intermediate member, and a movable locking member also carried by said drawer member and disposed to engage said stationary locking member on the side thereof opposite said projection; and said release means comprising means for moving said movable locking member to a position out of engagement with said projection.

10. In combination; a stationary frame member; an intermediate track member reciprocally carried by said stationary frame member; a drawer member reciprocally carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn positions of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said drawer member is in said rotated position; said means for locking said intermediate member to said frame member comprising a stationary locking member carried by said frame member and a pivotal member carried by said intermediate member, said pivotal member having a cam surface for engagement with said stationary locking member during withdrawal of said intermediate member in order to move said pivotal member upwardly along said cam surface upon engagement with said stationary member, and a locking surface to engage said locking member on the side thereof opposite said stationary member.

11. In combination; a stationary frame member; an intermediate track member reciprocally carried by said stationary frame member; a drawer member reciprocally carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn positions of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer

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member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said drawer member is in said rotated position; said means for locking said intermediate member to said frame member comprising a stationary locking member carried by said frame member and a pivotal member carried by said intermediate member, said pivotal member having a cam surface for engagement with said stationary locking member during withdrawal of said intermediate member in order to move said pivotal member upwardly along said cam surface upon engagement with said stationary member, and a locking surface to engage said locking member on the side thereof opposite said stationary member; and said release means comprising means for moving said pivotal locking member to a position out of engagement with said projection.

12. In combination; a stationary frame member; an intermediate track member reciprocally carried by said stationary frame member; a drawer member reciprocally carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn positions of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said drawer member is in said rotated position; said means for locking said drawer member in its rotated position comprising a laterally extending projection on said intermediate member, and a locking member on said drawer member comprising an ear having a recess disposed to engage said projection.

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said chassis comprising an ear having a recess disposed to engage said projection.

13. In combination; a stationary frame member; an intermediate track member reciprocally carried by said stationary frame member; a drawer member reciprocally carried by said intermediate member; means for locking said drawer member to said frame member in the fully closed position of said drawer member, means for locking said drawer member to said intermediate member and means for locking said intermediate member to said frame member in the fully withdrawn positions of said drawer and intermediate members; means permitting rotation of said drawer member with respect to said intermediate member, means for locking said drawer member to said intermediate member after rotation of said drawer member; and release means operative to unlock said drawer member from said frame member when said drawer member is fully closed, operative to unlock simultaneously said drawer member from said intermediate member and said intermediate member from said frame member when said drawer member and said intermediate member are in said fully withdrawn positions, and operative to unlock said drawer member from said rotated position when said drawer member is in said rotated position; said means for locking said drawer member in its rotated position comprising a laterally extending projection on said intermediate member, and a locking member on said drawer member comprising an ear having a recess disposed to engage said projection; said release means comprising means operated from the front of said drawer member for moving said ear to disengage said projection from said recess.

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