No. 871,393. PATENTED NOV. 19, 1907.

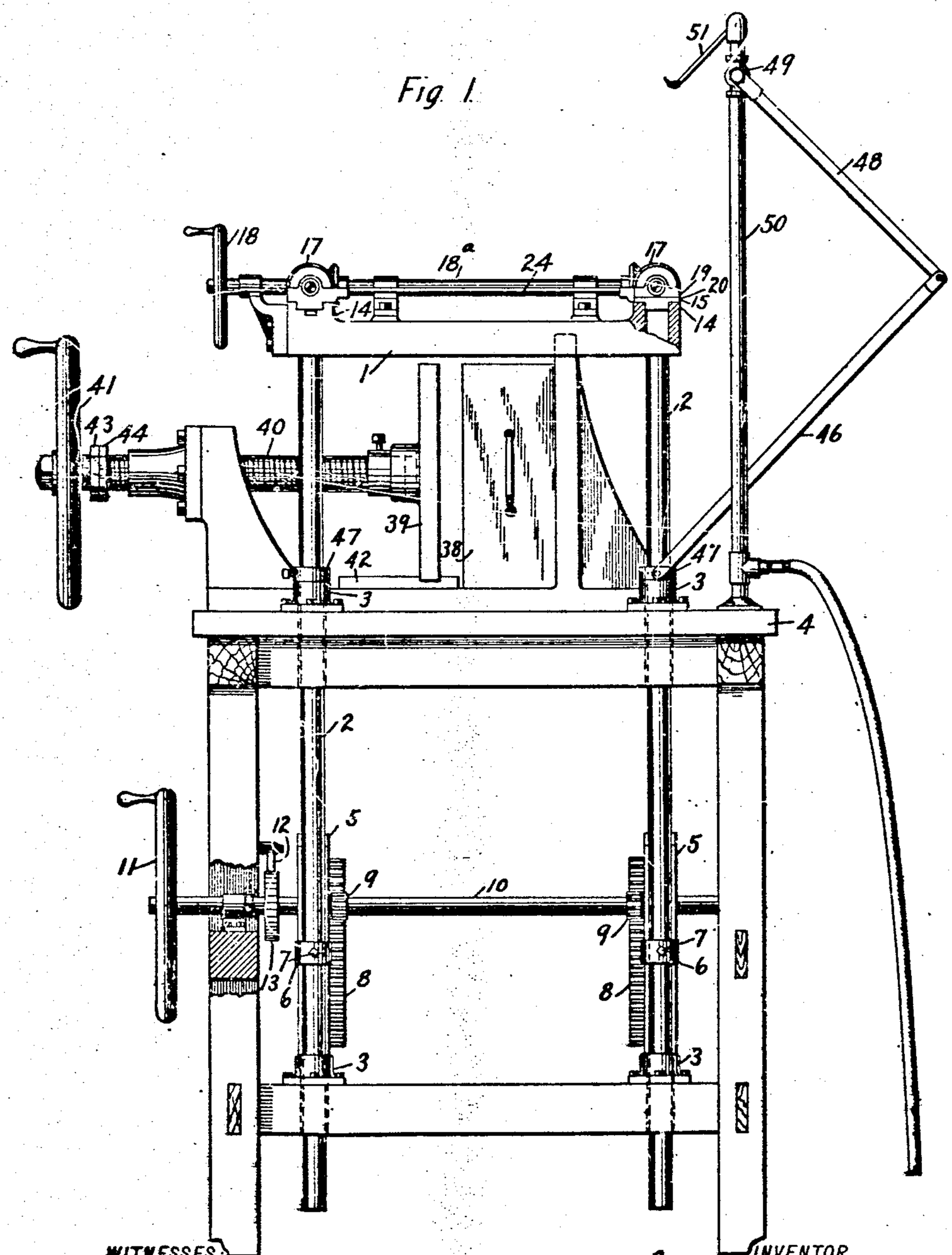
L. H. FLANDERS.

APPARATUS FOR ASSEMBLING STORAGE BATTERIES.

APPLICATION FILED FEB. 12, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

C. L. Belcher

Fred. H. Miller

INVENTOR

Louis H. Flanders

BY

Fisley & Sears

ATTORNEY

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4 SHEETS—SHEET 2.

Fig. 2.

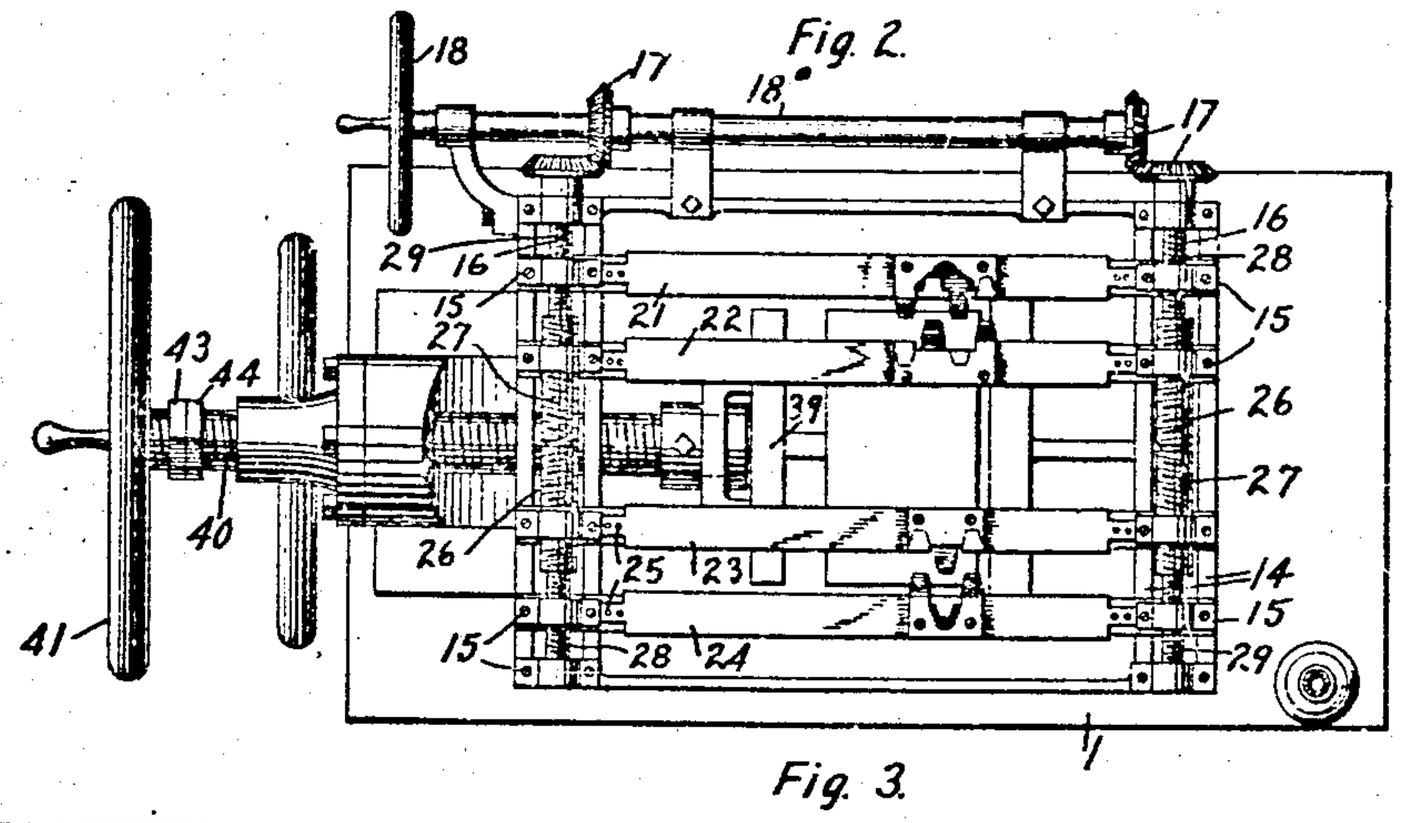


Fig. 3.

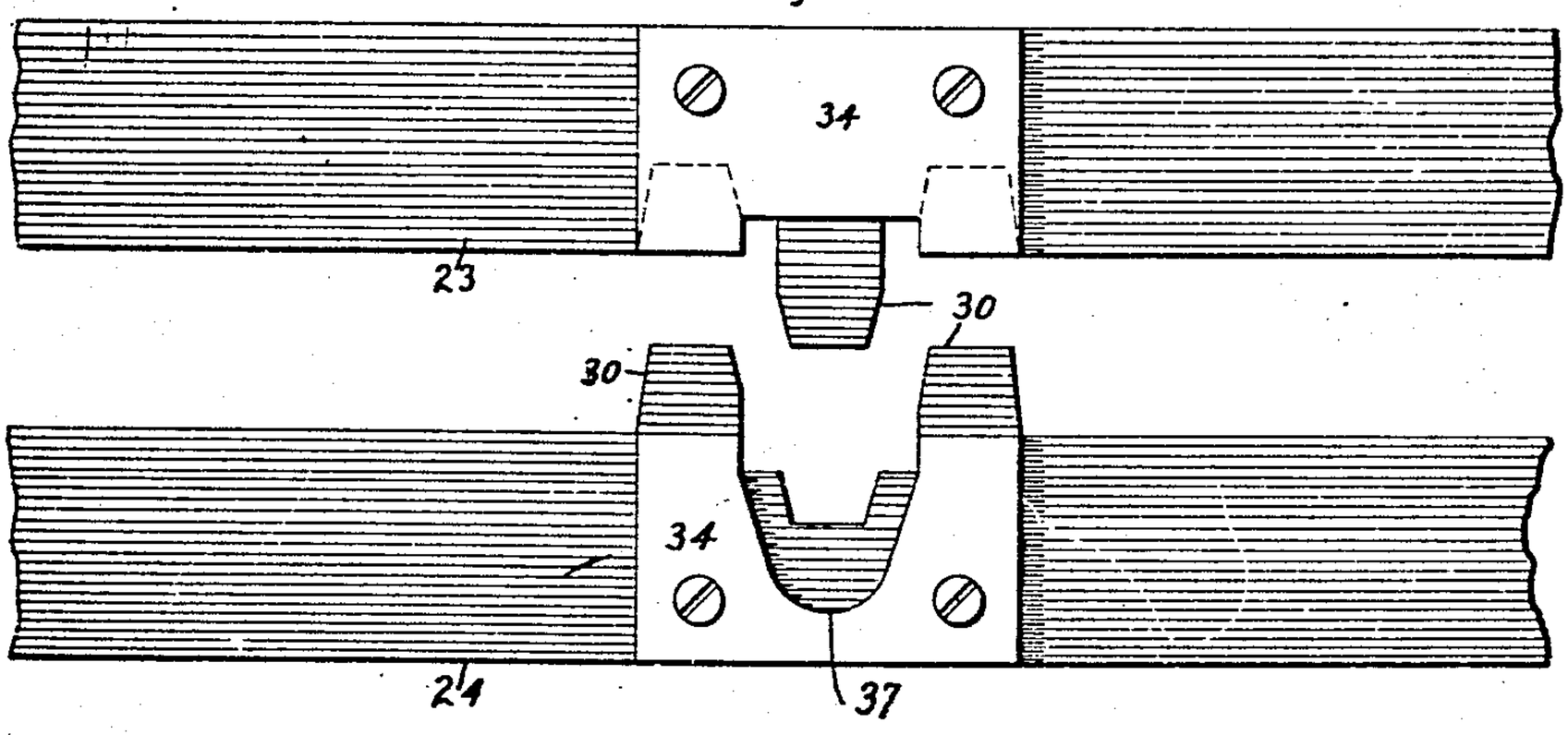
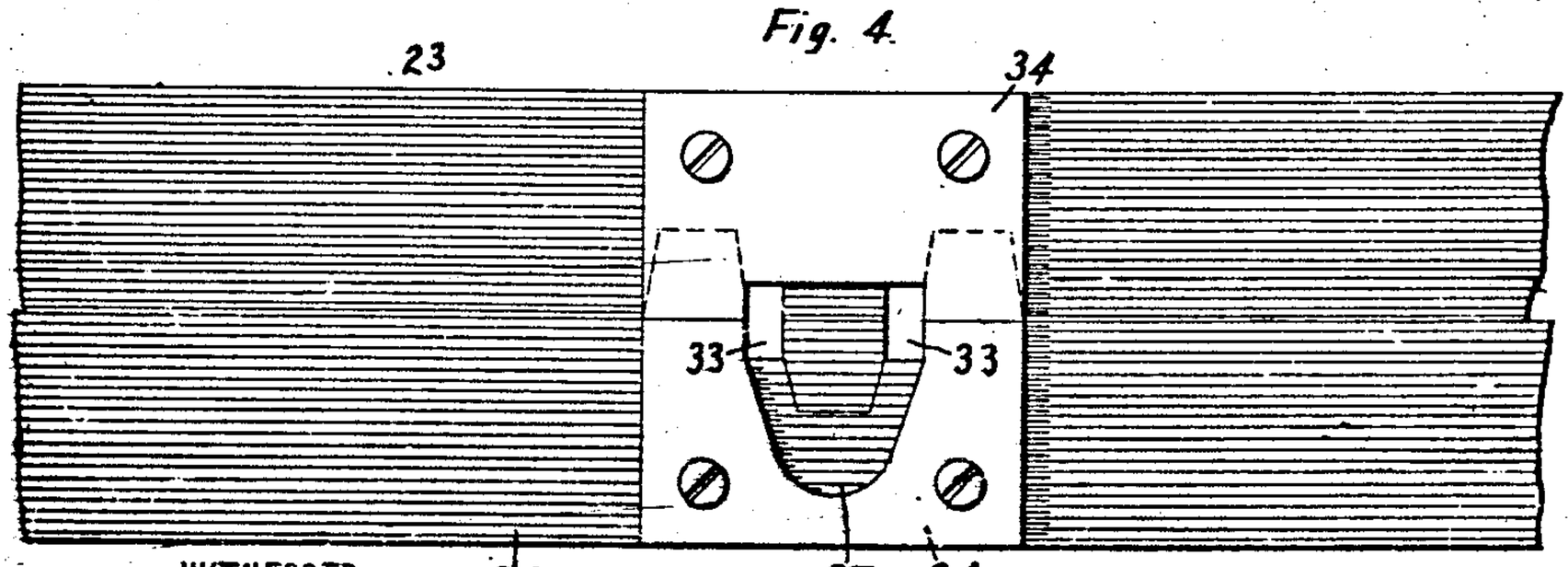


Fig. 4.



WITNESSES:

C. L. Belcher

Fred. H. Miller.

INVENTOR

Louis H. Flanders

BY

Shelby & Shelby

ATTORNEY

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4 SHEETS—SHEET 3.

Fig. 5.

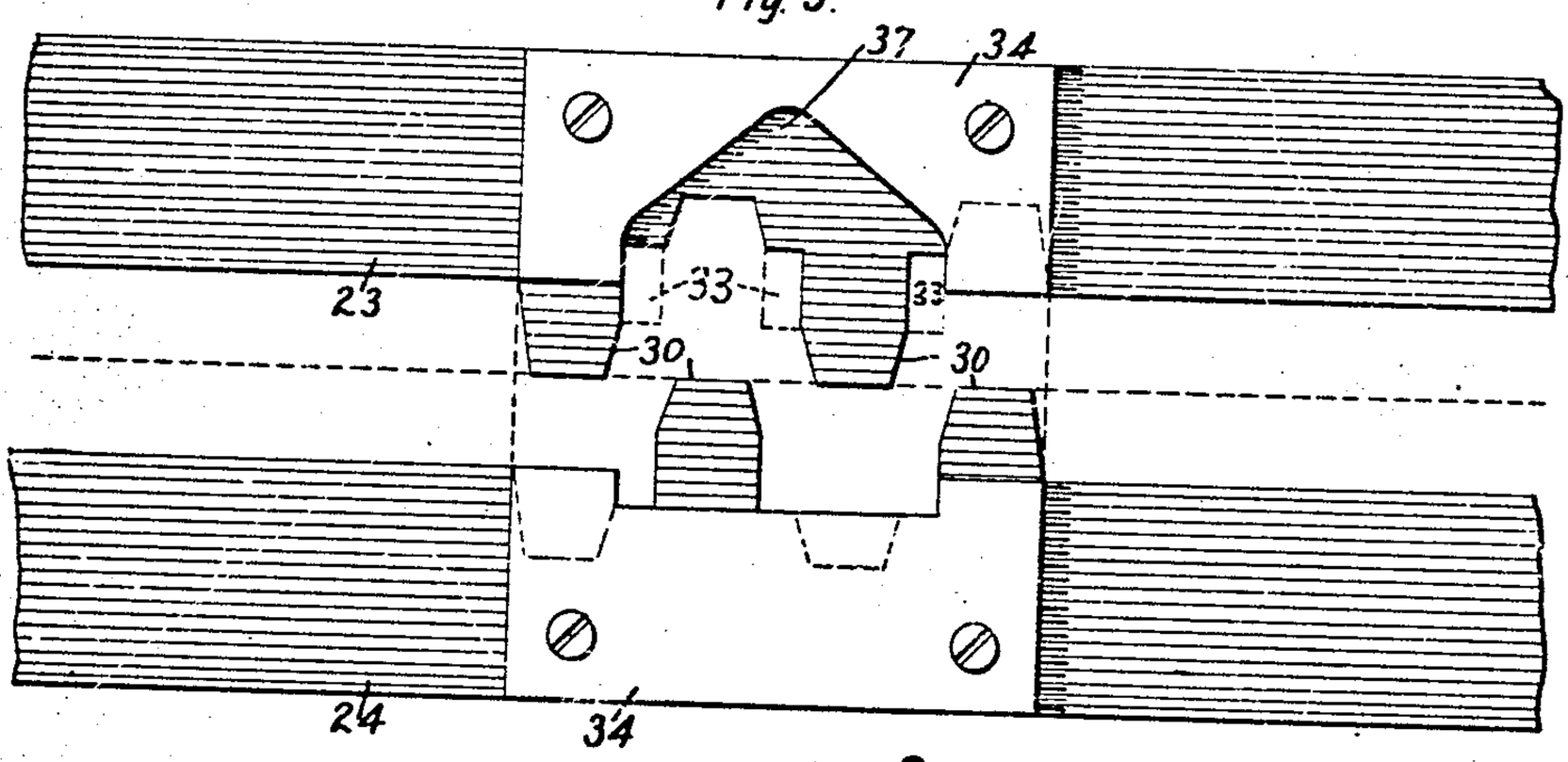
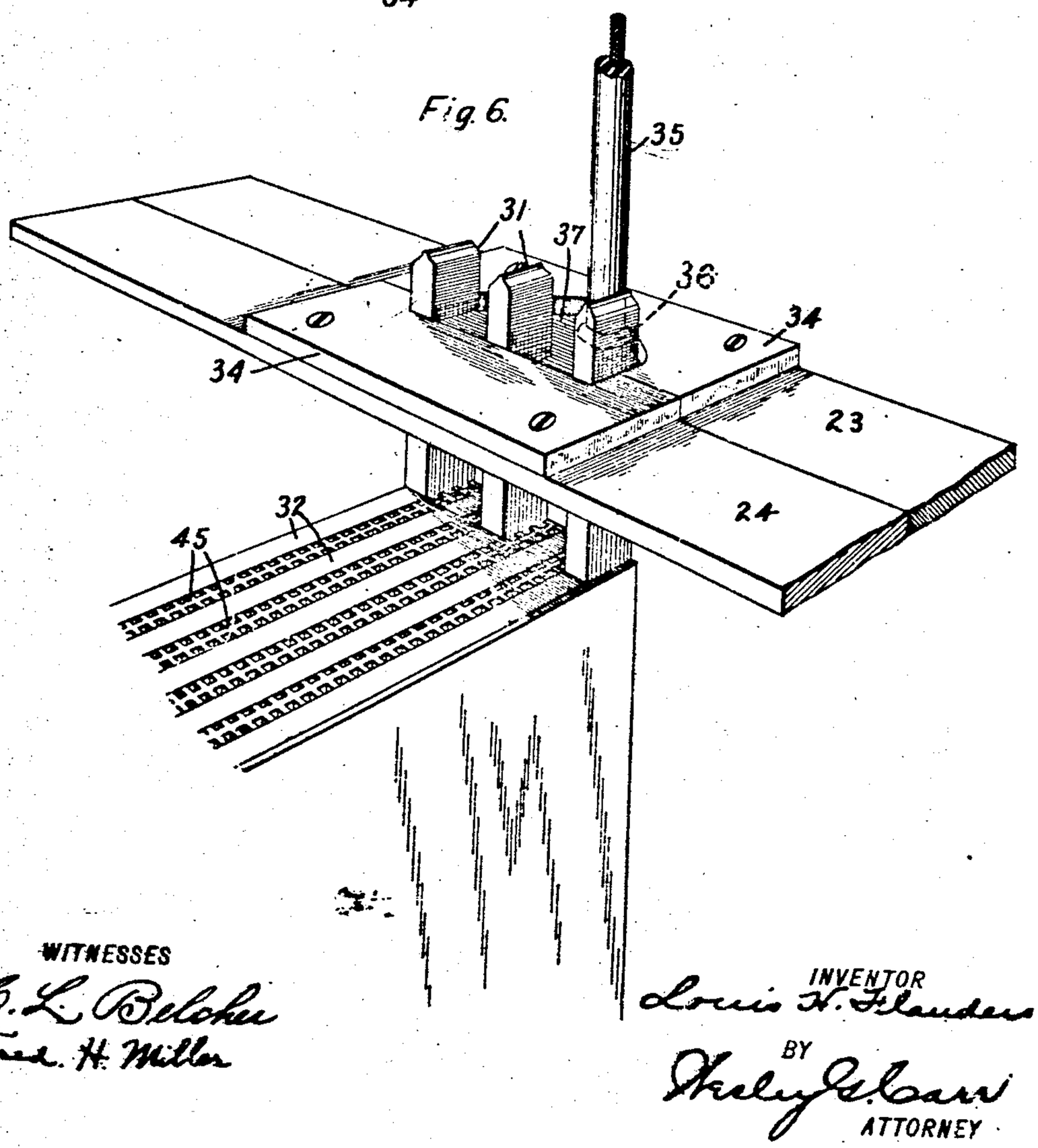


Fig. 6.



WITNESSES

C. L. Belcher

Fred. H. Miller

INVENTOR

Louis H. Flanders

BY

Darby & Darby

ATTORNEY

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4 SHEETS—SHEET 4.

Fig. 8.

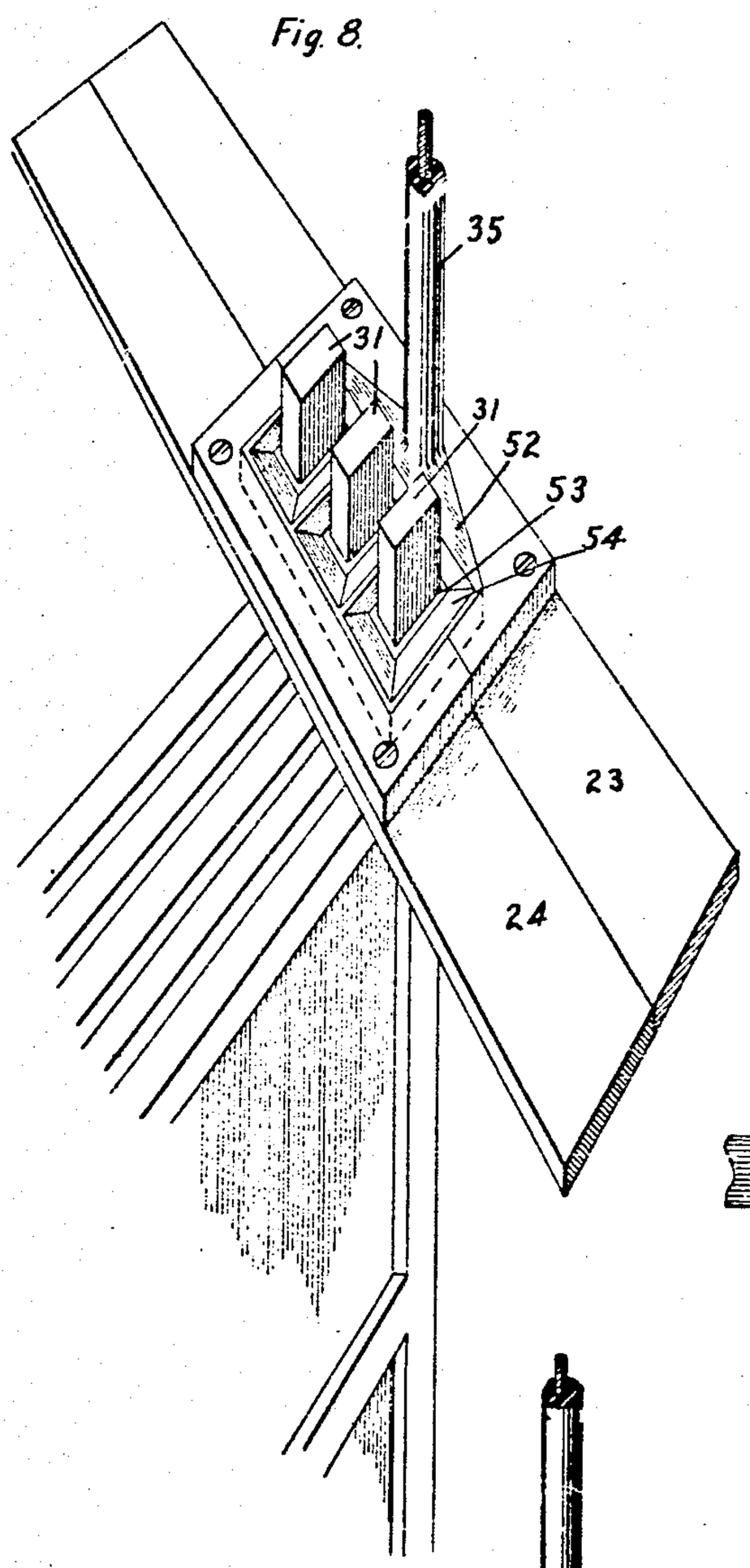


Fig. 9.

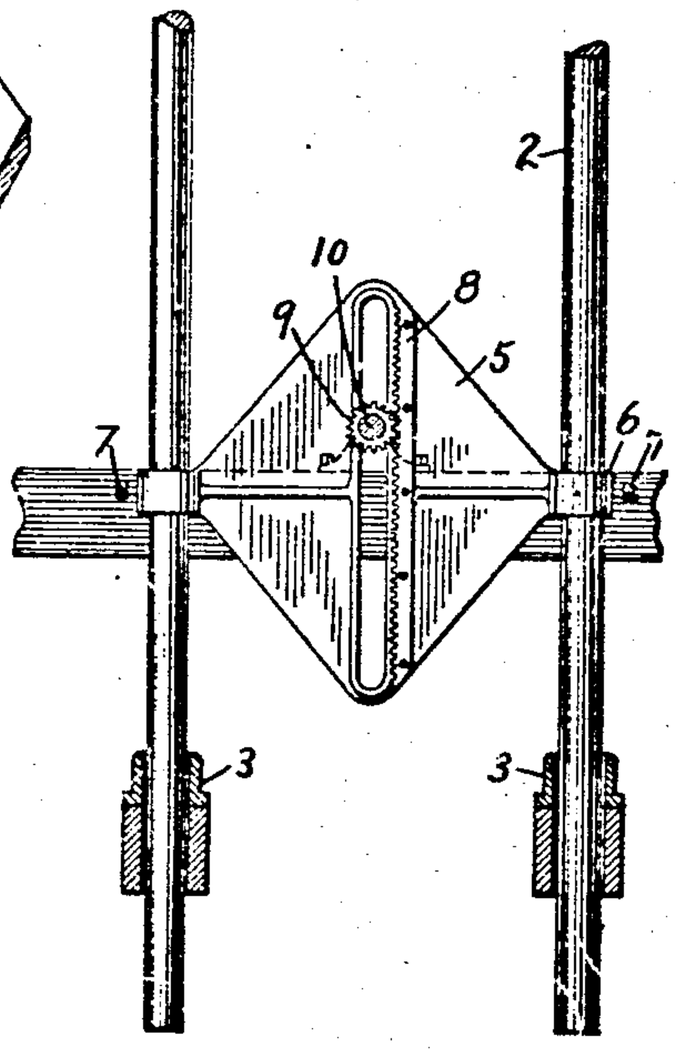
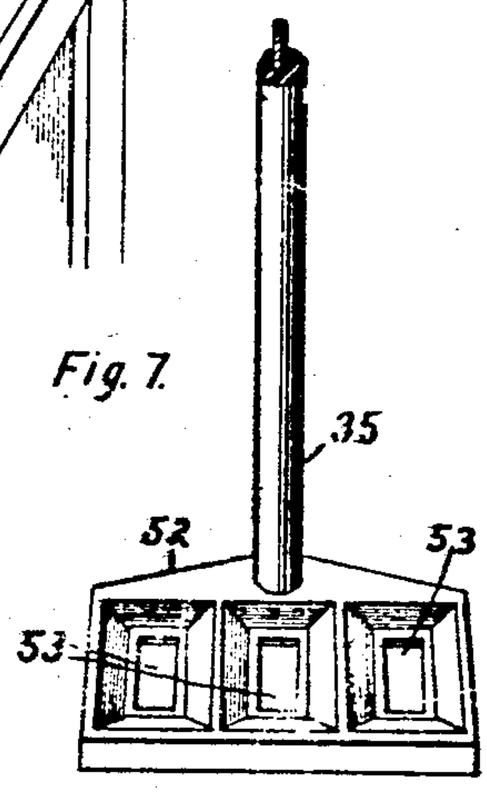


Fig. 7.



WITNESSES:

C. L. Belcher

Fred. H. Miller

INVENTOR

Louis H. Flanders

BY

Shirley & Sons

ATTORNEYS.

UNITED STATES PATENT OFFICE.

LOUIS H. FLANDERS, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE MACHINE COMPANY, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR ASSEMBLING STORAGE BATTERIES.

No. 871,393. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed February 12, 1904. Serial No. 193,352.

To all whom it may concern:

Be it known that I, LOUIS H. FLANDERS, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Assembling Storage Batteries, of which the following is a specification.

My invention relates to apparatus employed to facilitate the assembling and connecting of the plate electrodes of secondary batteries, and it has for its object to provide such means therefor as will render the manufacture of secondary batteries more simple and less expensive than has heretofore been possible.

In the accompanying drawings, Figure 1 is a view in side elevation and Fig. 2 is a top plan view of an apparatus embodying my invention, certain portions in Fig. 1 being broken away. Figs. 3, 4 and 5 are views of the molds and clamping bars employed in connection with the apparatus shown in Figs. 1 and 2. Fig. 6 is an enlarged perspective view of a plurality of plates clamped in position ready to be burned together, parts of the machine and plates being broken away. Fig. 7 is a perspective view of a special connecting plate and lug employed in a modified form of my invention, and Fig. 8 is a perspective view showing the plate and lug as used in connection with the mold bars. Fig. 9 is a view in side elevation of a portion of the raising mechanism.

A rectangular frame-work 1 is supported by vertical guide rods 2, which operate in suitable guides 3, properly secured to a table 4. The said rods and attached frame-work are raised and lowered, as desired, by means of suitable mechanism, a convenient means consisting of brackets 5 adjustably secured to the rods 2 by means of lugs 6 and set screws 7, and having racks 8 fastened thereto, pinions 9 meshing with said racks, a shaft 10 on which the pinions are mounted, and a hand-wheel 11 on the end of the shaft. The frame-work 1 is secured in any desired position by means of a pawl 12 and ratchet wheel 13.

On each side of the frame-work 1 is a pair of parallel guides 14 on which blocks 15 are caused to move by right and left-hand screw threads on shafts 16 that are actuated by means of bevel gears 17, a hand-wheel 18 and its shaft 18ª.

The blocks 15 comprise two parts 19 and 20, the former being threaded to engage the shafts 16 and being suitably attached to the pieces 20, and the latter serving both as guide blocks and as supports for the mold bars 21, 22, 23 and 24 which are detachably fastened thereto by means of screws 25.

The portions 26 of the shaft 16 are provided with right-hand screw threads and the portions 27 with left-hand screw threads, said portions being of larger diameter than the end portions 28 and 29, so that the corresponding blocks 15 may be readily slipped over said end portions. The portions 28 are provided with left-hand screw threads and the portions 29 with right-hand screw threads. It will be thus apparent that the arrangement is such that the mold bars 21 and 22 and also the bars 23 and 24 will be moved toward or away from each other according to the direction of rotation of the hand-wheel 18.

Referring now to Figs. 3, 4, and 5, it is seen that the mold bars are supplied with suitable teeth 30, which intermesh in such a manner as to guide the terminal lugs 31, which are cast integral with the battery plates 32, into suitable recesses 33. On the upper sides of said bars are fastened blocks 34 which are of such form as to provide open molds that partially surround the ends of the lugs 31. A rod 35, consisting either of lead alone or of a lead sheath and a copper core, and having a flared portion 36 at its lower end, is placed in a vertical position, with the flared end in the rounded portion 37 of the mold, substantially as shown. By means of lead and an oxy-hydrogen or other suitable flame, the various parts are welded together, thus forming a simple, neat junction without waste of material and with an expenditure of a minimum amount of labor.

It is, of course, understood that other bars may be constructed and substituted for those shown in Figs. 3, 4 and 5 such that any number of plates, within reasonable limits, may be joined. It is also evident that the structural details of the mold bars may be varied greatly without departing from my invention.

The battery plates are assembled, as desired, in a box 38, the top and one side of which are left uninclosed, said box being placed on the table 4 in such a manner that the battery plates may be pressed together

by means of a follower plate 39 and a screw 40, the latter being operated by a hand-wheel 41. The follower plate 39 may be kept from turning by any suitable means, as, for instance, by means of a raised guide 42 which engages with a groove in the bottom of said plate.

Two nuts 43 and 44 are provided on the screw 40, one to act as a stop when the plates are sufficiently compressed and the other to act as a lock nut. The stop nut may be adjusted and locked to allow a certain space for the battery plates, so that all batteries of a particular size may be subjected to the same pressure without special care by the operator. It is evident that means other than that shown for exerting pressure may be employed, if desired.

When the battery plates have been sufficiently compressed and before the lugs thereof have been clamped by the mold bars, the pressure is relieved so that the plates are free to move. Then when the mold bars have been clamped about the lugs, the battery plates are caused to assume the proper and approximately the same position with reference to the sheets of non-conducting material 45 which are generally placed between them.

Since the batteries are usually assembled with the terminal lugs of alternate plates on opposite sides, two pairs of mold bars are provided as shown, so that the lugs from both poles of the battery are clamped and may be joined simultaneously.

In order to place the box 38 containing the assembled plates on the table, it is desirable to raise the frame-work 1 and its attached parts, which is done by means of the hand-wheel 11, as before described. During this operation, a link 46, that is pivotally attached to one of the stops 47 with which the rods 2 are provided, actuates a second link 48, which opens a valve 49 in a gas pipe 50 and admits gas to the burner 51. The burner is adjusted at such an angle that when the frame-work 1 is raised the flame impinges on the molds and keeps them hot. When the frame-work is lowered, the gas is automatically shut off.

When a large number of plates are to be joined, it may be advantageous to employ a connecting plate 52 having a rod 35 attached thereto, as shown in Fig. 7, and adapted to be placed over the ends of the lugs 31 of the battery plates, so that they project through the apertures 53 therein, as shown in Fig. 8. In this case the disk-shaped recesses 54 completely surround the lugs 31.

I claim as my invention:

1. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recesses in the upper sides thereof and toothed edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds.

2. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recesses in the upper sides thereof and toothed edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds and means for bringing into engagement the two bars of each of said pairs.

3. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recesses in the upper sides thereof and toothed edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds, means for bringing into engagement the two bars of each of said pairs and means for raising and lowering said bars and for supporting the same in any desired position.

4. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recesses in the upper sides thereof and toothed edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds, means for bringing into engagement the two bars of each of said pairs, means for raising and lowering said bars and for supporting the same in any desired position and means for heating said bars when in a raised position.

5. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recesses in the upper sides thereof and toothed edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds, means for bringing into engagement the two bars of each of said pairs, means for raising and lowering said bars and for supporting the same in any desired position, means for heating said bars when in a raised position and means for automatically turning off the heat when said bars are lowered.

6. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recesses in the upper sides thereof and recessed edges adapted to be brought together

around the said lugs to clamp them in position and form molds, and means for bringing into engagement the two bars of each of said pairs.

7. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having recessed edges adapted to be brought together so as to clamp said lugs in said recesses and means for bringing into engagement the two bars of each of said pairs.

8. In apparatus for uniting storage battery plates having extended terminal lugs, the combination with a holder for said plates and means for compressing the same in said holder, of one or more pairs of bars having toothed edges adapted to be brought into engagement so as to surround and clamp the said lugs and means for bringing into engagement the two bars of each of said pairs.

9. In apparatus for joining secondary battery plates, the combination with a holder for said plates and one or more pairs of laterally movable bars having teeth which intermesh to clamp the lugs between them and having recesses through which the lugs project, of means for moving the bars of each pair toward and away from each other.

10. In an apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having toothed edges adapted to be brought into engagement around the lugs to clamp them in position and to form molds.

11. In an apparatus for uniting storage battery plates having extending terminal lugs, the combination of a holder for said plates of one or more pairs of molds provided with toothed edges adapted to be brought into engagement around said lugs to clamp them in position in said molds.

12. In apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having recesses in the upper sides thereof, and edges adapted to be brought into engagement around said lugs to clamp them in position and form molds.

13. In apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having recesses in the upper sides thereof and edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds, and means for raising and lowering said bars and for supporting the same in any desired position.

14. In apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having recesses in the upper sides thereof and edges adapted to be brought into engagement around the said lugs to clamp them in position and form molds, means for bringing into engagement the two bars of each of said pairs, means for raising and lowering said bars and for supporting the same in any desired position, and means for heating said bars when in a raised position.

15. In apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having recesses in the upper sides thereof and recessed edges adapted to be brought together around the said lugs to clamp them in position and form molds, and means for bringing into engagement the two bars of each of said pairs.

16. In an apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having edges adapted to be brought into engagement around said lugs to clamp them in position and to form molds, and means for raising and lowering said bars and for supporting the same in any desired position.

17. In an apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having toothed edges adapted to be brought into engagement around said lugs to clamp them in position and form molds, means for bringing into engagement the two bars of each of said pairs, means for raising and lowering said bars and for supporting the same in any desired position, and means for heating said bars when in a raised position.

18. In an apparatus for uniting storage battery plates having extending terminal lugs, the combination with a holder for said plates of one or more pairs of bars having recessed edges adapted to be brought into engagement around said lugs to clamp them in position and form molds, and means for bringing into engagement the two bars of each of said pairs.

19. In an apparatus for uniting storage battery plates having extending terminal lugs, the combination of a holder for said plates, means for compressing the plates in said holder, molds for receiving the lugs of said plates, means for adjusting the position of said molds, and means, controlled by the adjusting mechanism of said molds, for heating said molds.

In testimony whereof, I have hereunto subscribed my name this 1st day of February, 1904.

L. H. FLANDERS.

Witnesses:

OTTO S. SCHAIREK,

BIRNEY HINES.