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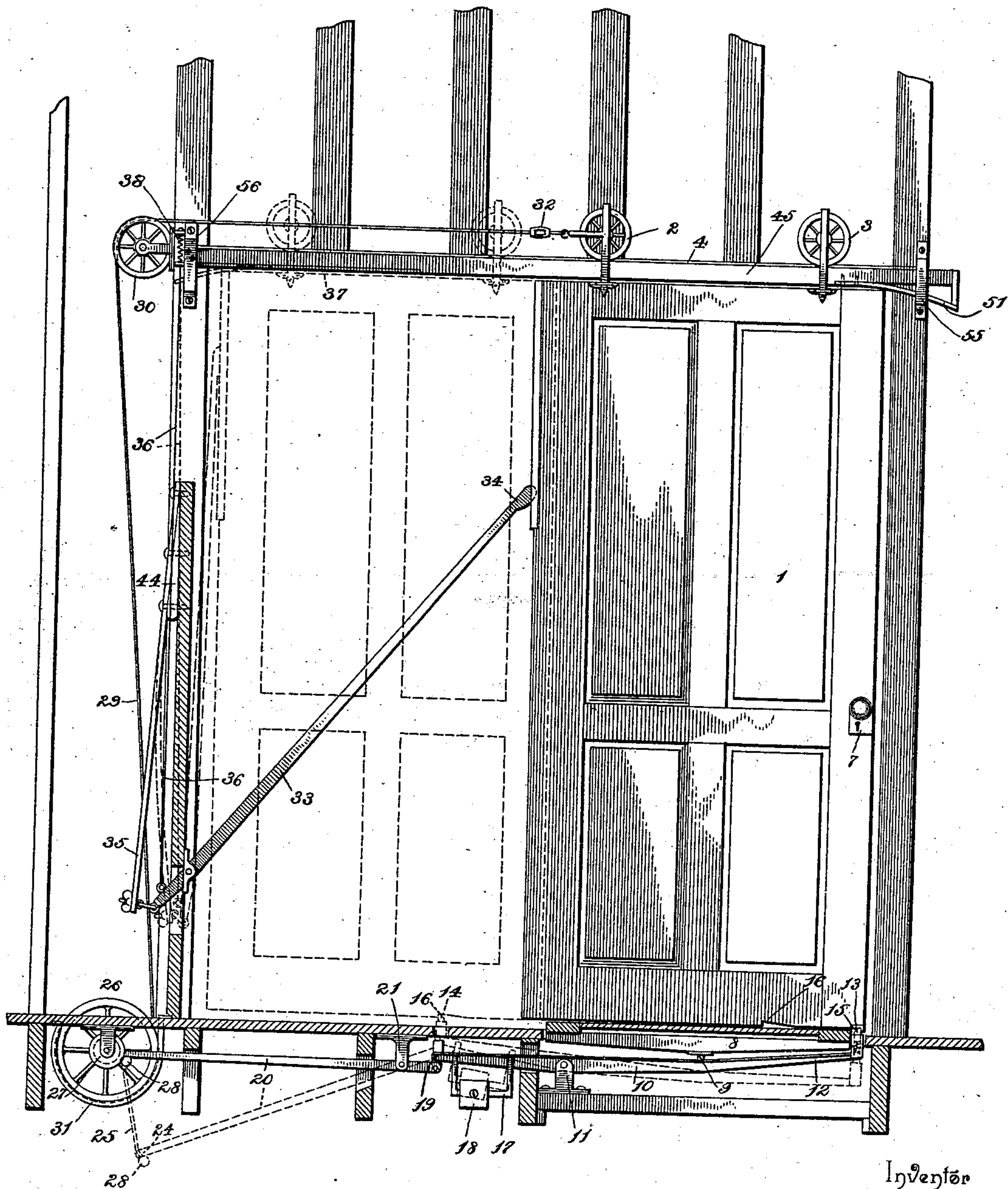
4 Sheets—Sheet 1.

A. THORN.
DOOR OPERATING APPARATUS.

No. 548,856.

Patented Oct. 29, 1895.

FIG. 1.



Inventor

Ashley Thorn.

Witnesses

By *his* Attorneys.

Edw. D. Wall Jr.
W. H. Wiley

C. A. Snow & Co.

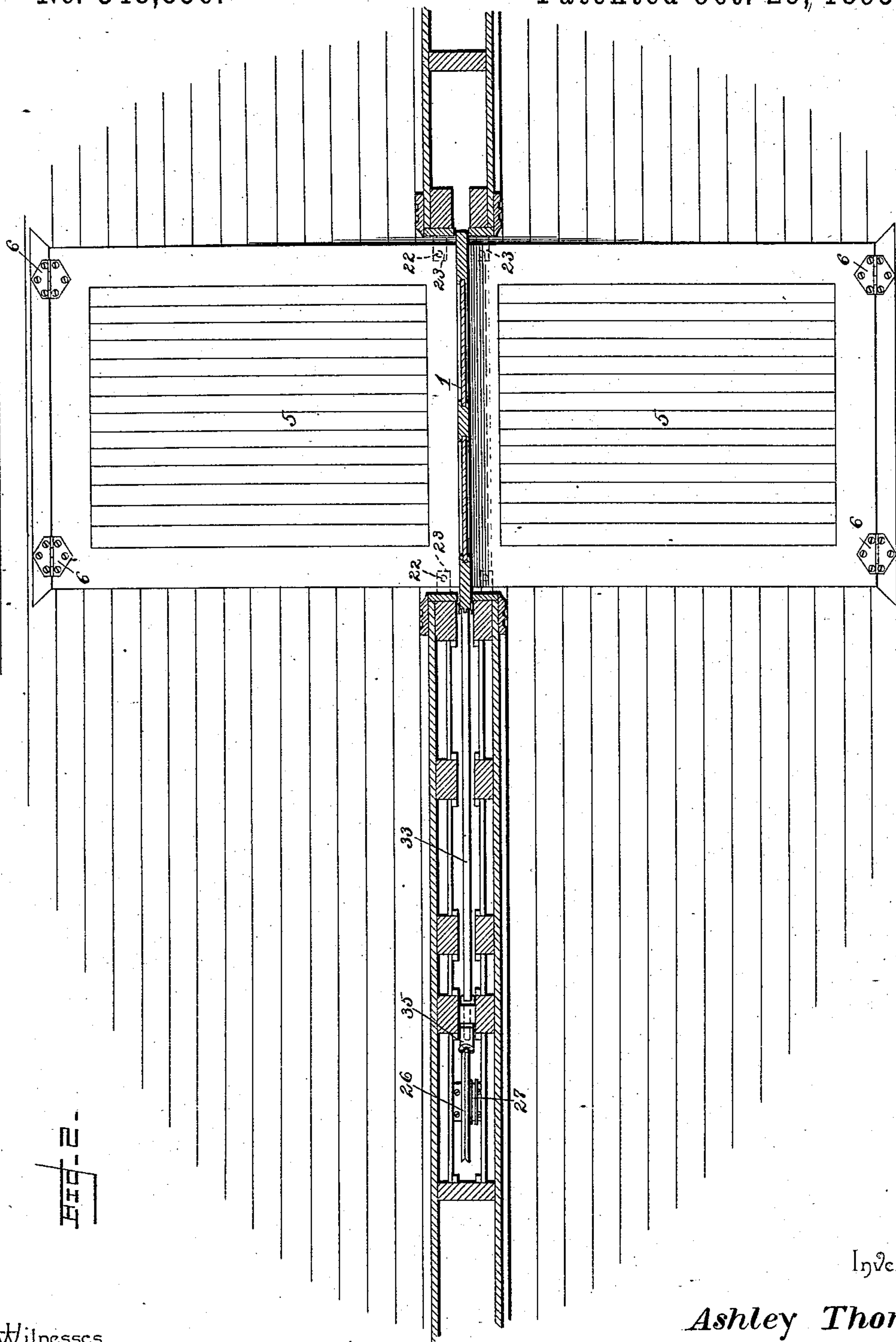
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(No Model.)

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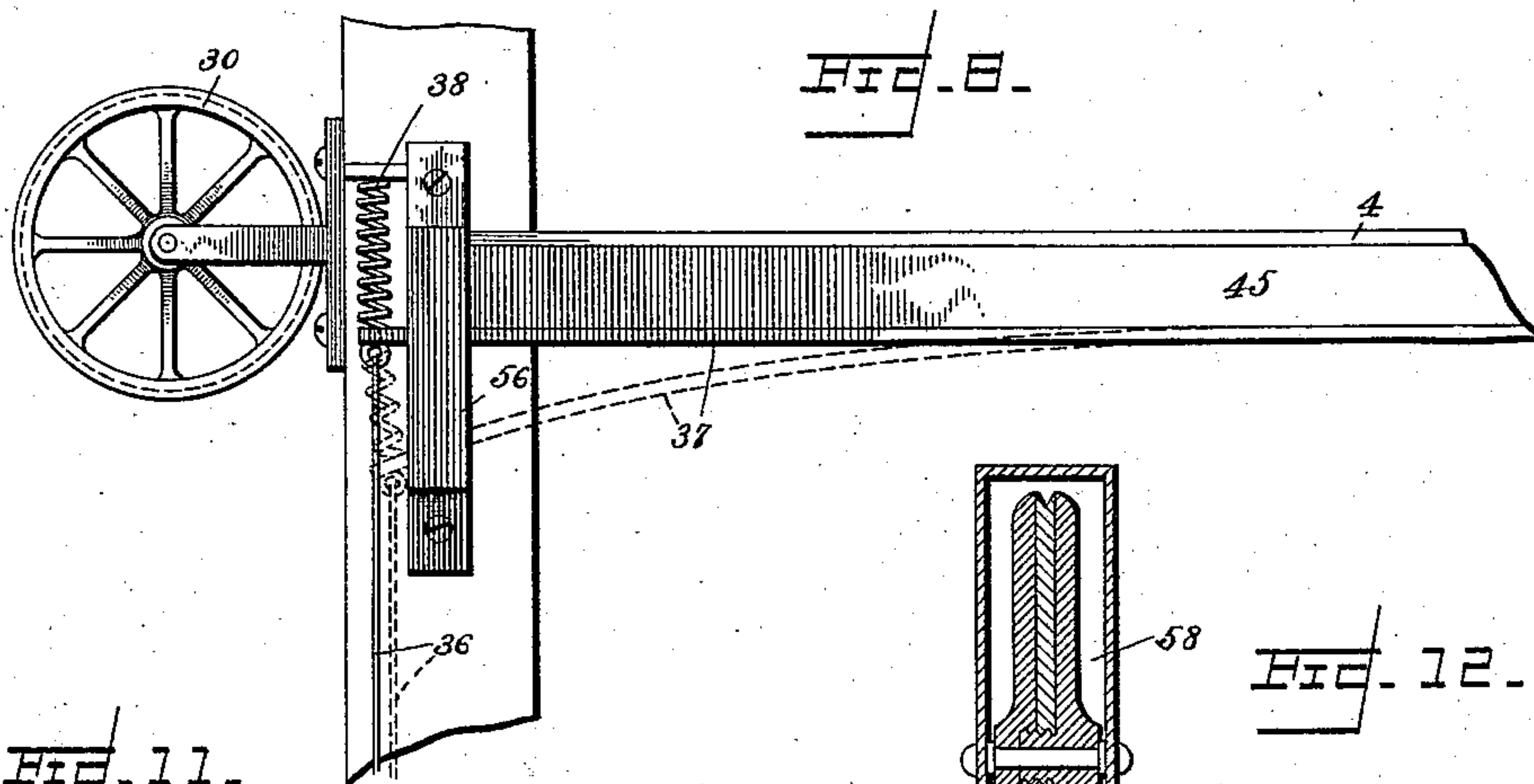
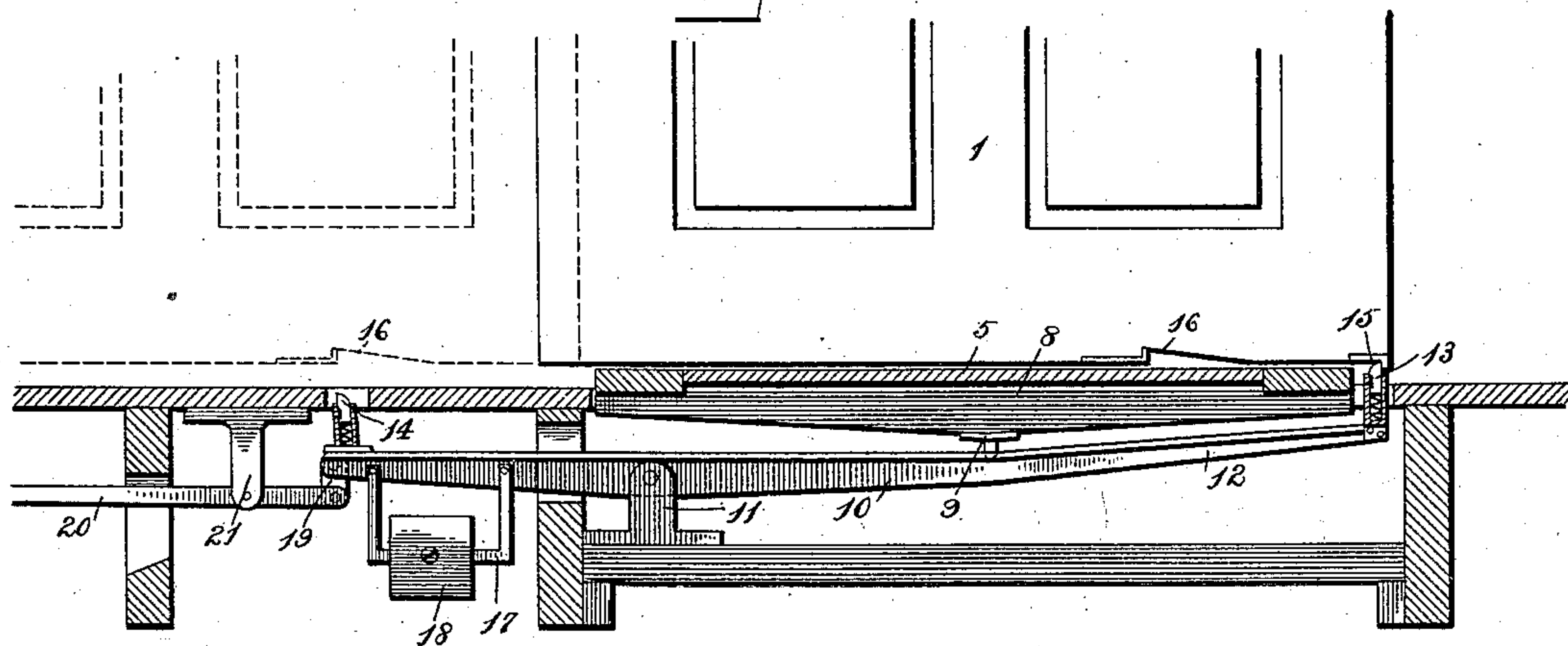


Fig. 11.

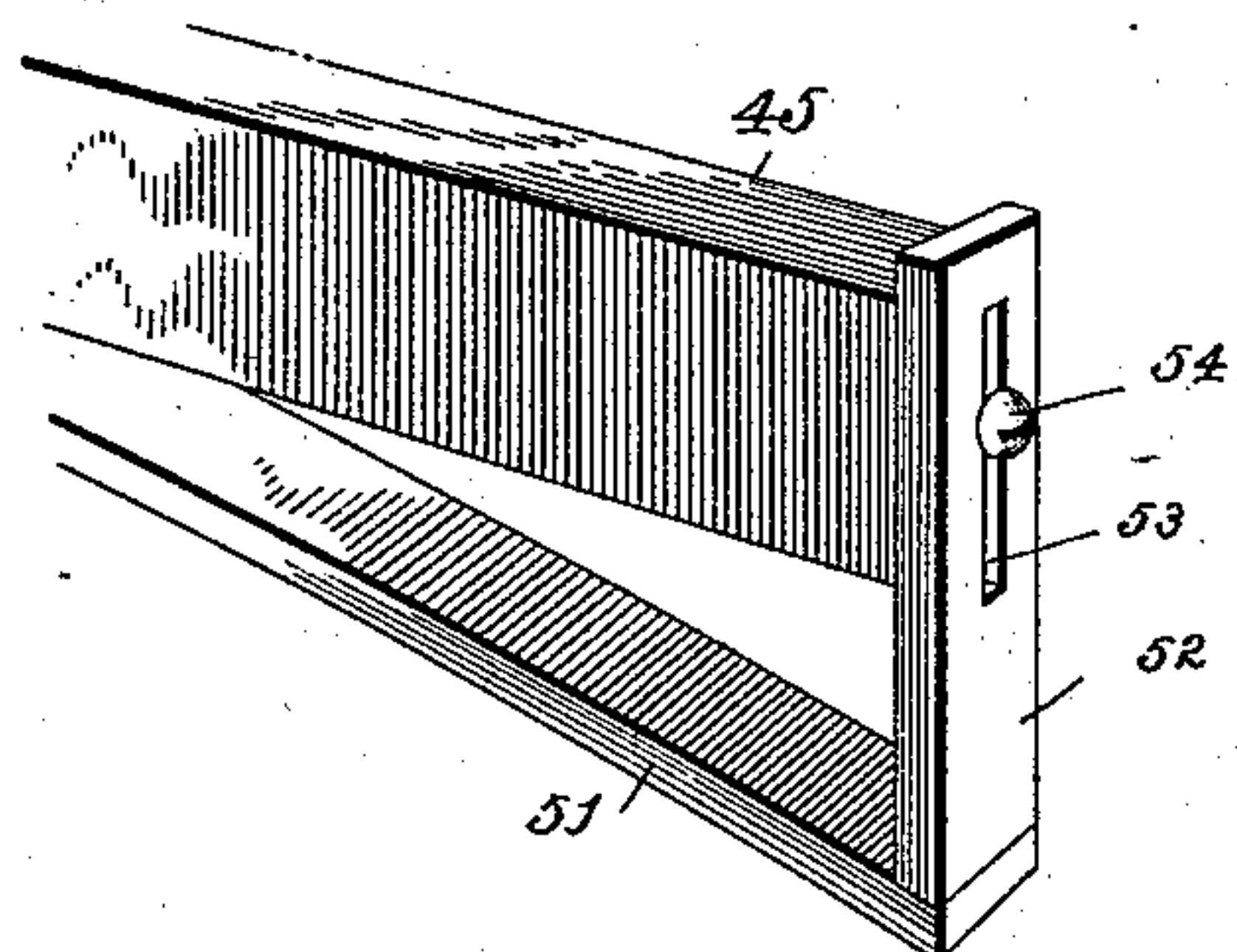


Fig. 9.

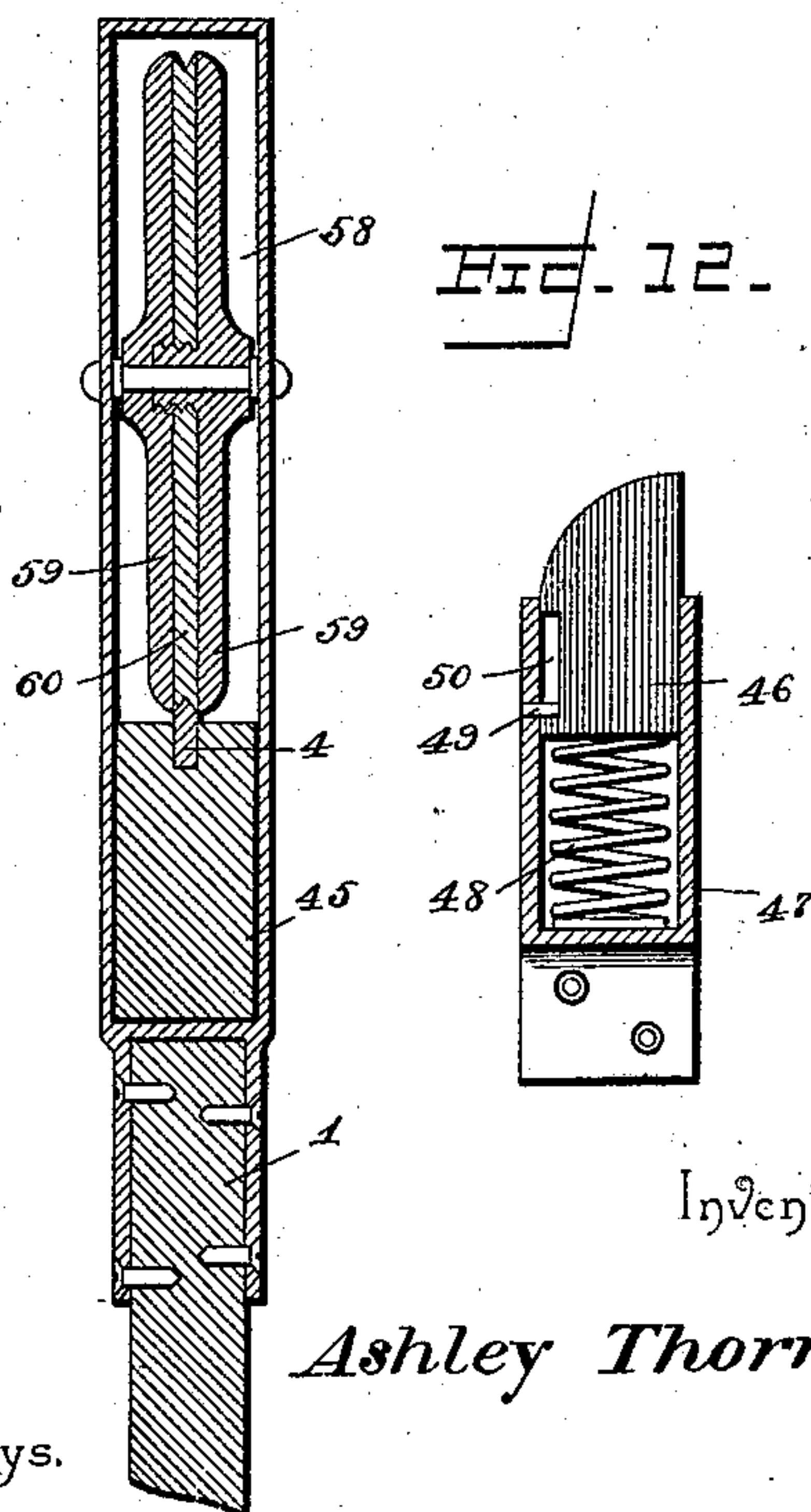


Fig. 12.

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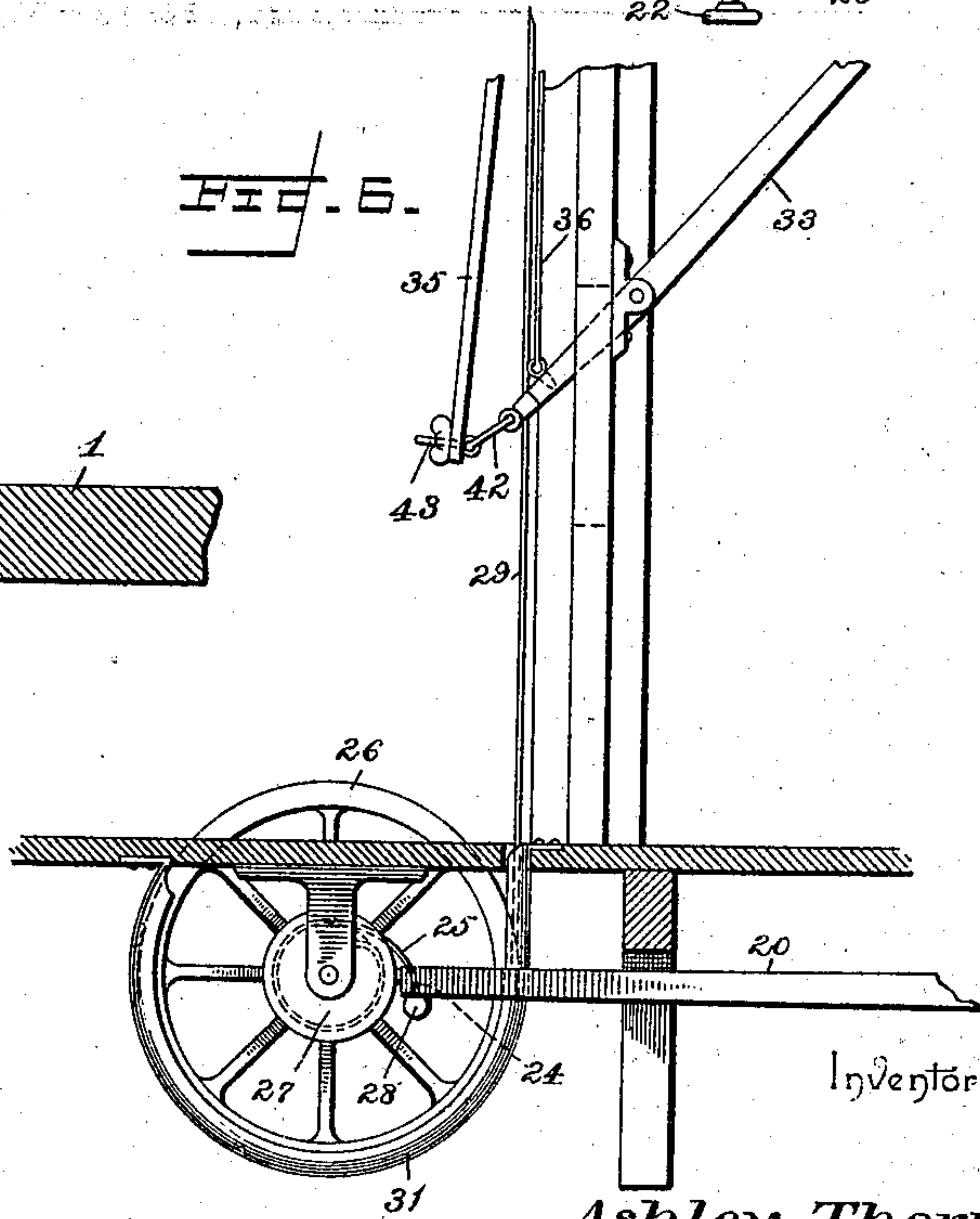
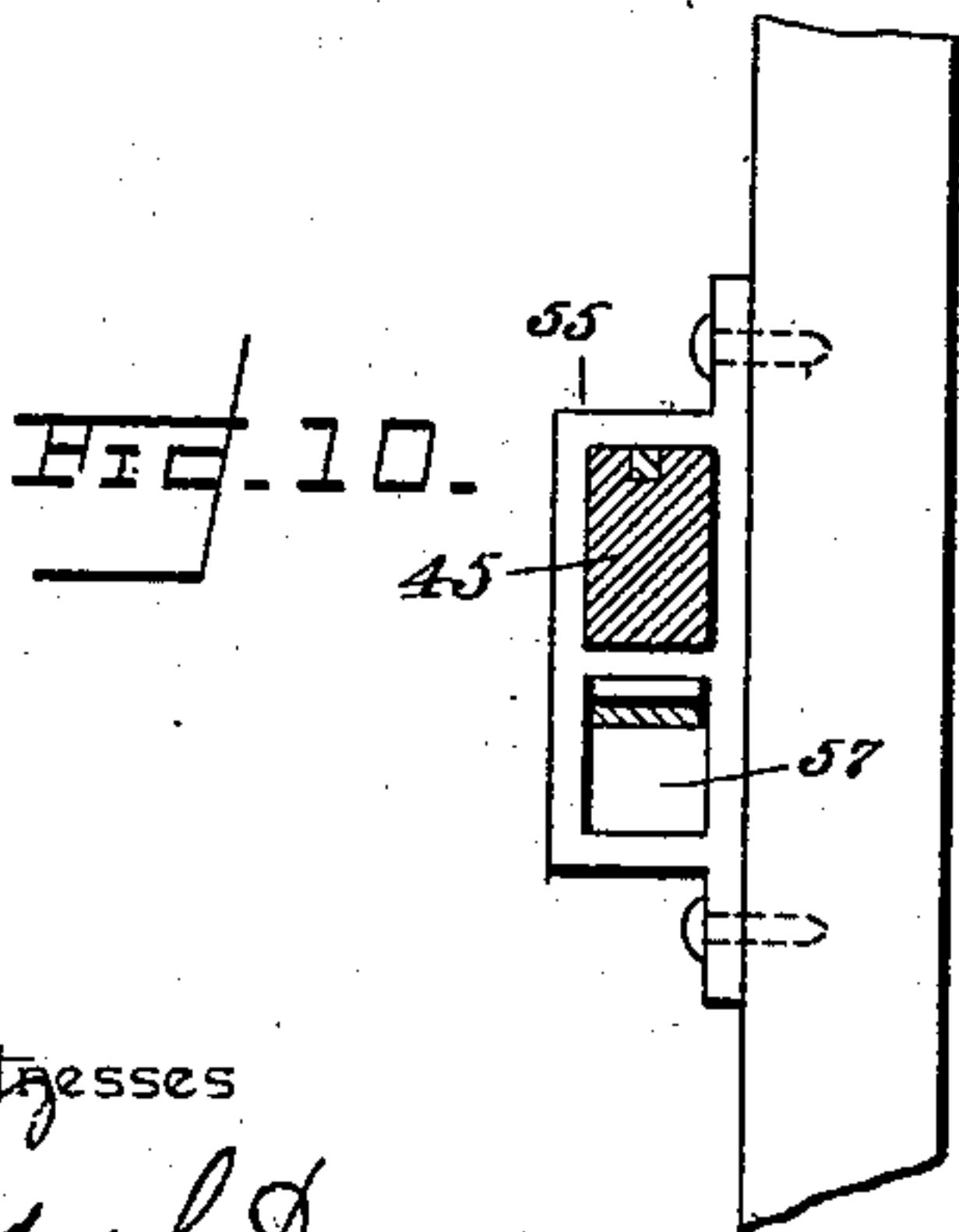
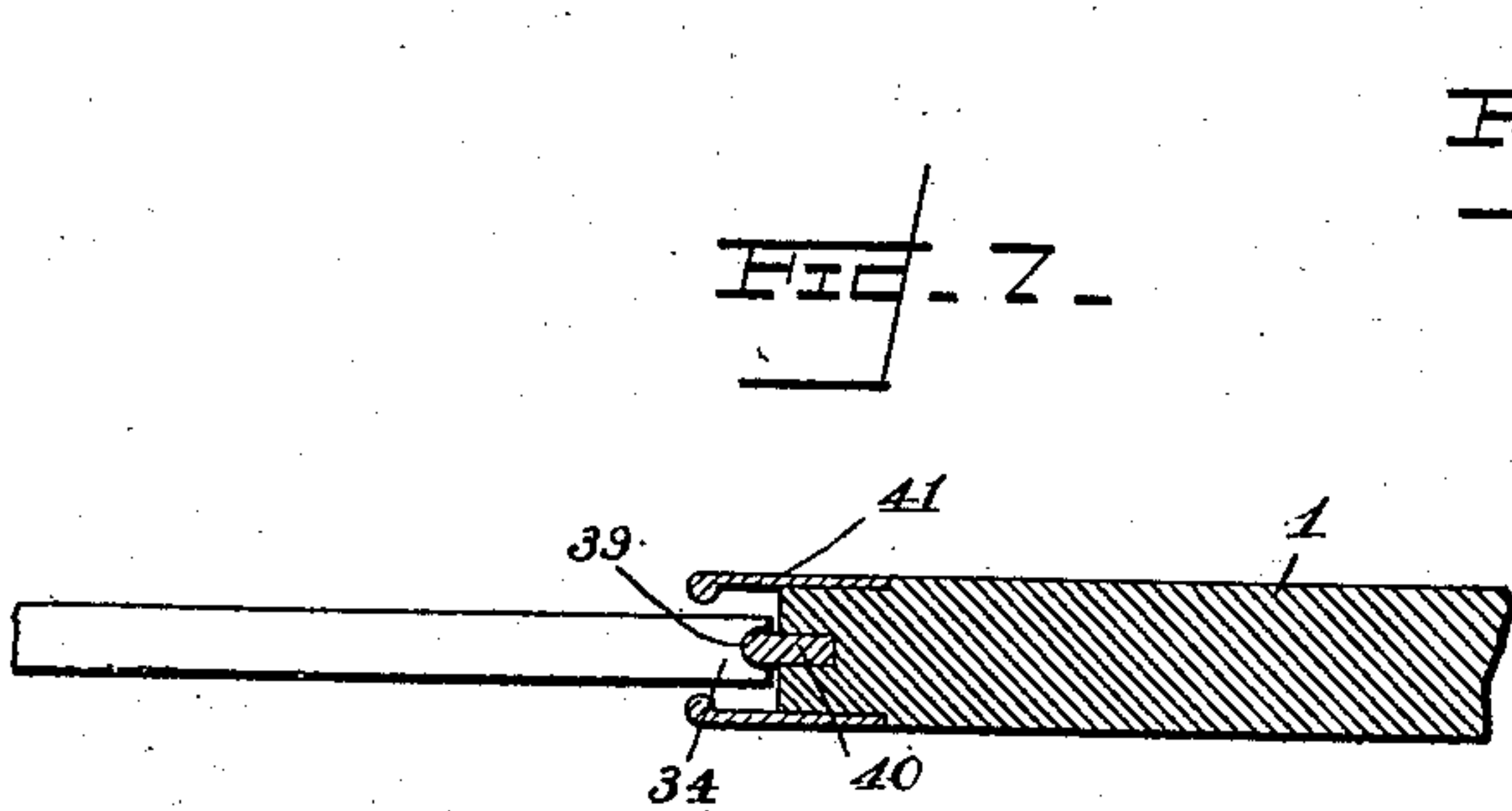
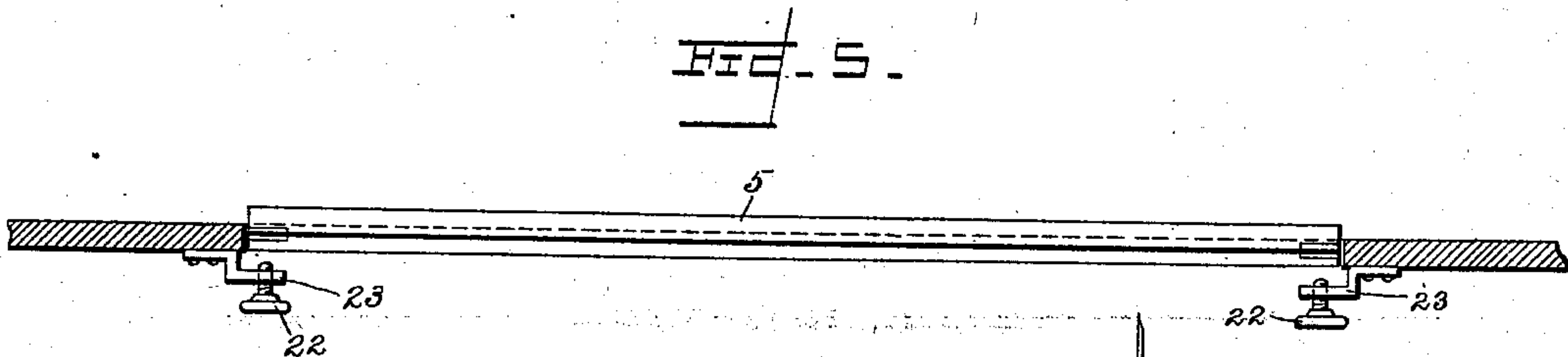
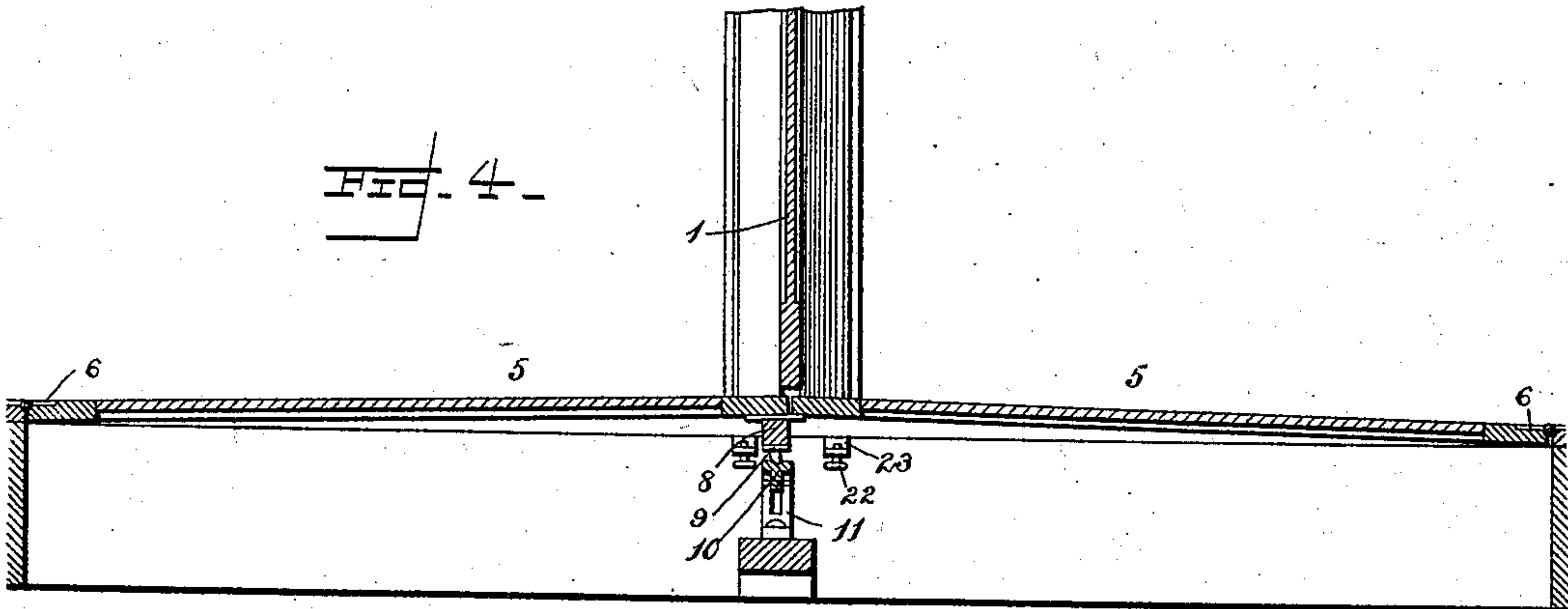
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A. THORN.
DOOR OPERATING APPARATUS.

No. 548,856.

Patented Oct. 29, 1895.



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UNITED STATES PATENT OFFICE.

ASHLEY THORN, OF CLEARFIELD, PENNSYLVANIA.

DOOR-OPERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 548,856, dated October 29, 1895.

Application filed August 31, 1894. Serial No. 521,845. (No model.)

To all whom it may concern:

Be it known that I, ASHLEY THORN, a citizen of the United States, residing at Clearfield, in the county of Clearfield and State of Pennsylvania, have invented a new and useful Door-Operating Apparatus, of which the following is a specification.

The invention relates to improvements in door-operating apparatuses.

10 The object of the present invention is to improve the construction of door-operating devices and to provide one which will be adapted for dining-rooms and the like and which will be automatically opened and closed
15 to facilitate the passage of waiters and to avoid collisions.

A further object of the invention is to provide a door-operating apparatus which will be noiseless and which may be readily adjusted
20 to the weight of a door to be operated and to the size thereof.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated
25 in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is a side elevation, partly in section, of a door and an apparatus for operating the same constructed
30 in accordance with this invention. Fig. 2 is a horizontal sectional view. Fig. 3 is an enlarged detail sectional view of the lower portion of the door, the platform-supporting lever, and the adjacent parts. Fig. 4 is a longitudinal
35 sectional view of the platform. Fig. 5 is a detail view illustrating the means for regulating the depression of the platforms. Fig. 6 is a detail sectional view showing the door-operating wheel and the door closing and
40 cushioning lever. Fig. 7 is an enlarged detail sectional view illustrating the manner in which the door closing and cushioning lever engages the door. Fig. 8 is a detail view of the sheath and the door cushioning and closing
45 springs. Fig. 9 is a vertical sectional view of one of the door-hangers. Fig. 10 is a detail view of one of the rail-brackets. Fig. 11 is a detail perspective view of the adjustable stop spring or cushion. Fig. 12 is a detail
50 sectional view of one of the door-engaging catches.

Like numerals of reference indicate corre-

sponding parts in all the figures of the drawings.

1 designates a sliding door suspended by 55 hangers 2 and 3 from a track 4 and arranged above the inner adjacent ends of platforms 5, which extend from the door in opposite directions and which have their outer ends hinged, the hinges 6 being arranged with their knuc- 60 kles downward in order to present a smooth upper surface. The door 1 is designed to be provided with a lock 7 to secure it against automatic operation when desired.

The inner adjacent ends of the platforms 65 5, which, together with the door, may be of any desired construction, are arranged directly beneath the door when the latter is closed, and they are supported directly by a cross-bar 8. The cross-bar tapers slightly 70 from its center to each end and is provided at its lower edge with a bearing-plate 9, which is arranged directly beneath the center of the said cross-bar 8 and which has a depending oppositely-beveled portion arranged in a 75 notch of a lever 10 and forming a frictionless knife-bearing.

The platform-supporting lever 10 is fulcrumed or pivoted in bearings 11. It has an angularly-disposed extension 12 beyond the 80 bearing-plate 9, and it is provided at its ends with upwardly-projecting spring-catches 13 and 14 for engaging shouldered notches 15 and 16 of the door to hold the latter either closed or open. The rear or shorter arm of 85 the platform-supporting lever is provided with a depending stirrup 17, on which is mounted an adjustable weight 18, which is secured in its adjustment by a set-screw and which is adapted to counterbalance the 90 weight of the door.

The rear end of the platform-supporting lever 10, which is preferably constructed of flanged metal, is hingedly connected by a link 19 with an oscillating lever 20. The os- 95 cillating lever 20 is fulcrumed on a hanger 21 a short distance from the platform-supporting lever, in order that a slight depression of the platforms and the corresponding movement of the platform-supporting lever may 100 produce a considerable movement or swing of the rear end or long arm of the lever 20. The amount of depression of the platforms may be regulated by adjusting-screws 22, mounted

below the inner ends of the platforms at each side thereof in angularly offset or depressed bracket-plates 23, which are secured beneath the flooring at opposite sides of the platform-opening. The screws 22 limit the swing or oscillation of the lever 20, and thereby regulate the pull on the door, in order to adjust the apparatus to doors of different widths requiring a greater or less length of pull to open them. The oscillating lever has its rear end provided with an opening 24 and connected by a belt 25 with a drive or door-actuating wheel 26 by being wound around a small pulley 27, which is fixed to and carried by the drive wheel or pulley 26. One end of the strap or belt 25 is arranged in and passed through the opening 24 of the lever 20 and is provided with a weight 28, and the other end of the strap or belt is secured to the pulley 27 in a beveled slot or opening thereof to avoid having a knot at the periphery of the pulley. When the lever 20 swings downward, the drive wheel or pulley 26 is rotated, and when the door is being closed the weight 28 will take up any slack of the strap or belt 25 should the lever 20 move upward with greater rapidity than the strap is rewound on the pulley 27. The rotation of the drive wheel or pulley 26, caused by depressing the platform, operates to wind up on it a line 29, which has its lower end attached to the drive wheel or pulley 26, passes over a sheave 30 at the top of the doorway, and has its other end attached to the rear hanger 2 of the door, whereby the door will be opened. The line 29 is preferably constructed of leather, but may be a cable, or may be constructed of any suitable material. The peripheries of the sheave 30 and the drive wheel or pulley 26 are grooved, and the curved guard 31 is arranged beneath the drive wheel or pulley 26 and extends around the greater portion of the periphery of the latter to prevent the line 29 from becoming displaced. The end of the line which is connected with the hanger 2 of the door is provided with a turnbuckle 32 or other adjusting device for drawing the line to the proper tension.

The sliding door is cushioned in opening and assisted in closing by an upward-extending lever 33, fulcrumed near its lower end in suitable bearings on the door frame or casing, and having its upper end 34 bearing against the rear edge of the door, while its lower end is connected directly to a downwardly-extending spring 35 and by a strap or other suitable connection 36 with a horizontally-disposed spring 37 and a spiral spring 38. As the door opens, the long arm of the lever 33 swings upward and rearward against the action of the springs 35, 37, and 38, which cushion the door and prevent the same from opening with a sudden jerk and which close the door as soon as the pressure is removed from the platforms. The upper end 34 of the lever 33 is provided with a groove or notch 39 and is arranged on a tongue 40, disposed vertically on the upper

portion of the door, and the lever is held in such contact against accidental disengagement by vertically-disposed plates 41. The vertically-disposed plates or strips 41 form a way and are provided at their outer edges with inwardly-extending ribs, which contract the entrance to the way. This construction enables the upper end of the lever, which is slightly enlarged and rounded at the top, to slide freely on the rear edge of the door without much friction.

The lever 33 is slightly tapered, and its short arm, which is provided with an eye, is connected by a link 42 with an eye of an adjusting-screw 43, that is mounted on the lower end of the spring 35, and the screw 43 is provided with a nut, which enables the tension of the spring 35 to be regulated. The downwardly-extending spring 35 is set at the proper angle by means of a wedge-shaped block 44, interposed between the upper portion of the spring and the adjacent portion of the casing.

The horizontally-disposed spring 37 and the downwardly-extending spring 35 are preferably constructed of hard wood. The former is arranged adjacent to the top of the door with its front end secured to the rail 45, that supports the track 4, and its free end is attached to the upper end of the strap 36 and is connected with the spiral spring 38. The spring 38 assists in returning the flat spring 37 to its normal position. These springs cushion the door and retard the same and prevent a too sudden opening of the door, and the greater the weight placed on the platform the more quickly the springs will operate to check the door. The door is held open against accidental closing by the catch 14 and it is held closed against accidental opening by the catch 13.

Each of the spring-actuated catches consists of a bolt 46, arranged in a socket or housing 47 above a spiral spring 48, this bolt 46 having its upper end beveled at one side to enable it to be readily depressed by the door preparatory to engaging its proper notch. The bolt is limited in its movement by means of a pin 49 of the casing or socket and a recess 50 of the bolt. The spring-actuated catches are carried at the ends of the platform-supporting lever 10, and when one end of the platform-supporting lever is elevated the other end is depressed, so that only one of the catches is in position to engage the door. The flooring is provided with suitable openings through which the catches operate to engage the door.

The door is cushioned in closing to prevent a recoil or rebound by a flat downwardly-inclined spring 51, arranged to be engaged by the upper front corner or edge of the door and having its upper end secured to the rail 45 and its lower end engaged and depressed to secure the proper tension by an adjustable plate 52. The adjustable plate 52 is provided with a longitudinal slot 53, and is secured to one end of the rail 45 by a set-screw 54, where-

by the plate may be adjusted vertically. The rail 45 is mounted in brackets 55 and 56, which are rectangular and which are divided by horizontal flanges to form lower rectangular guides 57 for the springs 37 and 51.

The hanger-wheels 58 are each preferably composed of metal sides 59 and the paper center or filling 60, which is provided with a peripheral groove and which rolls on the track 4. The track 4 is constructed of paper, and the door is thereby rendered absolutely noiseless in its operation of sliding. One of the sides 59 of the hanger-wheel is provided with an inwardly-projecting hub extension, which is exteriorly threaded and which fits in a threaded socket of the other side 59.

It will be apparent that the sliding door is automatic in its operation of opening and closing, that it is rendered noiseless, and that the mechanism for operating the door may be readily adjusted to suit doors of different sizes and weights. It will also be seen that the apparatus is capable of cushioning and retarding the door to prevent any quick movement should a heavy weight be suddenly placed on the platform. This feature especially adapts the door for dining-rooms where it is necessary for waiters to pass in and out with great rapidity.

Changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

What I claim is—

1. In an apparatus for operating doors, the combination of a door, platforms arranged on opposite sides of the door, a platform supporting lever arranged beneath the door and having one arm extending beneath the platform, a drive wheel carrying a pulley of smaller size, an oscillating lever having one end connected with the platform supporting lever, a belt having one end connected with and wound around the pulley and having its other end attached to the oscillating lever, and connections between the drive wheel and the door for actuating the latter, substantially as described.

2. In an apparatus for operating doors, the combination of a door, a depressible platform, an oscillating lever having one end connected with the platform and provided at its other end with an opening, a drive wheel provided with a pulley of smaller diameter than it, a belt connected with and wound around the pulley at one end and having its other end passed through the opening of the oscillating lever and provided with a weight, and connections between the drive wheel and the door, substantially as described.

3. In an apparatus for operating doors, the combination of a door mounted for sliding and provided at its bottom with shoulders, a platform, a platform lever supporting the platform and fulcrumed between its ends and provided at its ends with catches arranged to engage alternately the shoulders of the door to

hold the latter open or closed, and mechanism connected with the platform lever and the door for actuating the latter, substantially as described.

4. In an apparatus for operating doors, the combination of a sliding door provided at its bottom with shouldered notches, a platform, a platform supporting lever arranged beneath the door and provided at its ends with spring actuated catches, said lever being disposed horizontally and being fulcrumed between its ends, whereby the spring actuated catches are adapted to engage the door alternately, and mechanism for actuating the door connected with the platform lever, substantially as described.

5. In an apparatus for operating doors, the combination of a sliding door, a depressible platform, a platform lever having one arm supporting the platform, an oscillating lever having one arm connected with the other arm of the platform lever, a drive wheel carrying a pulley, a belt having one end arranged on the pulley and its other end connected with the oscillating lever, and a line arranged on the drive wheel and connected with the door, substantially as described.

6. In an apparatus for operating doors, the combination of a sliding door provided at its bottom with shoulders, a depressible platform, a platform supporting lever having one arm arranged beneath the platform and provided at its ends with catches arranged to engage alternately the shoulders of the door, an oscillating lever connected with the platform lever, a drive wheel provided with a pulley, a belt having one end wound around the pulley and its other end attached to the oscillating lever, and means for connecting the drive wheel with the door for actuating the latter, substantially as described.

7. In an apparatus for operating doors, the combination of a door, a platform arranged beneath the door, a platform lever having one arm supporting the platform, and provided at its other arm with a depending stirrup, an adjustable weight mounted on the stirrup, an oscillating lever connected with the platform lever and fulcrumed adjacent thereto, a drive wheel carrying a pulley, a belt having one end arranged on the pulley, and its other end attached to the oscillating lever, and means for connecting the drive wheel with the door for actuating the latter, substantially as described.

8. In an apparatus for operating doors, the combination of a sliding door, a lever arranged in rear of the door and fulcrumed adjacent to one end and having its other end bearing against the rear edge of the door, springs connected with the short arm of the lever for checking and cushioning the door, and means for opening the door, substantially as described.

9. In an apparatus for operating doors, the combination of a sliding door, a lever fulcrumed adjacent to one end and arranged in

rear of the door and having its other end bearing against the door, a flat spring secured at one end, an adjusting screw connecting the other end of the spring with the short arm of the lever and adapted to regulate the tension of the spring, and means for opening the door, substantially as described.

10. In an apparatus for operating doors, the combination of a sliding door, a lever arranged in rear of the door and fulcrumed near its lower end and having its upper end bearing against and slidingly mounted on the door, a downwardly extending spring connected with the short arm of the lever, a horizontally arranged spring disposed at the top of the door and connected with the short arm of the lever, and means for opening the door, substantially as described.

11. In an apparatus for operating doors, the combination of a sliding door provided at its rear end with a vertically disposed tongue, guide strips secured to the door and arranged on opposite sides of the tongue and forming a way, a downwardly extending lever fulcrumed near its lower end and provided at its upper end with a notch engaging the tongue, springs connected with the short arm of the lever, and means for opening the door, substantially as described.

12. In an apparatus for operating doors, the combination of a sliding door provided at its rear edge with a vertical way, a lever fulcrumed near its lower end and having its upper end arranged in said way, a downwardly extending spring connected with the short arm of the lever, a horizontally disposed flat spring arranged at the top of the door and connected with the short arm of the lever, a spiral spring arranged above and connected

with the horizontally disposed spring, and means for opening the door, substantially as described.

13. In an apparatus for operating doors, the combination of a horizontal track bar, a sliding door suspended from the track bar and provided with rollers arranged on the upper face of the track bar, an inclined spring located on the lower face of the track-bar and having one end secured to the same and arranged to be engaged by the door in closing and to be interposed between the same and the track bar, and means for adjusting the other end of the spring away from the track bar to regulate the tension of the spring, substantially as described.

14. In an apparatus for operating doors, the combination of a door casing, a sliding door, an inclined spring having one end secured to the door casing and arranged to cushion the door in closing, and an adjustable plate secured to the door casing and engaging the other end of the spring, substantially as and for the purpose described.

15. In an apparatus for operating doors, the combination of a door, a depressible platform, means for opening the door connected with the platform, and a bracket extending beneath the platform and provided with an adjusting screw arranged to be engaged by the platform to limit the depression thereof, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ASHLEY THORN.

Witnesses:

HARRY ROSS,

A. BOYD THORN.