

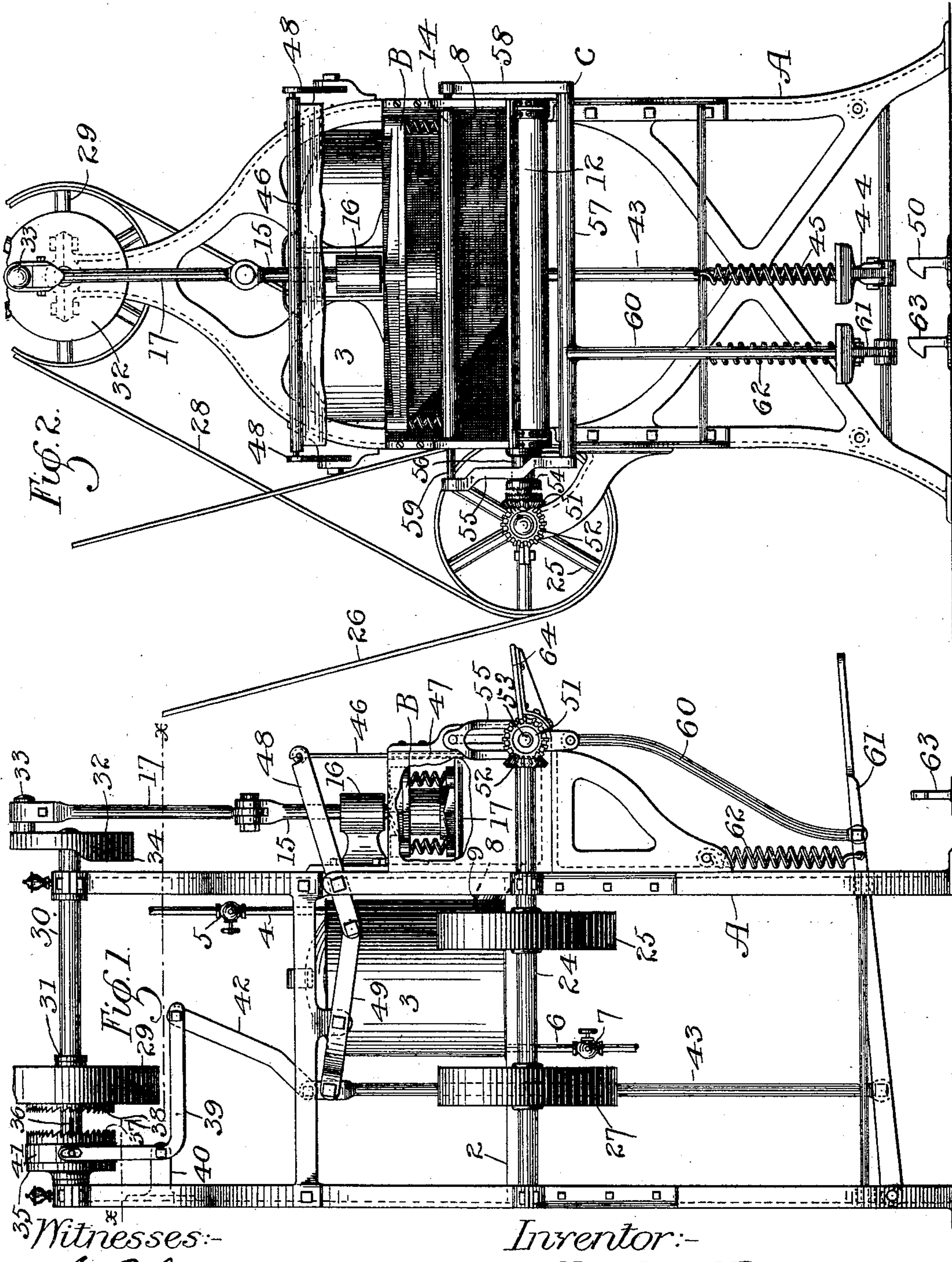
(No Model.)

2 Sheets—Sheet 1.

C. J. DION.
STARCHING MACHINE.

No. 489,556.

Patented Jan. 10, 1893.



Witnesses:-

W. R. Caldwell.

A. M. V. V. V.

Inventor:-

Charles J. Dion,

per. Paul D. D.

Attorneys.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 7.

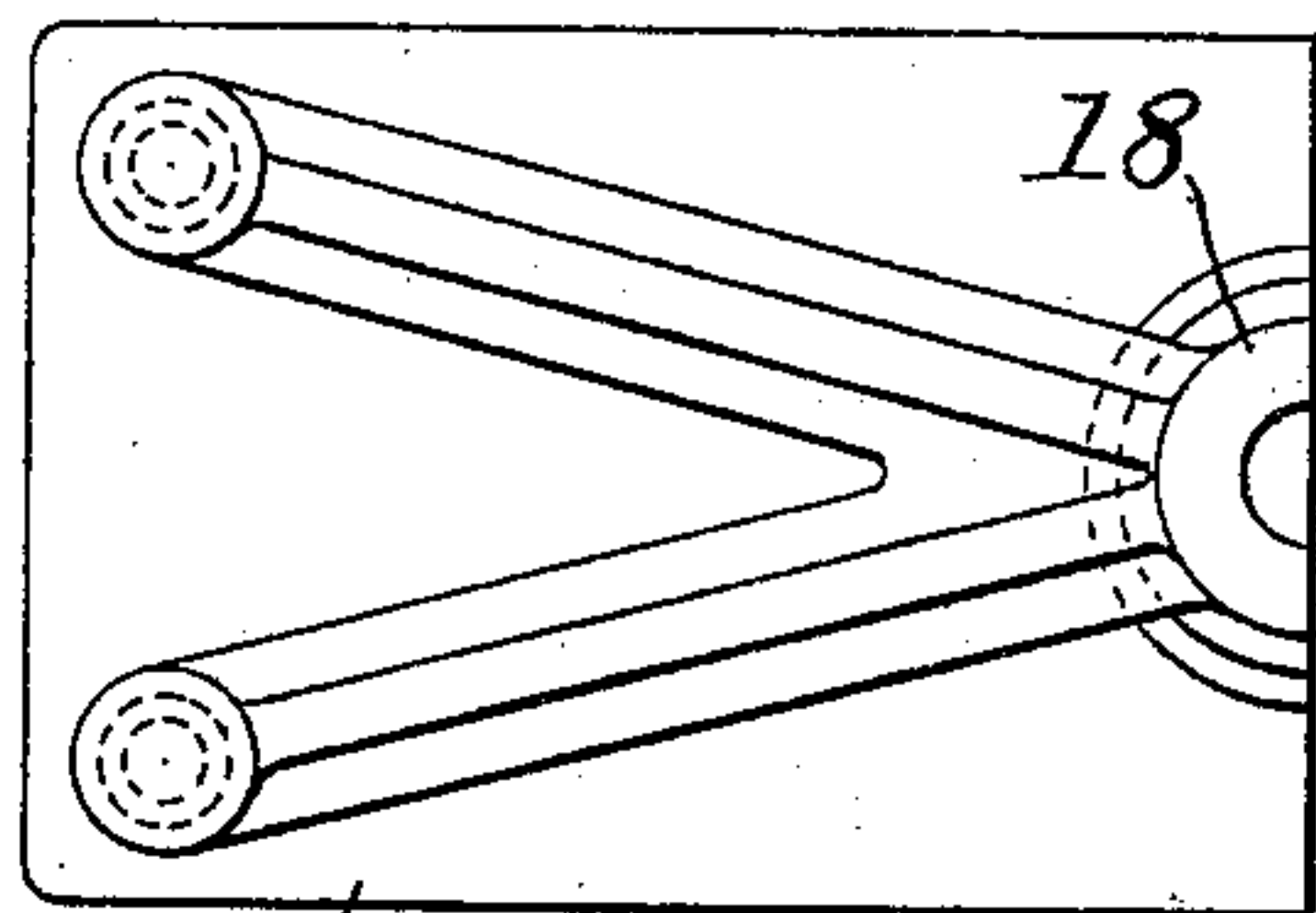
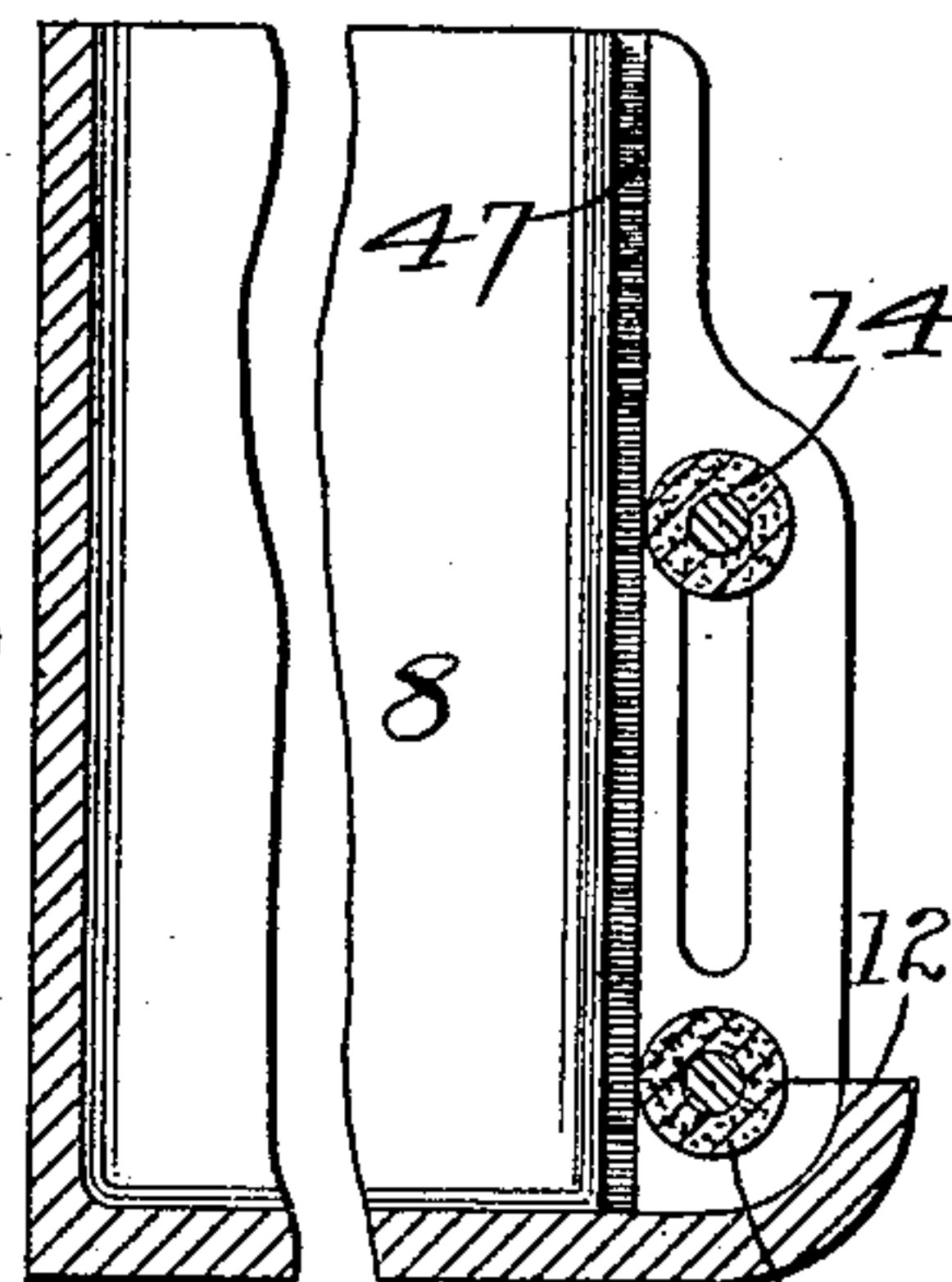
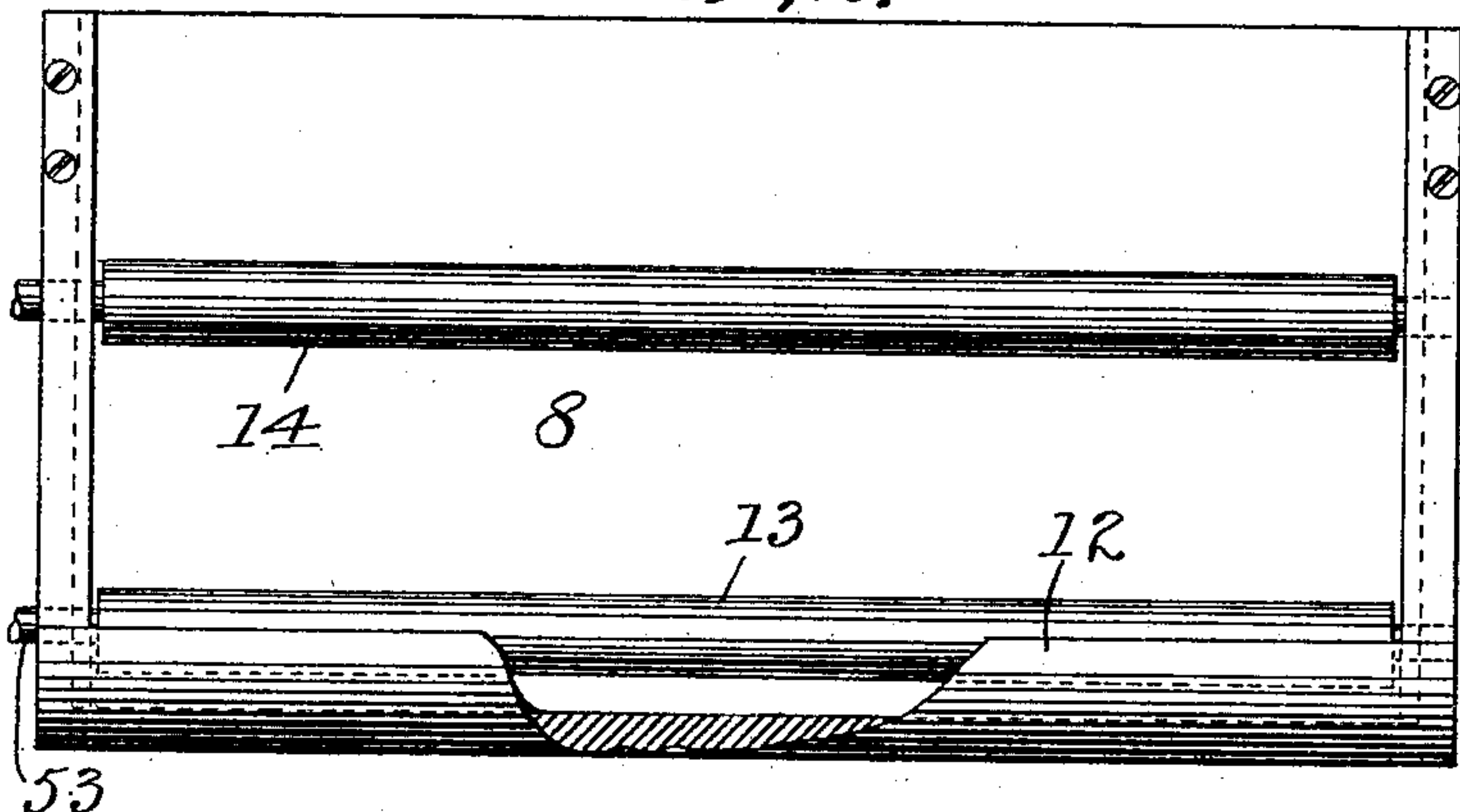


Fig. 6.

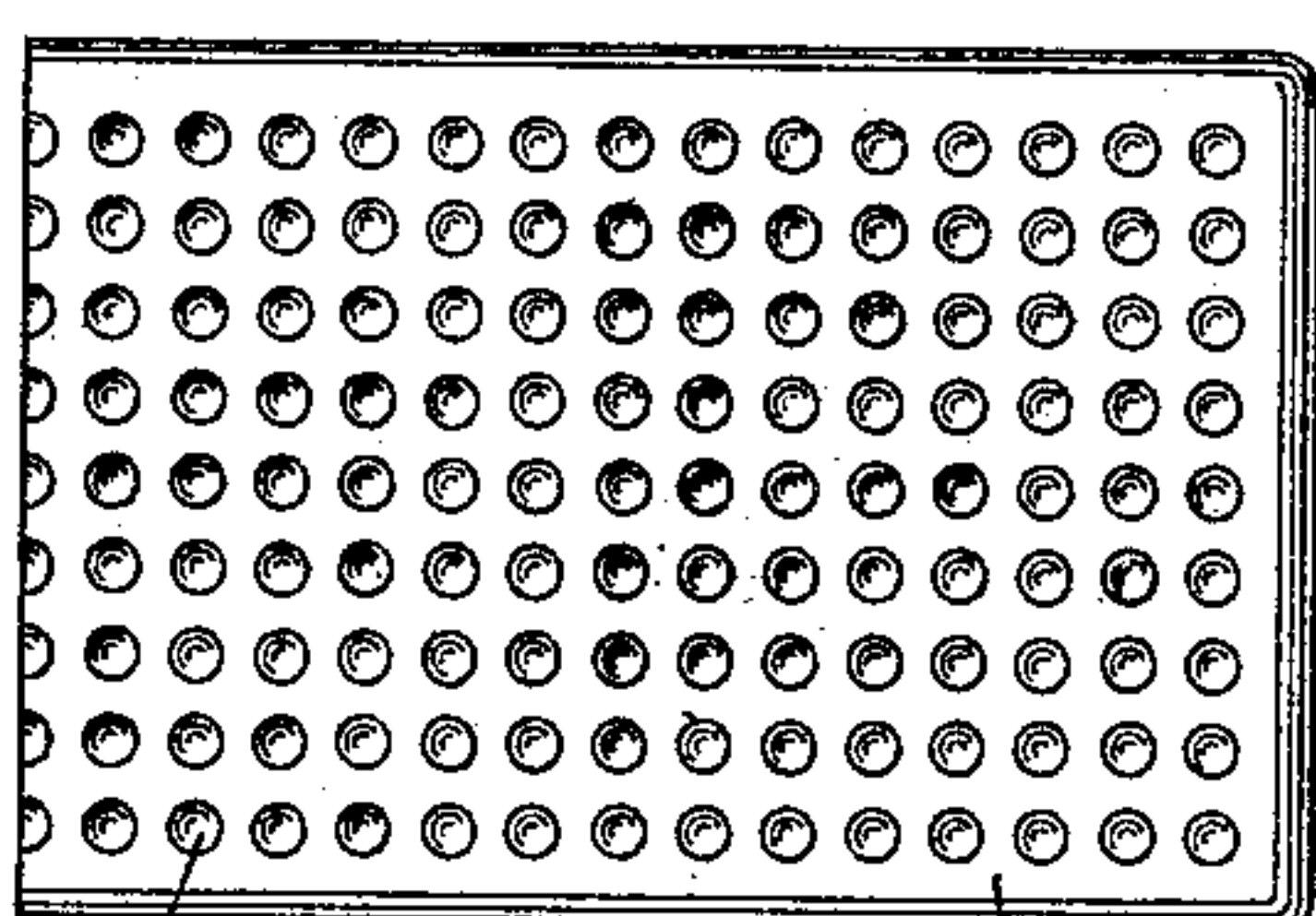


Fig. 5.

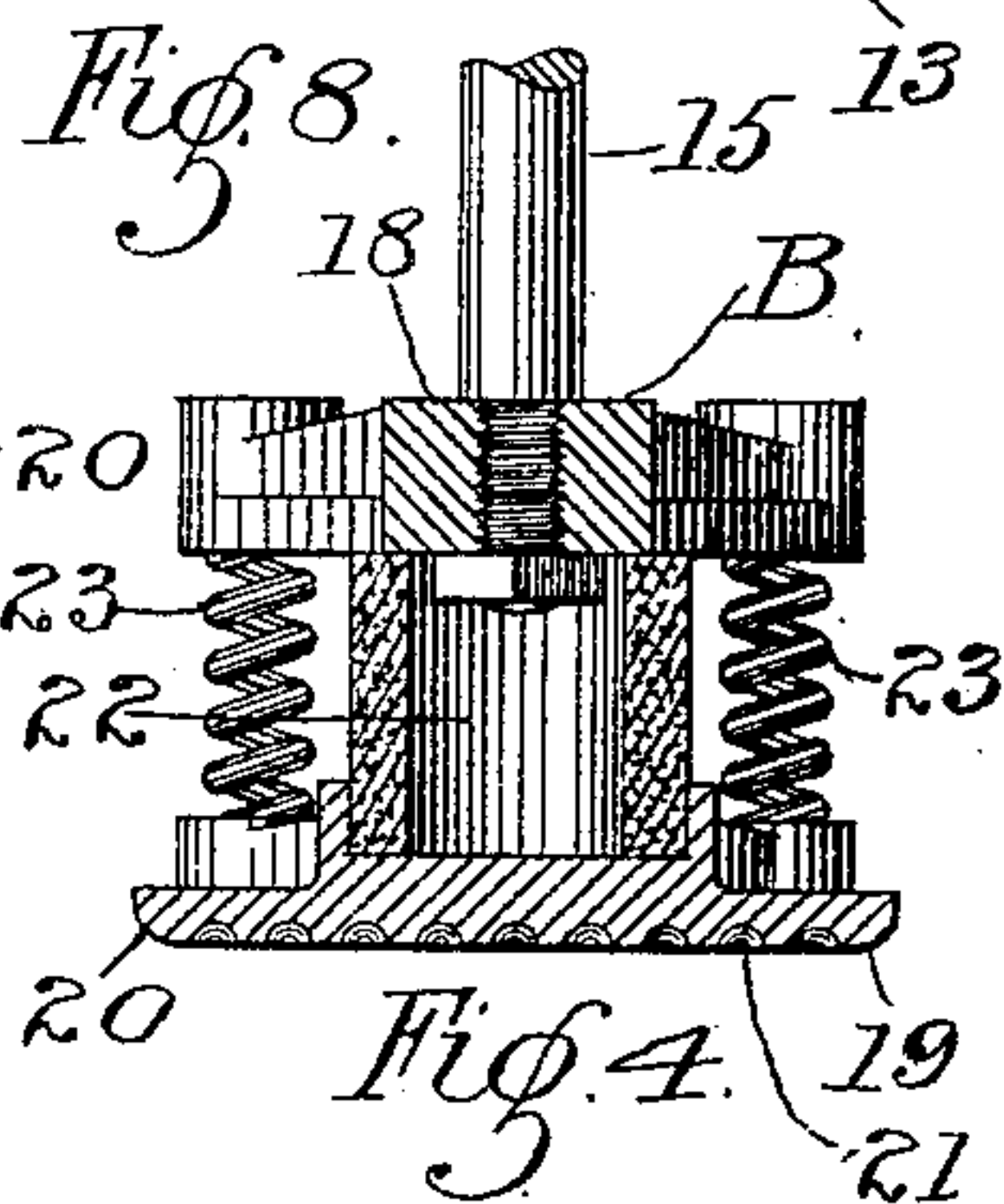


Fig. 4.

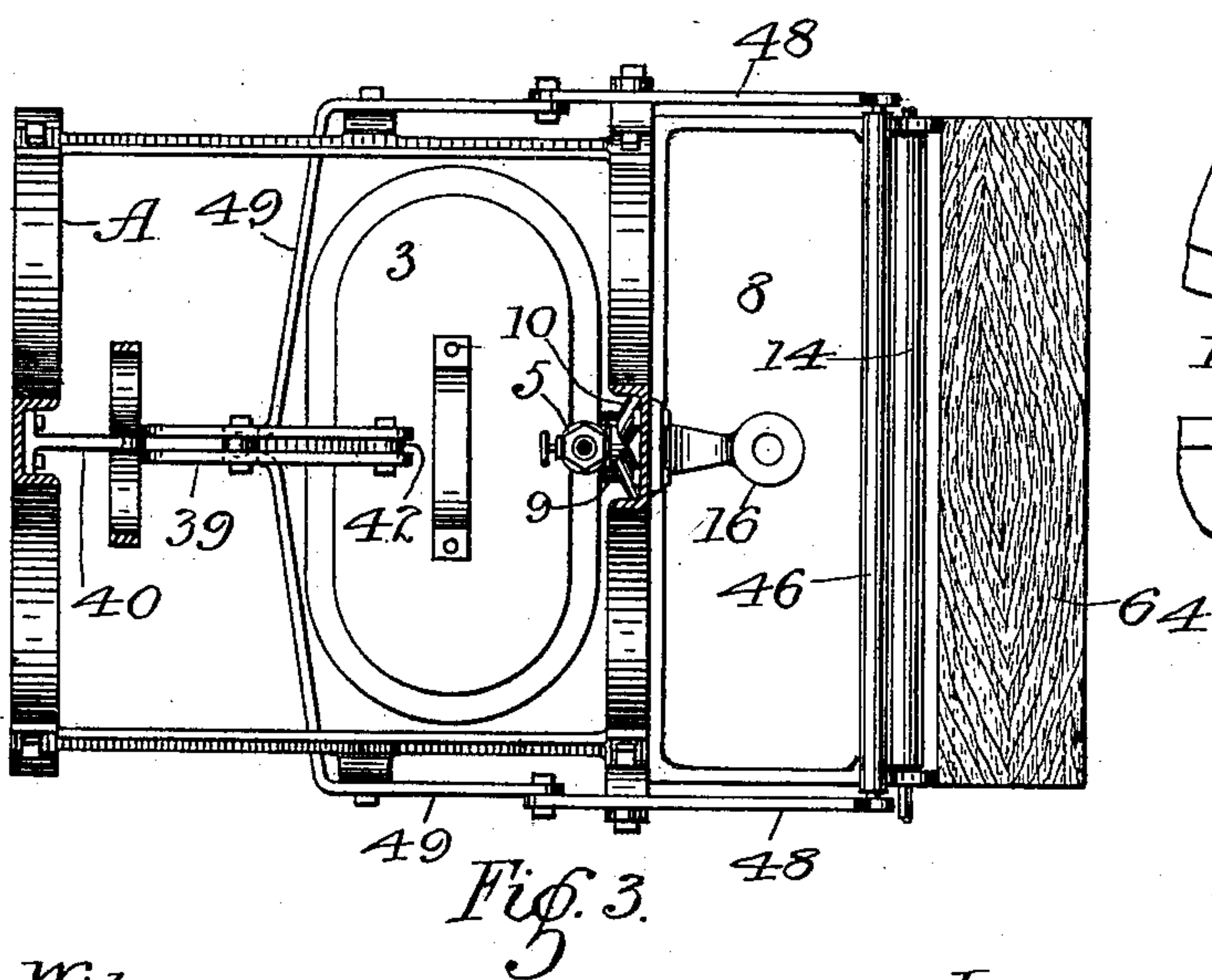


Fig. 3.

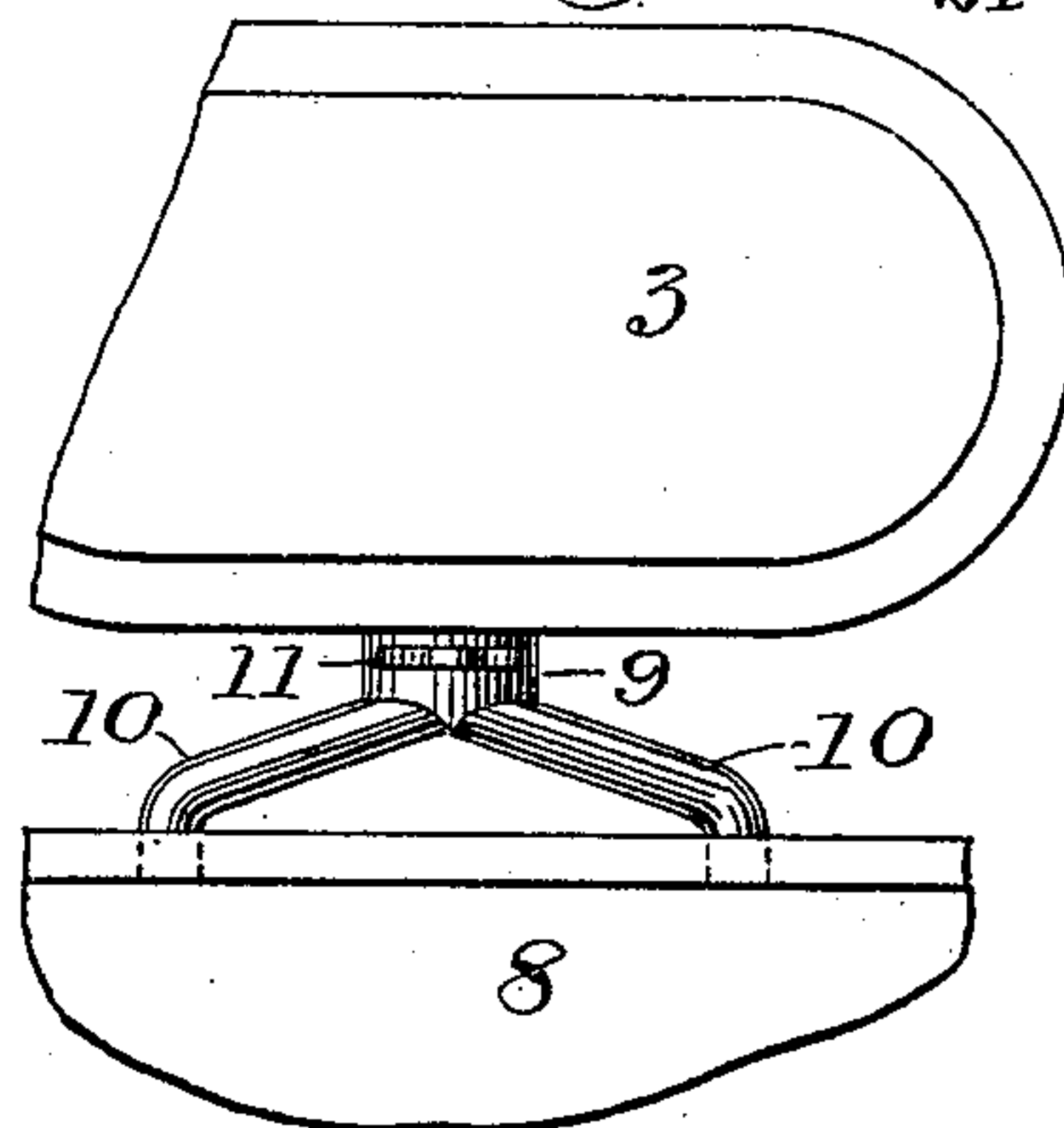


Fig. 9.

Witnesses:-

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UNITED STATES PATENT OFFICE.

CHARLES J. DION, OF ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-HALF TO
CHESTER L. CALDWELL, CLIFFORD B. DEACON, AND ERNEST L. MABON,
OF SAME PLACE.

STARCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,556, dated January 10, 1893.

Application filed September 18, 1891. Serial No. 406,060. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. DION, of St. Paul, Ramsey county, Minnesota, have invented certain Improvements in Starching-Machines, of which the following is a specification.

My invention relates to improvements in shirt starching machines, its object being to provide a machine by means of which the fabric of the garment may be quickly and thoroughly saturated with the starch, but without injury to it from blows or strains.

To this end my invention consists in providing an open front rectangular box of convenient size to receive the shirt bosom, so connected by suitable pipes with a starch reservoir, that the requisite amount of starch can be delivered into it. A piston, provided with indentations or depressions upon its face, is fitted closely to the box, and is driven up and down therein into contact with the garment, by means of suitable machinery connected to its rod, the piston having a spring or other elastic connection to the rod, so as to adapt itself to inequalities of surface or varying thicknesses of material. A sliding gate is arranged to close the opening of the box, and a pair of rolls is journaled adjacent to the opening, for stripping the starch from the garment as it is removed from the box, delivering the starch back into the box.

My invention further consists in the construction and combination hereinafter described and specifically pointed out in the claims.

In the accompanying drawings forming part of this specification Figure 1 is a side elevation of my improved machine, the end of the starching box being broken away to show the plunger therein; Fig. 2 is a front elevation of the same showing the interior of the starching box, the sliding door or gate being broken away; Fig. 3 is a sectional, detail, plan view of the same, the plunger and its rod being removed; Fig. 4 is a cross section of the plunger showing the connection between the head and the piston; Fig. 5 is a partial detail plan view of the under side of the piston, showing the series of cup shaped depressions; Fig. 6 is a

partial top plan view of the plunger head; Fig. 7 is a detail front elevation, and partial section of the starching box, showing the rubber rolls for stripping the starch from the garment; Fig. 8 is a partial cross section of the same, and Fig. 9 is a detail of the pipe connections between the starch reservoir and the starching box.

In some of the common methods of starching by machinery, great injury is done to the garment by the severe blows which are given it to force the starch through the fabric, and by which it is torn and the buttons broken; and where the garment is carried through series of cogs or fluted rolls which force the starch into the fabric, there is inevitably an injurious strain and wear upon it. Plaits, ruffles and other parts of the garment, are also disarranged, and have to be properly adjusted by hand, after the starching operation is completed. By the use of my improved machine these objections are all obviated. The action of the piston is to first gently force the starch on top downward through the garment by elastic pressure, and then to draw that beneath upward through the fabric, without displacing the garment or any parts of it, or in any way straining or injuring it. The elastic connection between the piston and its rod, cushions the blow made by the downward stroke, and also allows the piston to yield to the atmospheric pressure, as it is first lifted, so as to check the initial movement, and prolong the action of suction by which the starch is drawn through the fabric. The depressions in the surface of the piston serve also to receive and hold the starch on the downward movement of the piston, which otherwise would be forced outward around the outer edge of the piston, the starch dropping out of the depressions back on to the garment as the piston rises. By this means a sufficient quantity of starch is kept on top of the garment to thoroughly saturate it, and the portions of the garment underneath the depressions not being as firmly compressed as the other portions, permit the starch to flow upward through it more freely.

In the drawings, A represents the frame of

the machine which is preferably of iron. Arranged centrally within the frame upon a board 2, or other suitable support, is the starch reservoir 3, for the holding of a quantity of the starch ready for use. This reservoir is provided preferably with a steam pipe 4, connecting with a suitable source of steam supply and having a valve 5 for controlling the inlet of steam to the reservoir, and also with a drip pipe 6, having a valve 7, for carrying off the surplus water.

The starching box 8 is arranged at the front of the machine, and is connected with the reservoir by means of the main pipe 9 having the branches 10 running to each end of the box, the flow of the starch being controlled by the valve 11. The starching box is provided with solid end and rear walls, but is open in front down to nearly the bottom of the box, as shown best in detail Fig. 7 the front side 12 of the box extending above the bottom a sufficient distance to retain the small quantity of starch which is at any one time contained therein. Journaled at the front of the box near the bottom, is the rubber roll 13, which is adapted to be driven in the manner hereinafter described. Arranged in sliding bearings directly above the roll 13 is a similar roll 14, which is closed down against the roll 13 when brought into use, as hereinafter described.

The starching box is provided with a plunger B having a plunger rod 15, which slides in the guide 16, and is connected to the pitman 17, by means of which it is driven from the disk crank 32. The plunger is made up of the head 18 rigidly connected to the rod 15, and the piston 19, connected with the head preferably by means of the central soft rubber block 22, and the spiral springs 23 arranged one at each corner of the piston. The piston is fitted closely to the box 8, and provided with rounded edges 20 to prevent binding in the box, and is also provided with series of cup shaped indentations or depressions 21 in its face. By means of this construction, the piston will readily adapt itself to any inequalities or varying thicknesses of the garment underneath, and with the upward movement of the plunger, the springs expand slightly, yielding to the atmospheric pressure, as a partial vacuum is formed underneath, thus causing a slightly slower initial movement of the piston than of the head, and more efficiently drawing the starch upward into the fabric.

The main driving shaft 24, journaled upon the frame of the machine, is provided with the pulley 25, which takes power from any suitable source by means of a belt 26. It is also provided with the pulley 27, for transmitting power by means of a belt 28 to the pulley 29 journaled loosely upon the shaft 30, which is journaled at the top of the machine, a collar 31 holding the pulley 29 from sliding upon the shaft. The shaft 30 is provided

with the disk crank 32 having the crank pin 33 to which the pitman 17 is connected. The disk is over-balanced opposite the crank pin by means of the enlarged portion 34, which exceeds the weight of the crank pin and its connections, so that when the clutch is thrown out of gear the disk will turn and lift the plunger, holding it in the position shown in Fig. 1.

Sliding upon the shaft 30 is the clutch 35 held from turning by means of the feather 36, and provided with the teeth 37, adapted to engage the similar teeth 38 on the pulley 29. In order to throw the clutch into engagement with the pulley so as to drive the shaft 30 from the shaft 24, I provide the bell crank lever 39, pivoted to the support 40 which is secured to the frame. The upper arm of the lever is connected to the collar 41, which lies in a groove in the clutch. The other arm of the lever is connected by means of the link 42 to the rod 43, the lower end of the rod being pivoted to the treadle lever 44. This treadle lever is normally held in its raised position, so as to keep the clutch out of engagement with the pulley 29, by means of the spiral spring 45 connected to the frame of the machine. By depressing the treadle lever 44, the clutch is thrown forward into engagement with the pulley, and the plunger operated.

In order to close the front of the starching box before the plunger commences to operate, I provide the sliding gate 46 running in the grooves 47 in the ends of the box and inside the rolls 13 and 14. This gate is connected to the long arms of the levers 48, which are pivoted to the frame of the machine, the short arms of the levers being similarly connected to the long arms of the levers 49, the short arms of which are curved around back of the reservoir and connected to the rod 43. Thus by depressing the treadle lever 44, the levers 48 and 49 serve to carry the gate downward and close the box before the clutch comes into engagement with the pulley 29. In order to secure the treadle lever 44 in its depressed position, I provide a treadle-hook or catch 50, under which the lever may be hooked and held. When released therefrom the spring 45 instantly lifts the lever and throws the machine out of gear, raising the gate of the starching box to give access to its interior, the overbalanced disk crank turning automatically to lift or hold the plunger in its raised position, and away from the garment in the starching box.

The roll 13 above described turns in fixed bearings near the bottom of the box just inside the edge 12, its shaft 53 being provided with a loose bevel gear 51, which meshes with the bevel gear 52 upon the constantly running shaft 24. The shaft 53 is also provided with the sliding clutch 54, having teeth adapted to engage similar teeth on the bevel gear 51, and thus to impart motion to the roll. The clutch is thrown into or out of engage-

ment with the gear, preferably by means of a double curved guide 55 engaging the circumferential groove 56 of the clutch, the two members of the guide standing on opposite sides of the clutch. This guide serves as one member of the yoke C, having the cross bar 57 and the member 58. The guide 55 is connected at its upper end to the shaft 59 of the roll 14, and the upper end of the member 58 is similarly connected to the other end of the shaft. The bar 57 is connected to a rod 60, the lower end of which is connected to the treadle lever 61, provided with a spring 62 tending to hold it in a raised position, and having a catch 63 for securing it in said depressed position. By depressing the lever 61, the roll 14 is drawn downward and into bearing contact with the roll 13, and at the same time the guide bar 55 throws the clutch 54 into engagement with the gear 51, thus causing the rolls to operate and carry outward the garment which lies between them, at the same time expressing the starch therefrom, which is delivered back into the starching box, the garment itself being carried outward on to the shelf 64.

Operation: The pulley 25 being connected to the source of power so that its shaft and the pulley 29 are driven, the valve 11 in the pipe 9 is opened to admit a sufficient quantity of starch from the reservoir to the starching box to cover the bottom of the box. The garment is then introduced through the front of the box and placed upon the layer of starch therein, when the valve 11 is again opened to admit a supply of starch to the box on top of the garment. The treadle 44 is then depressed closing the gate 46 in the front of the box, and throwing the clutch 35 into engagement with the pulley 29, thus causing the plunger B to be operated. The downward movement of the plunger forces the starch on top of the garment into the fabric and into the depressions in the piston, and presses the garment into the starch at the bottom of the box, the springs and rubber cushion yielding to adapt the piston to inequalities of surface or varying thicknesses of material, and deadening the force of the blow. With the return or upward movement of the plunger, a partial vacuum is formed underneath, thereby drawing the starch underneath the garment upward through the fabric, the springs yielding to the atmospheric pressure as the partial vacuum is formed, so as to slightly retard the upward motion of the piston and the starch held in the depressions flows back on to the garment. This operation is continued until the starch above and below the garment has been thoroughly worked into it by the alternate compression and suction. The treadle 44 when released, is lifted by the spring 45, throwing the clutch out of gear with the pulley 29, and lifting the gate 46. The treadle 61 on being depressed closes the roll 14 against the garment, which lies upon the roll 13, at the same time throwing the clutch 54 into en-

gagement with the gear 51. The roll 13 is thus turned, and with it the roll 14, carrying the garment outward from the box, and pressing the surplus starch out of the fabric, the rolls being so placed that the starch falls back into the box. When the treadle 61 is released, it is lifted by its spring, throwing the shaft of the roll 13 out of gear and carrying the roll 14 upward, leaving the front of the box open to receive another garment, when the operation may be repeated. By means of the pipe 4 steam may be admitted to the starch reservoir whenever necessary, and by means of the pipe 6 the surplus water in the reservoir may be carried off.

I claim—

1. In a starching machine, the combination of the open-front starching box, the gate for closing said opening, and the piston fitted to and working in said box.

2. In a starching machine, the combination with the starching box having a side opening by means of which a portion of a garment can be laid in the box, and the rest of the garment held outside thereof, the indented piston working in said box, and means for closing said opening upon said garment, substantially as described.

3. In a starching machine, the combination of the rectangular starching box, the gate in one of its sides adapted to be opened to receive a portion of a garment and to be closed down upon the garment to protect the outer portion from the starch, the piston working in said box, a continuously running source of power, and means for throwing said piston into gear with said source of power, and simultaneously closing said gate, substantially as described.

4. In a starching machine, the combination with the rectangular starching box, of the piston fitted to and working therein, a lateral opening to admit a portion of the garment into said box, and means for closing said opening upon the interposed garment, substantially as described.

5. In a starching machine, the combination with the starching box having an opening to receive the garment, of the roll journaled in fixed bearings on one side of the said opening, the continuously running source of power, the clutch upon the shaft of said roll adapted to be thrown into gear with said source of power, the roll arranged on the opposite side of said opening journaled in bearings movable to and from said other roll, and means engaging said clutch for shifting said movable roll, whereby said rolls are thrown into gear with said source of power when closed together, and thrown out of gear therewith when separated, substantially as described.

6. In a starching machine, the combination with the starching box having an opening to receive the garment, the gate for closing said opening, the piston working in said box, its crank shaft, the continuously running source

of power, the mechanism for simultaneously throwing the crank shaft into gear with said source of power and closing said gate, and for simultaneously raising said gate when said crank shaft is thrown out of gear with said source of power, substantially as described.

7. In a starching machine, the combination with the starching box, of the piston working therein, the opening in said box to receive a portion of the garment, the sliding gate adapted to close said opening and to bear upon the interposed garment, the roll journaled in fixed bearings at the bottom of said opening, the roll journaled in vertically sliding bearings above said first roll, the continuously running source of power, and means for simultaneously closing said rolls together upon said garment, and throwing the same into gear with said source of power, whereby the garment is automatically withdrawn from the starching box and the surplus starch stripped therefrom into said box, substantially as described.

8. The combination of the starching box having a lateral opening to receive a portion of the garment, the indented piston working in said box, a gate for closing said opening upon said garment, the roll journaled in fixed bearings at the bottom of said opening, the roll arranged normally at the top of said opening in bearings slidable to and from said other roll, the continuously running source of power, and means for simultaneously closing said rolls together upon the garment, and throwing them into gear with said source of power, and for throwing them out of gear with said source of power when separated, substantially as described.

9. In a starching machine, the combination with the starching box, and the piston fitted to and working therein, of means for inserting a portion of a garment in said box, and for protecting the rest of the garment from the starch, and means for withdrawing said garment from said box and simultaneously stripping the starch therefrom into the box, substantially as described.

10. In a starching machine, the combination of the starching box, the piston working therein, an opening in said box through which a portion of the garment may be inserted, a gate for closing said opening adapted to bear upon said garment when in position and to protect the outer portion from the starch, the stripping rolls arranged adjacent to said opening, one on each side of said garment when in position, the continuously running source of power, means for closing said rolls together upon said garment, and simultaneously throwing the same into gear with said source of power, and means for simultaneously separating said rolls and throwing them out of gear with said source of power, whereby the garment after being starched is withdrawn from said box and the surplus starch stripped from it into said box, and the opening then left free

for the insertion of another garment, substantially as described.

11. In a starching machine, the combination with the starching box and the indented piston working therein, of the roll journaled in fixed bearings on one side of the opening to said box, the roll journaled in bearings movable to and from said other roll, on the opposite side of said opening, the gate for closing said opening, the continuously running source of power, means for simultaneously connecting said piston with said source of power and closing said gate, and for opening said gate when said piston is disconnected from said source of power.

12. The combination of the starching box having vertical sides, the piston fitted to and working therein and provided with indentations in its face, the piston rod, the over-balanced crank for operating said rod, and the springs between said rod and piston, substantially as described.

13. The combination of the starching box having vertical sides, the piston having depressions in its face fitted thereto, the plunger head, the elastic connection between said head and piston, the over-balanced crank connected with said plunger head, the continuous power, and means for throwing said crank shaft into and out of gear therewith, substantially as described.

14. In a starching machine, the combination of the rectangular, open-front starching box, the sliding gate for closing said front, the piston fitted to and working vertically in said box and provided with indentations in its face, and an elastic connection between said piston and its rod, substantially as described.

15. In a starching machine, the combination of the rectangular, open-front box adapted to receive the garment, the piston working in the box, means for conveying starch into said box and upon said garment, a vertically sliding gate for closing the front of said box, the roll journaled in fixed bearings at the bottom of said opening, the roll journaled in vertically movable bearings above said opening, and means for connecting said piston and rolls to a source of power to operate the same, substantially as described.

16. The combination of the open front box, the sliding gate for closing the same, the plunger working in said box, the overbalanced crank for operating said plunger, means for simultaneously closing said gate and throwing said crank into gear with a continuously running source of power, and means for automatically and simultaneously opening said gate and throwing said crank out of gear, substantially as described.

17. In a starching machine, the combination of the rectangular, open-front starching box, the indented piston working therein, the vertically sliding gate for closing the front of said box, the roll journaled in fixed bearings at the bottom of the opening, the roll journaled

in vertically movable bearings at the top of
said opening, the continuously running source
of power, and means for throwing said rolls
into gear with said source of power when
5 closed together, and out of gear therewith
when separated from each other, substantially
as described.

In testimony whereof I have hereunto set
my hand this 11th day of September, 1891.

CHARLES J. DION.

In presence of—
T. D. MERWIN,
A. MAE WELCH.