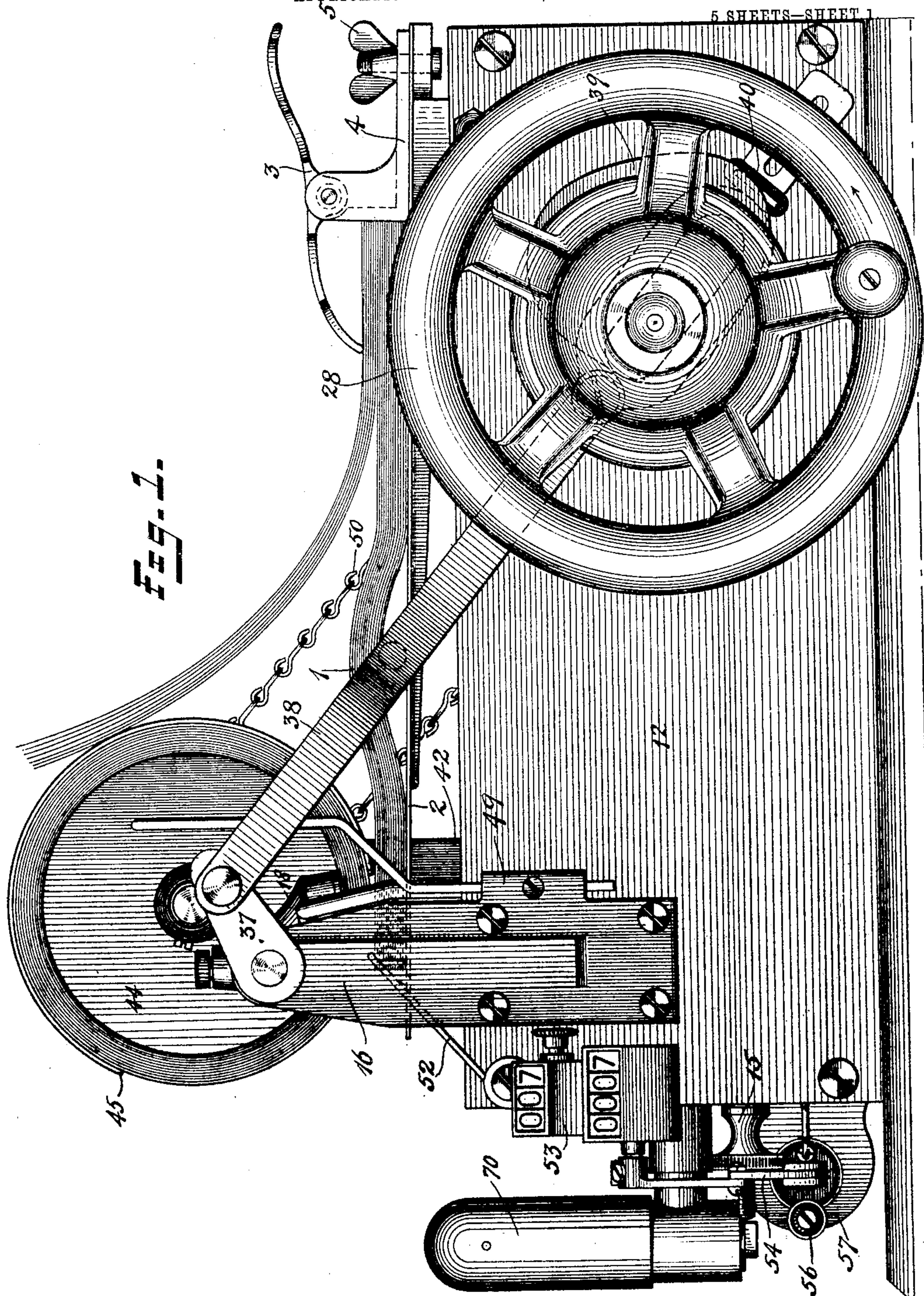


No. 800,897.

PATENTED OCT. 3, 1905.

J. D. BISHOP.  
COUNTING MACHINE.  
APPLICATION FILED DEC. 17, 1904.

5 SHEETS—SHEET 1



Witnesses  
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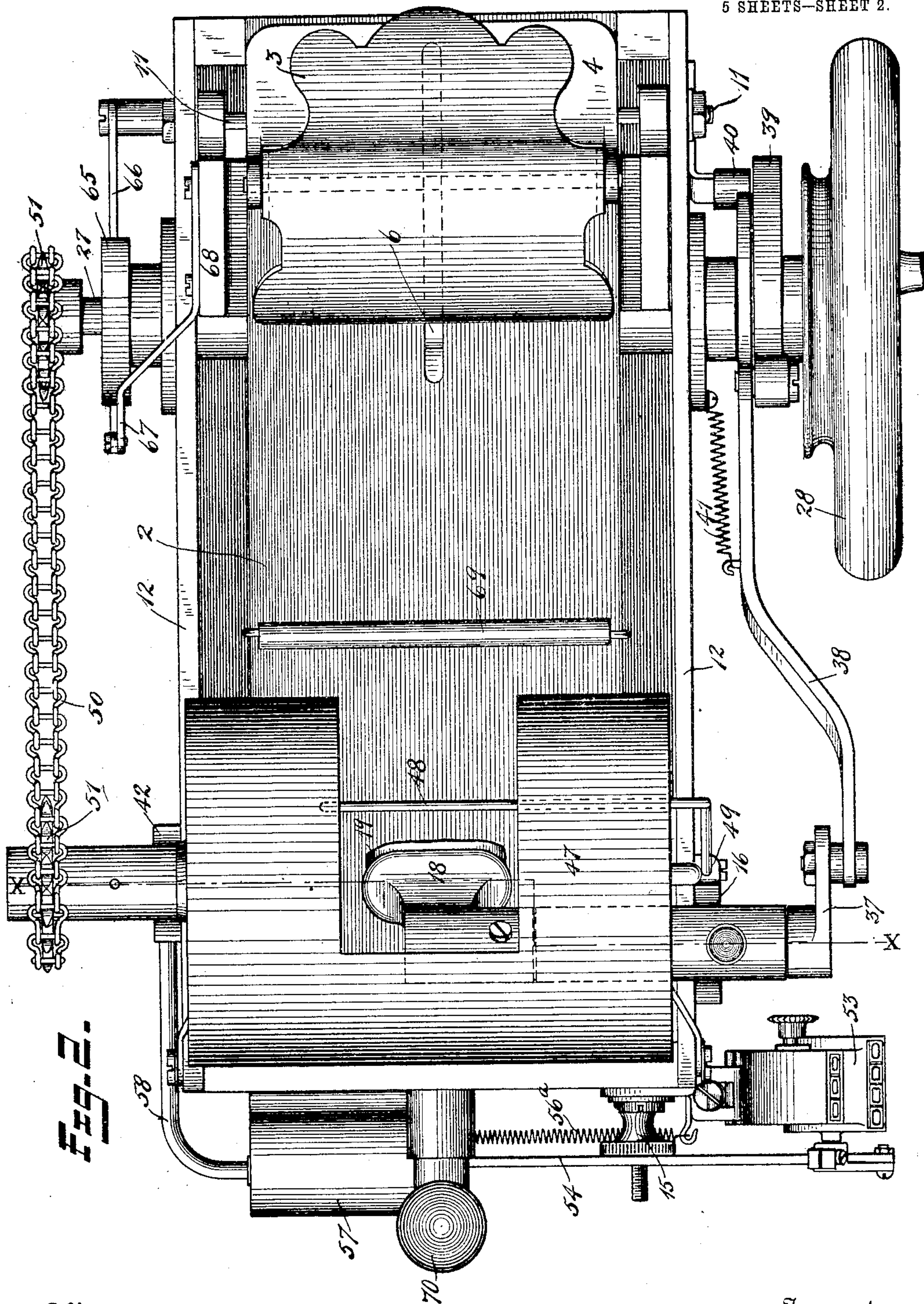
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5 SHEETS—SHEET 2.



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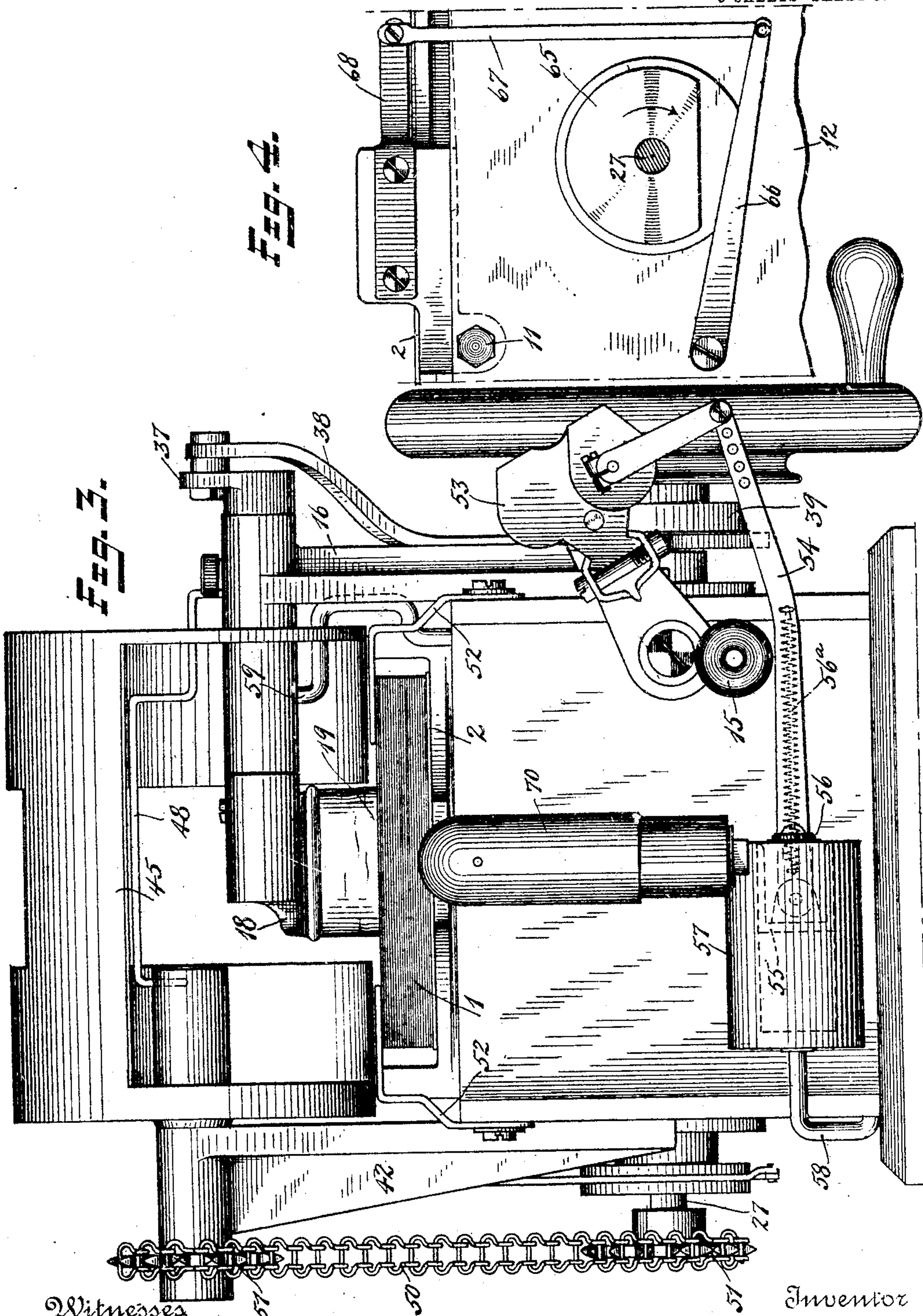
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

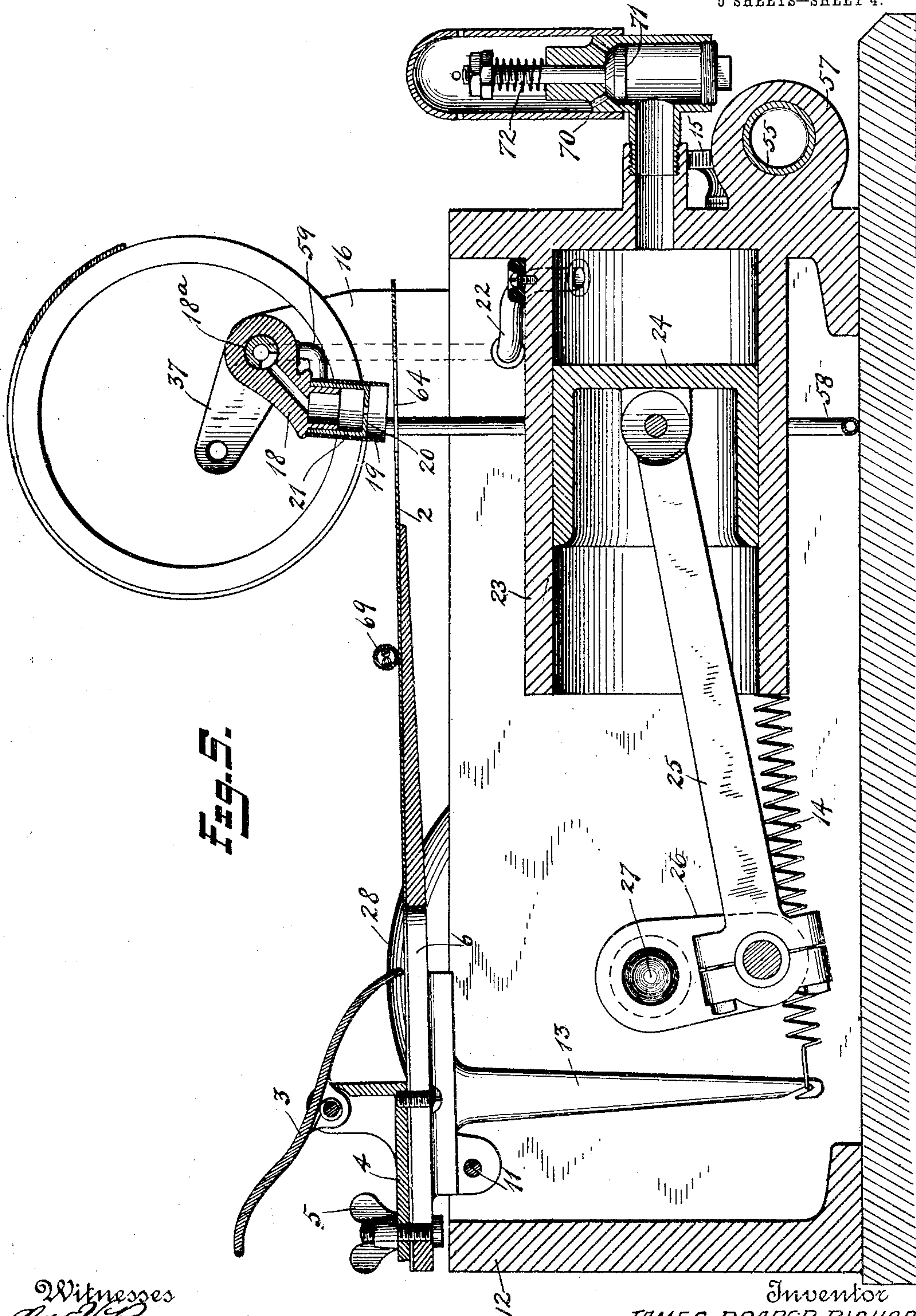


Fig. 5.

Witnesses  
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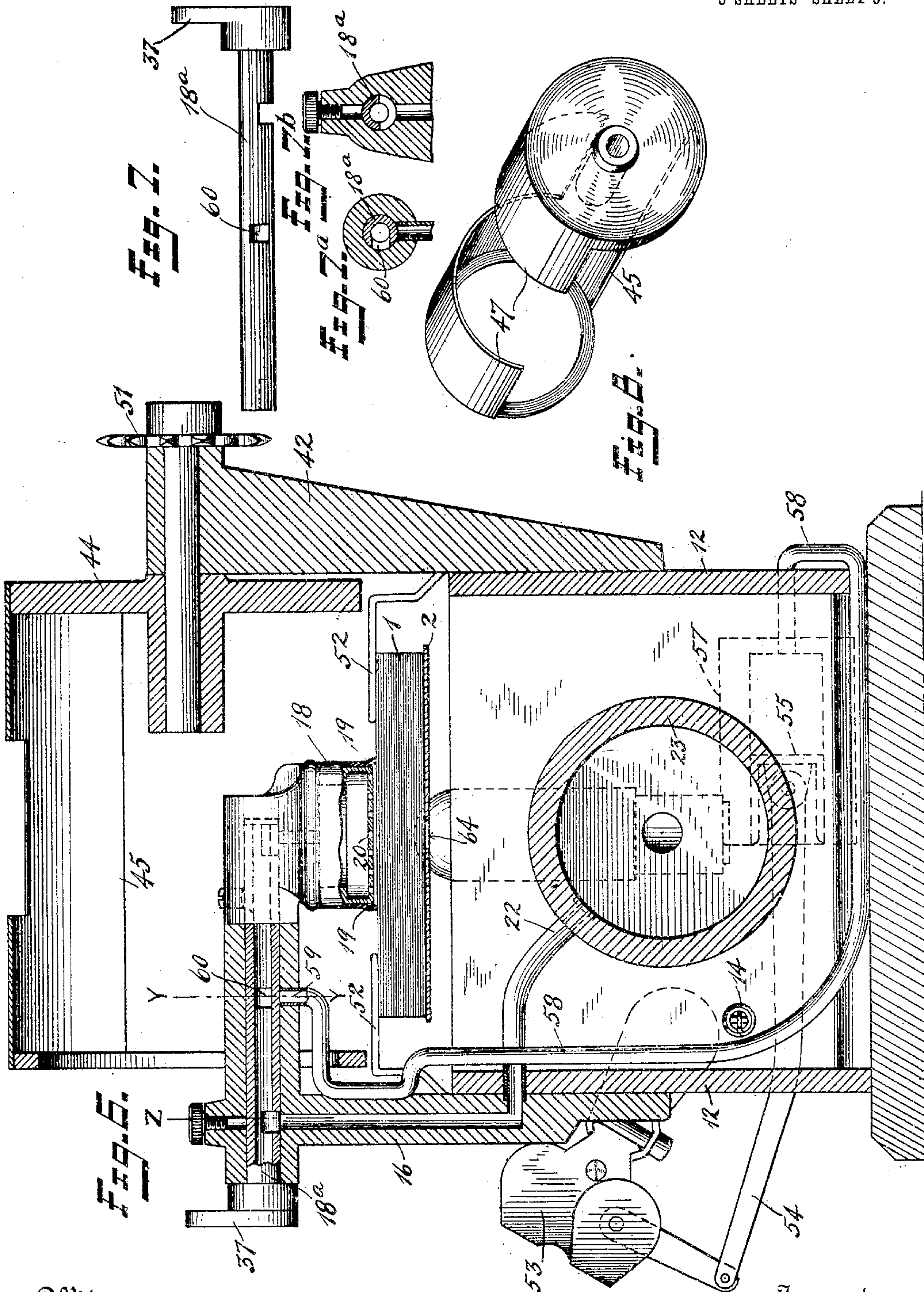
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COUNTING MACHINE.

APPLICATION FILED DEC. 17, 1904.

5 SHEETS—SHEET 5.



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# UNITED STATES PATENT OFFICE.

JAMES DRAPER BISHOP, OF NEWARK, NEW JERSEY.

## COUNTING-MACHINE.

No. 800,897.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed December 17, 1904. Serial No. 237,234.

*To all whom it may concern:*

Be it known that I, JAMES DRAPER BISHOP, a subject of the King of Great Britain, residing at Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Counting-Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in machines for counting sheets of paper or similar material, including bank notes, stock certificates, transfers, and similar matter of all kinds, and has for its object to provide an improved mechanism simplified in form and of greater accuracy and efficiency for accomplishing the desired ends.

The following is a description of a machine embodying my invention, reference being had to the accompanying drawings, in which—

Figure 1 is a left side elevation of the machine. Fig. 2 is a plan of the same. Fig. 3 is an end elevation of the same. Fig. 4 is a partial right right side elevation showing a detail. Fig. 5 is a longitudinal section. Fig. 6 is a partial cross-section on the line X X, Fig. 2. Fig. 7 is a view of a detail. Fig. 7<sup>a</sup> is a section on the line Y Y, Fig. 6. Fig. 7<sup>b</sup> is a section on the line Z, Fig. 6. Fig. 8 is a perspective view of the combined sweep and retainer.

This machine embodies various fundamental features embodied in the machine of my application, Serial No. 193,584, filed February 15, 1904.

Referring more particularly to the drawings, 1 represents the sheets to be counted, which may be regarded as notes or transfers. These sheets are clamped to a table 2 by a spring-clamp 3, which is mounted on the plate 4, so as to be movable and adjustable by the bolt 5, sliding in the slot 6. The table 2 is pivoted at 11 to the base or frame 12 and has at one end a downwardly-projecting lug 13, to which a spring 14 is attached. This spring 14 tends to elevate the other end of the table for the purpose hereinafter described. The tension of the spring 14 can be adjusted by the nut 15. Supported by a hollow bracket 16, secured to the base, is a pneumatic or suction-lifting device or lifter 18, whose mouth is formed with lips 19, preferably of rubber, and bears upon the sheets 1. Within the lips and at the mouth of the lifting device is a perforated diaphragm 20, which acts to prevent the sheets from being drawn in so far as to be injured. The lips 19 are carried by a removable head 21, so that

heads with lips having openings of different widths can be readily and easily substituted. The lifting device is provided with a hollow trunnion 18<sup>a</sup>, through which and the hollow bracket 16 the head and lips are connected at 22 with the main cylinder 23 within the base. Inside this cylinder is a piston 24, operated through the rod 25 from a crank 26, mounted on the shaft 27, to which in turn is connected the driving or crank wheel 28. The lifter shown has an oscillating movement which is brought about by a crank-arm 37, connected to the trunnion of the lifter 18, to which is in turn joined a connecting-rod 38, which at its other end is engaged by a cam 39, mounted on the main shaft. A stop 40 is provided to limit the backward movement of the rod 38, which takes place under the influence of the spring 41. The cam 39 through the rod 38 actuates the lifter, so that it begins to rise shortly after the piston 24 begins to cause it to exert a suction. On the opposite side of the machine from the hollow bracket 16 is a bracket 42, in which is rotatably mounted a device 44, one part 45 of which is a pusher or sweep, while the other part 47 is a retainer for the notes raised by the lifter 18 and pushed up by the sweep 45. As the suction device 18 is lifted the sweep 45 revolving passes beneath the end of the paper and pushes it upward until it is fully raised, after which it is retained by the parallel portions forming the retainer 47. When the gap between the retainer 47 and the pusher 45 is reached, the notes are kept from falling back by the retaining-guard 48, which is adjustably mounted at 49. The rotating device 44 is positively driven by any suitable means from the main shaft 27. In the present instance I have shown a chain 50, engaging sprocket-wheels 51 51 on the main and driven shafts. To prevent the sweep from engaging more than the single sheet engaged by the lifter, I provide guard-wires 52, which project over the ends of the sheets and prevent them from springing up, so as to be engaged by the sweep.

In order to count the movements of the piston 24 whenever a sheet is lifted by it and to provide against making a record of the piston-stroke whenever the lifter fails to raise a sheet, I provide a pneumatic counter, consisting of an integrating mechanism 53, indicating both items and totals, connected by a link 54 with a piston 55 within a cylinder 57. The backward stroke of the piston (to the right in Fig. 3) is limited by a stop 56 and produced by a spring



56<sup>a</sup>, connected to a hook projecting from the framework, Fig. 2. The forward movement is produced by suction in the following manner: This cylinder 57 is connected to the main  
 5 cylinder 23 by a pipe 58, which joins the bracket 16 at the point 59. Here it is connected through the port 60 in the hollow trunnion 18<sup>a</sup> of the lifting device and the hollow bracket 16 with the piston-cylinder 23. By  
 10 changing the position of the trunnion 18<sup>a</sup> relatively to the crank 37 and the lifter-head 18 the time when the port 60 begins to register with the end of the pipe 58 can be varied. Preferably I so adjust these parts that the con-  
 15 nection will be made with the pipe 58 when the lifter has been raised about half-way. This insures the registering of every sheet raised and prevents registry when a sheet is not raised.

20 In order to provide against registry when all the sheets are exhausted whatever the adjustment, I form in the table 2 an opening 64 directly beneath the mouth of the lifter, so as to prevent the vacuum from the start of the  
 25 piston. The table 2 is normally moved by the spring 14, subject to the cam 65, mounted on the main shaft 27, so as to bring the sheets to be counted into contact with the mouth of the lifter 18 just after suction has commenced.  
 30 In order to facilitate the lifting, the notes below the one being lifted are separated therefrom by the sudden depression of the table, which is made to occur just after suction begins. This may be brought about in various ways;  
 35 but I have done it by causing the cam 65 to re-engage the lever 66, connected by the link 67 with the arm 68, connected to the table 2, so as to depress the table at the proper time. An adjustable prop 69 beneath the sheets pro-  
 40 duces a bulge in the sheets which assists in causing them to bend properly when raised by the lifter.

In order to regulate the suction so as to adapt it for sheets of various thickness, stiff-  
 45 ness, and porosities, I provide a relief-valve 70, consisting of a valve-head 71, held to its seat by a spring 72. The valve-chamber is connected to the main cylinder 23. As the piston is moved to create a suction the valve  
 50 yields to admit more or less air to the main cylinder, regulating the suction of the lifter, and thereby equalizing the pressure on the main piston throughout the counting of all the sheets in the machine.

55 In the manipulation and operation of the machine the sheets 1 are placed with one end under the clamp 3, so that their other ends are substantially in the position shown beneath the lifter 18. The machine is then operated by  
 60 turning the handle counter-clockwise, which creates the following movements: The piston 24 is first rapidly drawn back—*i. e.*, to the left in Fig. 5—by the crank 26. This produces a vacuum in rear of the piston 24, which act-  
 65 ing through the port 22 and hollow bracket

and trunnion produces a suction at the mouth of the lifter 18, causing the uppermost sheet to adhere. The suction device is then raised or oscillated by the cam 44. The sweep 45, which in the meantime has been revolving, 70  
 passes beneath the lifted end and pushes the sheet up, straightening it out, so that it is retained by the retainer 47. The lifter is then free to return for another sheet, while the sweep continues in its movement about its axis 75  
 and its movement being properly timed relatively to the lifter returns so as to be ready to engage another sheet as soon as lifted. The movement of the lifter need not necessarily be oscillating, though I prefer a construction 80  
 having such a movement, since if two sheets should be raised at any time the forward movement would tend to cause the second sheet to be separated and to drop back before the lifted sheet is engaged by the sweep. The sweep 85  
 45 and retainer 47 may be made of transparent material, so that the sheets shall be visible through them. The counting mechanism acts as before explained, the air being controlled by the trunnion-port, so as preferably to ac- 90  
 tuate the pneumatic counter only when the lifter has been sufficiently raised to bring the lifted sheet within the range of the sweep. The dropping of the table 2 is properly timed by the positioning of the cam 65, while the 95  
 relief-valve 70 prevents injury to the sheets by reason of too great suction and also equalizes the working of the machine.

The principal features of my improved machine over the machine of my earlier appli- 100  
 cation consists in the improved sweep and improved retaining device, also in the means for adjusting the time of action of the counting mechanism, also the use of a relief-valve and the approach of the lifter and table after 105  
 suction has begun and their separation after the sheet has adhered to the lifter, all of which, together with other minor improvements, are referred to in the claims.

What I claim is— 110

1. In a counting-machine, means for lifting a sheet and a sweep revolubly mounted on a fixed axis and so placed and timed as to en-  
 115 gage said sheet when lifted.

2. In a counting-machine, means for lifting 115  
 a sheet and a sweep revolubly mounted on a fixed axis and so placed and timed as to en-  
 120 gage said sheet when lifted, and a retaining device for retaining said sheet in position when disengaged by said sweep.

3. In a counting-machine, a table for hold-  
 125 ing sheets, a sweep adapted to rotate so as to describe, about a given axis, a cylinder in proximity to the sheets and a lifter mounted within said cylinder of revolution and adapted  
 130 to raise said sheets one at a time into the path of said sweep.

4. In a pneumatic counting-machine, a pneumatic lifter, a pneumatic registering mechanism and means for controlling the 130



pneumatic connection of said registering mechanism so as to determine the time of its operation relatively to the lifter.

5 In a pneumatic counting-machine, a suction-producing chamber, a pneumatic lifter 18 connected therewith, a pneumatic register, means for connecting said pneumatic register with said suction-chamber and means for controlling the time of such connection relatively  
10 to the action of said lifter.

6. In a pneumatic counting-machine, the combination of a table for the sheets to be counted, a pneumatic lifter for raising said sheets one at a time, means for causing said  
15 table and lifter to approach each other and thereafter separate by a substantially vertical movement of the opposing portion of one of said parts once during every operation of the lifter.

20 7. In a pneumatic counting-machine, the

combination of a table for the sheets to be counted, a pneumatic lifter for raising said sheets one at a time, said lifter oscillating on an axis, and means for causing the distance  
25 between said table and the axis of revolution of said lifter to increase substantially as said lifter engages a sheet.

8. In a pneumatic counting-machine, a pneumatic lifting device, a pneumatic register consisting of an integrating mechanism, a piston for actuating the same, a cylinder for said  
30 piston connected with the suction-chamber of said lifting device, and a spring for retracting said piston whenever the suction ceases.

Signed at New York city, New York, this 35  
15th day of December, 1904.

JAMES DRAPER BISHOP.

Witnesses:

ROBT. S. ALLYN,  
L. VREELAND.