No. 829,645. PATENTED AUG. 28, 1906.

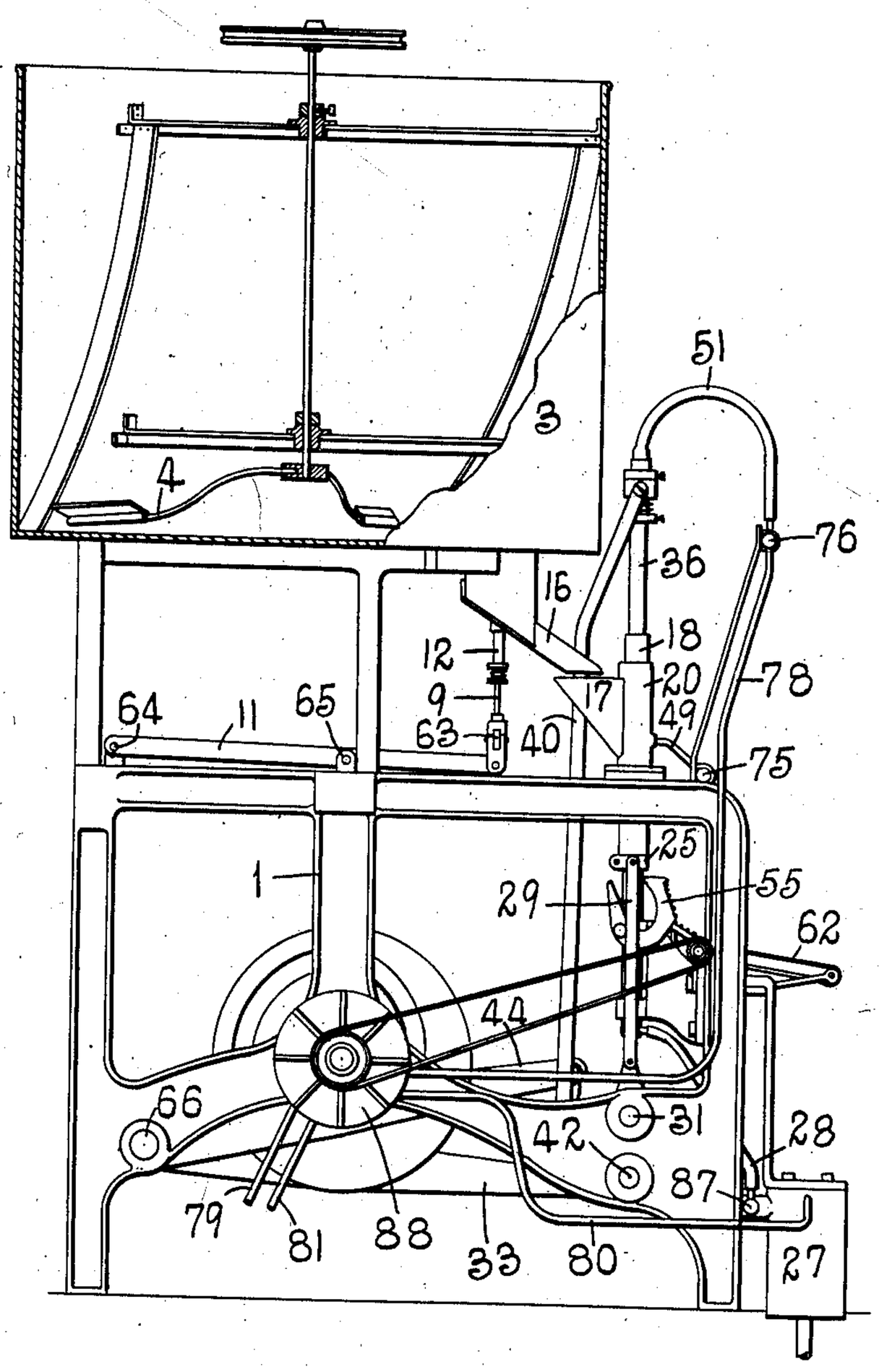
R. W. GOEB.

MACHINE FOR FORMING PULP FIBER DISKS.

APPLICATION FILED FEB. 15, 1906.

5 SHEETS—SHEET 1.

Fig. 1.



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5 SHEETS—SHEET 2.

Fig. 2.

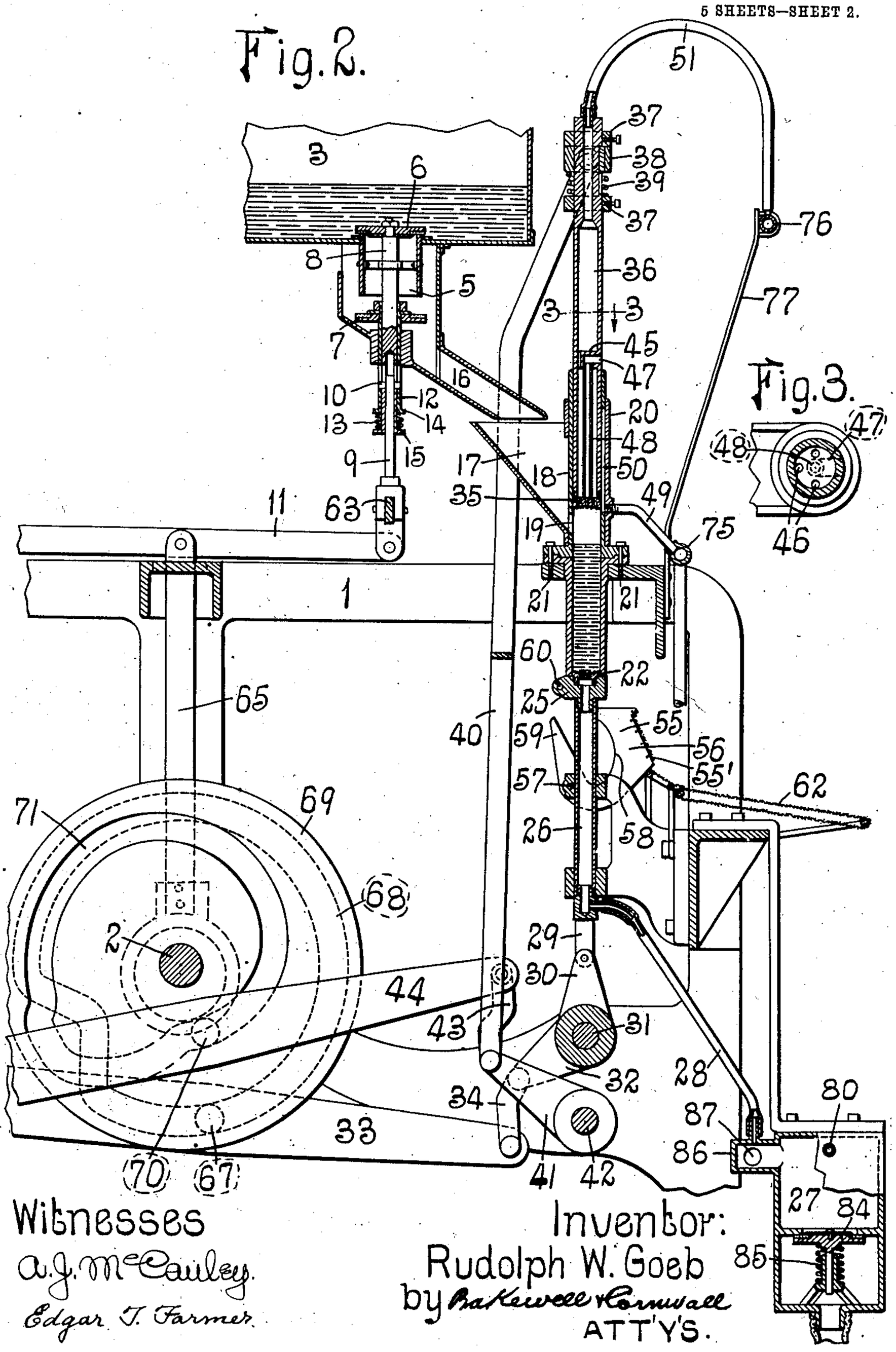

Fig. 3.

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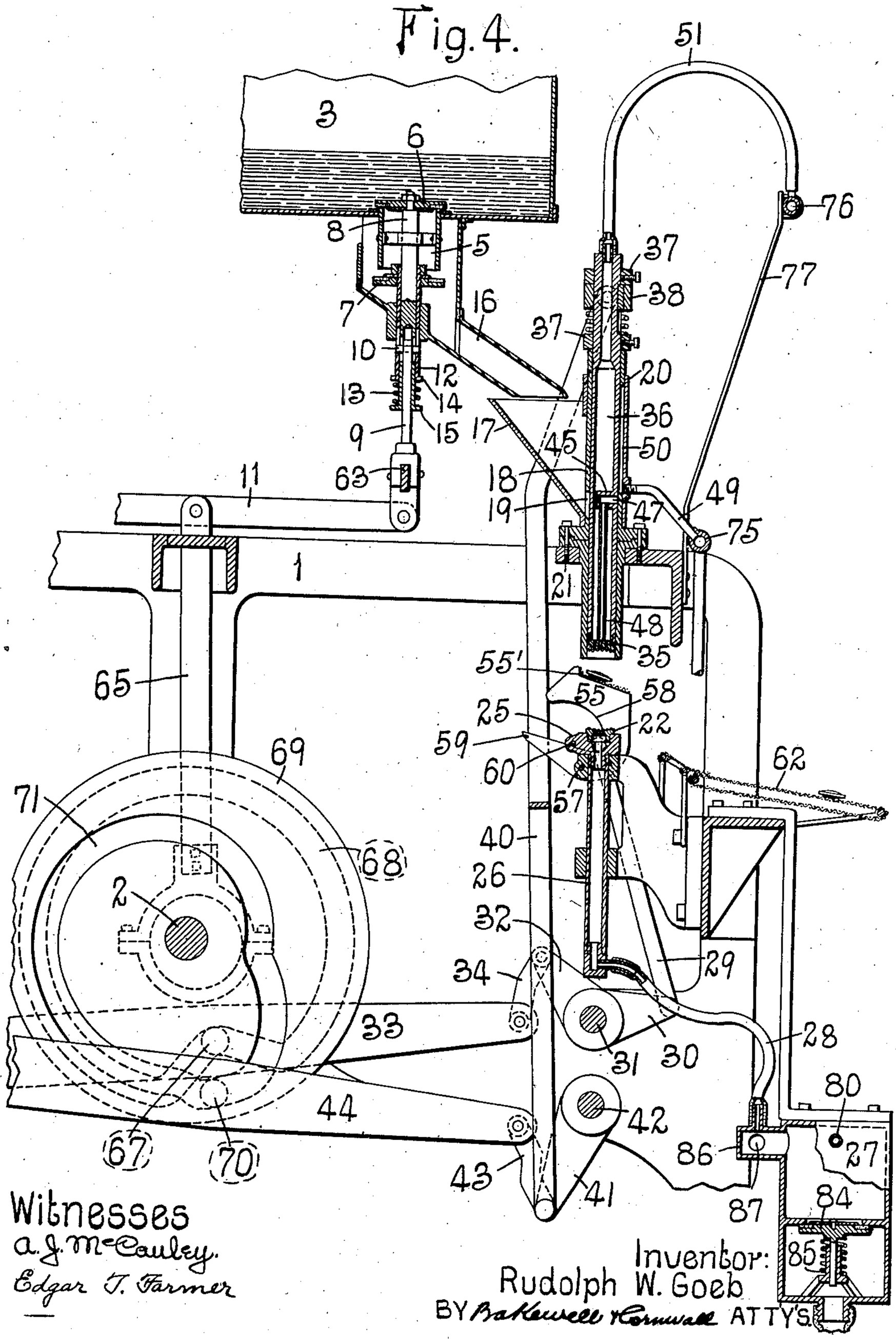
5 SHEETS—SHEET 3.

Fig. 4.



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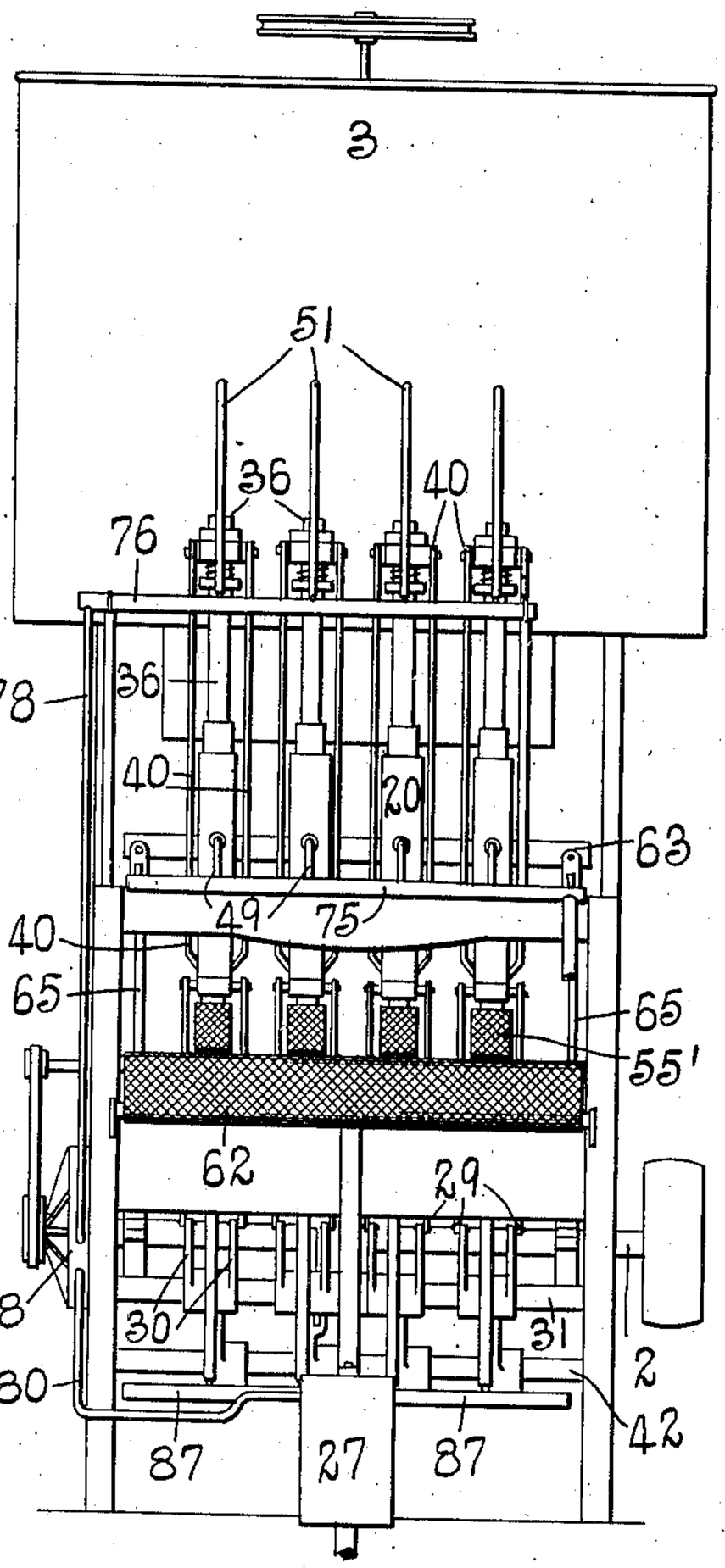
5 SHEETS—SHEET 4.

Fig. 5.



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5 SHEETS—SHEET 5.

Fig. 6.

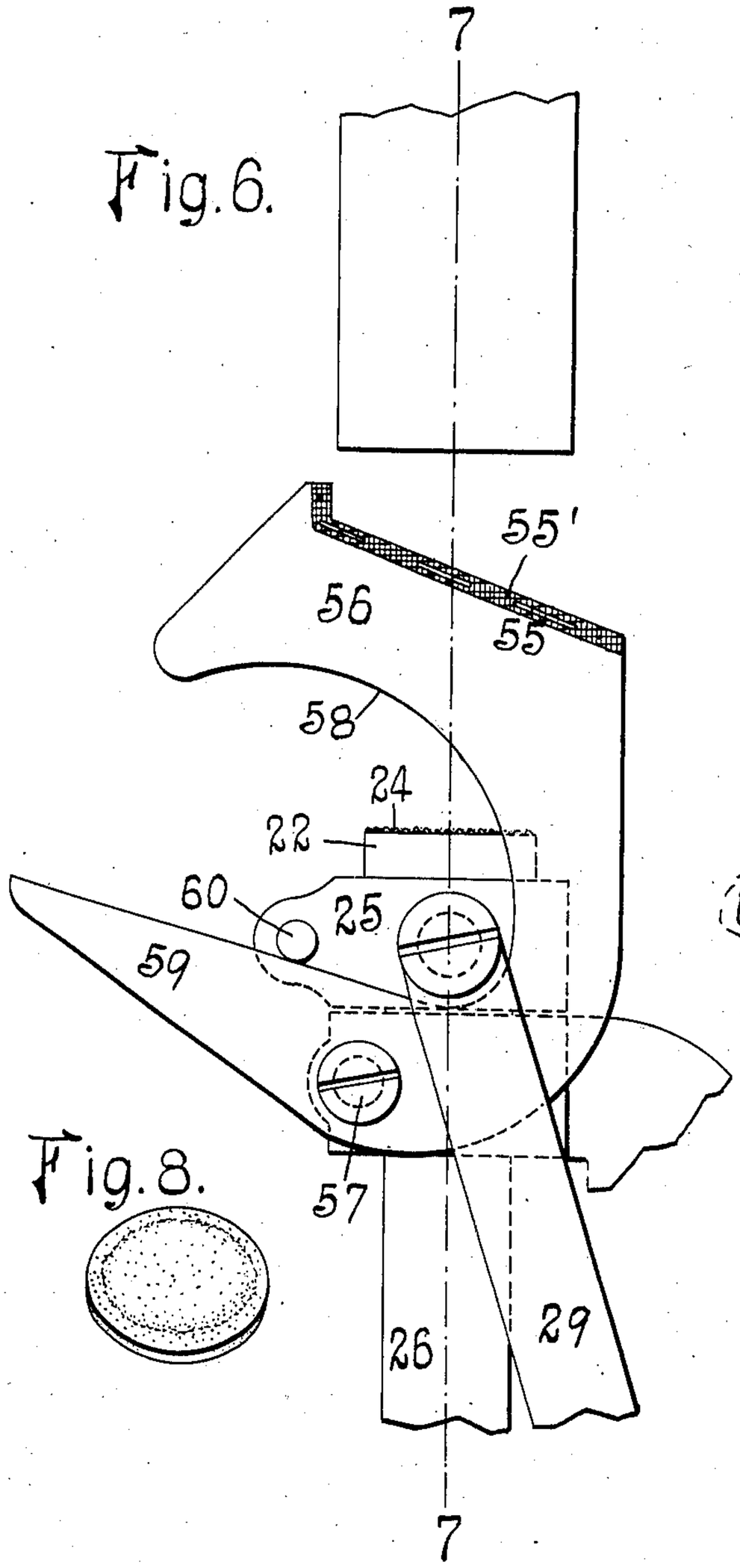


Fig. 8.

Fig. 7.

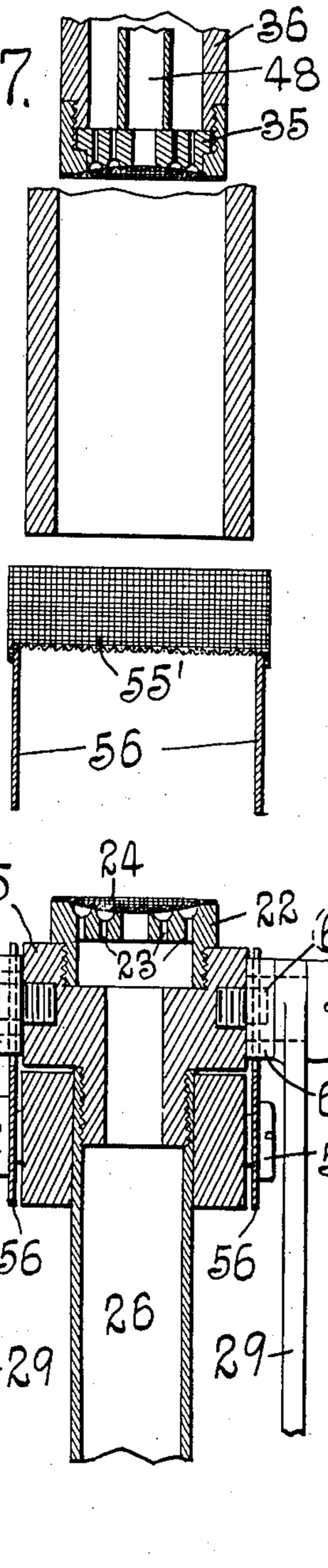
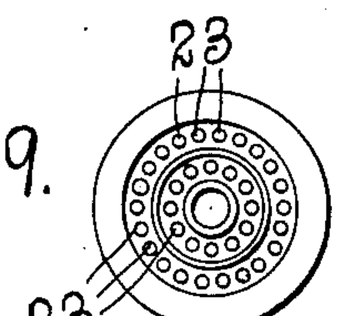


Fig. 9.



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UNITED STATES PATENT OFFICE.

RUDOLPH W. GOEB, OF ST. LOUIS, MISSOURI, ASSIGNOR TO UNITED STATES FIBER STOPPER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF SOUTH DAKOTA.

MACHINE FOR FORMING PULP-FIBER DISKS.

No. 829,645. Specification of Letters Patent. Patented Aug. 28, 1906.

Application filed February 15, 1906. Serial No. 301,247.

To all whom it may concern:

Be it known that I, RUDOLPH W. GOEB, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Machines for Forming Pulp-Fiber Disks, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevational view showing a machine embodying the features of my invention. Fig. 2 is a transverse sectional view showing the lower die in engagement with the end of the cylinder and the upper die in its elevated position. Fig. 3 is a detail sectional view taken on the line 3 3 of Fig. 2. Fig. 4 is a transverse sectional view similar to Fig. 2, showing the position of the parts after a disk has been formed and ejected onto the tilting table or carrier. Fig. 5 is a front elevational view of the machine shown in Fig. 1. Fig. 6 is an enlarged side elevation showing the dies and the tilting table or carrier. Fig. 7 is a longitudinal sectional view on the line 7 7 of Fig. 6. Fig. 8 is a perspective view of a disk, such as is made in this machine; and Fig. 9 is a plan view of the lower die with the screen removed.

This invention relates to machines for making disks to be used in connection with a cap-piece to form a closure for bottles or other receptacles.

The object of my invention is to provide a machine of simple construction by which disks can be made from pulp-water.

In the machine herein shown, which represents the preferred form of my invention, the pulp-water, which contains a certain number of grains of pulp to a cubic inch of water, is introduced into a cylinder in which two perforated dies operate, the dies being brought together to firmly compact the pulp fibers together, and thus form a disk. Preferably air-pressure is applied to one side of the body of pulp-water in the cylinder as the dies are moving together, and means is provided for causing said pressure to force the water upwardly through the upper perforated die. At the same time the other side of the body of water is being subjected to an air-vacuum, so that these two forces operate to positively draw all of the water away from the pulp fiber, which is molded into the form of a disk when the dies are brought together. When the dies are separated, the disk is held in engagement with one of the dies, from which it is ejected onto a movable member that is thereafter actuated to eject it from the machine.

Referring to the drawings, which represent the preferred form of my invention, 1 designates the frame of the machine carrying the main drive-shaft 2 and having attached to its upper portion a tank 3, in which the pulp-water is contained, said tank being provided with an agitator 4, which insures a thorough distribution of the pulp fibers through the water.

The machine herein shown is provided with means for forming a plurality of disks simultaneously, and as said means are duplicates of one another I will only describe one means. It is necessary to supply the cylinder in which the forming-dies operate with just the exact amount of pulp-water required to form a disk of the desired thickness, and to provide for this a measuring-receptacle 5 is mounted in the bottom of the tank, said receptacle being open at both ends and having valves 6 and 7 in engagement therewith. The valve 6, which closes the upper end of the receptacle, is provided with a stem 8, which is connected to a rod 9, said rod extending into a bore in the lower end of the stem and provided with a cross-pin 10, which extends through a slot in the valve-stem, said rod 9 being connected at its lower end to an actuated lever 11. The valve 7, which closes the lower end of the measuring-receptacle, is provided with a tubular stem 12, which surrounds the stem of the upper valve, and said lower valve is held normally in engagement with the lower end of said receptacle by means of a spring 13, which is interposed between collars or flanges 14 and 15 on said valve-stems. As the valve-actuating rod 9 is moved upwardly its pin will come in contact with the upper end of the slot in the stem of the upper valve and elevate said valve to permit the pulp-water in the tank to flow into the measuring-receptacle. The valve-actuating rod 9 is then moved downwardly to seat the upper valve

after the desired quantity of water has flowed into the receptacle, and when the cross-pin in said rod reaches the lower end of the slot in the tubular stem of the lower valve the lower valve will be unseated, so that the pulp-water in said receptacle can pass down the chute 16 into the hopper 17, which communicates with the cylinder 18 through an opening 19 therein, said cylinder being partially surrounded by a tubular-shaped member 20, that is integral with the hopper and the hopper being connected to the frame of the machine by screws 21. The cylinder 18 is open at both ends, and prior to the entrance of the pulp-water into said cylinder the lower die 22 is moved upwardly into engagement with the lower end of the cylinder, as shown in Fig. 2. Said die, which is shown in detail in Fig. 7, has a concave face and is provided with a plurality of perforations 23, through which the water is drained, the upper face of the die being covered by a screen 24, which prevents the pulp fibers from being drained away with the water. Said die is detachably connected to a block 25, fastened to the upper end of a hollow rod 26, which at its lower end communicates with a reservoir or tank 27 by means of a flexible tube 28. Fastened to the block which carries the lower die are two links 29, which at their lower ends are connected to an arm 30 on a rock-shaft 31, said shaft being provided with another arm 32, which is connected to a positively-actuated lever 33 by means of a link 34, whereby movement of said positively-actuated lever imparts reciprocating movement to the lower die. The upper die 35 is similar in construction to the lower die, so that the disk, which is molded between them, will have convex faces, said upper die being detachably connected to a hollow rod 36, reciprocatingly mounted in the cylinder 18, said rod being provided at its upper end with two fixed collars 37. A ring 38 surrounds said rod adjacent to the upper collar, and a spring 39 is interposed between said ring and the lower collar. Fastened to said ring are two links 40, which at their lower ends are connected to an arm 41 on a rock-shaft 42, said arm being connected by means of a link 43 to a positively-actuated lever 44.

As shown clearly in Figs. 2 and 4, a block 45 is mounted in the hollow rod 36 at approximately the center thereof, said block being provided with a plurality of perforations 46, extending therethrough, and also with a bore 47, extending transversely from the exterior to the center of the block. A tube 48 is fastened to the block 45 in communication with the transversely-extending bore 47, the lower end of said tube extending down to the upper die. The tubular-shaped member 20, which surrounds the cylinder 18, is tapped at its lower end by a drain-pipe 49, and the cylinder 18 is provided with a longitudinally-extending slot 50, which terminates adjacent to the drain-pipe, said slot being in alinement with the transversely-extending bore in the block 45, so that an exit will be provided for the water as the upper die is depressed. A flexible tube 51, which is connected to the upper end of the hollow rod 36, communicates with the bore of said rod, and at the time said rod is moving downwardly to depress the upper die air-pressure is passing through said tube and down through the perforations 46 in the block 45. Accordingly the pulp-water in the cylinder will be forced upwardly through the tube 48 and out through the transversely-extending bore into the drain-pipe 49, the pulp fiber being prevented from passing through the tube 48 with the water by means of the screen on the face of the upper die. During the time the upper die is moving downwardly and air-pressure is being applied to the upper face of the body of water to force the water upwardly through the tube 48 a vacuum is being created in the hollow rod 26, which carries the lower die, thereby drawing some of the water downwardly through said rod and into the reservoir 27, these two forces—namely, the air-pressure acting on the upper face of the body of pulp-water in the cylinder and the vacuum acting on the lower face of the body of pulp-water—operating to draw all the water away from the pulp fiber, which is molded between the upper and lower dies to form a disk of the form shown in Fig. 8. After the pulp fiber has been molded the lower die is depressed, and just as it commences to move away from the upper die a blast of air is forced upwardly through the hollow rod which carries the lower die to cause the disk to be ejected from the lower die and forced into engagement with the upper die. The downward movement of the lower die moves a carrier or tilting table 55 into operative position beneath the upper die, as shown in Fig. 4, and just as said table arrives in position the upper die is given a slight downward movement until it projects beyond the end of the cylinder to positively force the disk out of the cylinder, a short blast of air which then passes downwardly through the hollow rod which carries the upper die ejecting the disk from said upper die onto said tilting table. This tilting table comprises two side plates 56, preferably of the form shown in Fig. 6, said plates being pivotally connected at 57 to a stationary part of the frame and each having a curved face 58 and an extending arm 59, the upper ends of said side plates being connected by a piece of fibrous material 55′, which forms the supporting-face of the table. It is desirable to have the supporting-face of the table formed of fibrous material, owing to the fact that the disk is very moist when it is ejected from the upper die. The table is swung u[p]wardly from its inoperative position (sho[wn]

in Fig. 2) to its operative position (shown in Fig. 4) by means of pins 60 on the block 25, which carries the lower die, said pins engaging the arms on the side plates of the table as the lower die is depressed and swinging it upwardly and inwardly. When said lower die moves upwardly, rollers 61 on the block 25 engage the curved faces of the side plates and swing said table outwardly and downwardly into inoperative position. As the table is swung outwardly the disk thereon falls onto an endless belt 62, which conveys it away to a suitable point, said belt being driven from the main shaft of the machine.

As previously pointed out and as shown in Fig. 5, the machine is provided with means for forming a plurality of disks simultaneously, and instead of providing a lever 11 for each valve-actuating rod 9 said rods are connected by a transversely-extending bar 63, and only the two endmost valve-actuating rods are connected to said levers. These levers 11 are pivotally connected at 64 to the frame of the machine, and each lever is operated by means of a link 65, which is connected to an eccentric on the main shaft, as shown in dotted lines in Fig. 4. The levers 33 and 44, which actuate the dies, are fulcrumed at 66 to the frame of the machine, the lever 33 being provided with a roll 67, which travels in a cam-groove 68 in the cam-block 69 on the main shaft, and the lever 44 being provided with a roll 70, which travels in a cam-groove 71 on the other side of said cam-block, the rock-shafts 31 and 42 being provided with arms to which the links for actuating the dies are connected. The drain-pipes 49, which are tapped into the tubular-shaped members 20, lead to a main drain-pipe 75, extending transversely of the machine and thence downwardly to a suitable drain. The flexible tubes 51, which are connected to the upper ends of the hollow rods 36, that carry the upper dies, are supplied with compressed air from a main pipe 76, extending transversely of the machine and supported by stationary brackets 77, one end of said pipe communicating with a pipe 78, which leads to a port in a valve-seat. The valve-seat is provided with another port which communicates with a pipe 79, leading from a source of compressed air, and the valve which operates on said valve-seat is provided with a port which at certain times registers with the ports in said valve-seat to establish direct communication between the source of supply of compressed air and the main supply-pipe 78 to cause a prolonged blast of air to enter the hollow rod 36 as it is moving downwardly to depress the upper die. Said valve is also provided with another port of smaller dimensions which is intermittently brought into communication with the valve-seat ports to cause a short blast of air to pass down the rod 36 to eject the disk from the upper die. The reservoir 27, with which the tubes 28, leading from the lower dies, communicate, is tapped by a pipe 80, that leads to a port in the valve-seat, which is provided with another port that communicates with a pipe 81, leading from a vacuum-pump. The valve is provided with a port which registers with the valve-seat ports just referred to, so that a vacuum is created in the tubes 28 in communication with the hollow rods that carry the lower dies, the water which is drawn through said tubes passing into the reservoir 27. As previously pointed out, a short blast of air passes up through the lower die to force the disk into engagement with the upper die, and to provide for this the valve is so constructed that it intermittently establishes communication between the compressed-air-supply pipe and the pipe leading to the reservoir, so that a vacuum is being created in said reservoir for a certain time and then changed to air-pressure.

The valve mechanism 88 above referred to, with which the machine is provided, forms no part of my present invention, so further description of same is deemed unnecessary, it being similar to that shown and described in my prior United States patent, No. 801,659, in which the valve is carried by the main shaft.

The bottom of the reservoir is provided with a valve 84, that is normally held in operative position by a spring 85, the valve being displaced after a certain quantity of water has entered the reservoir and this displacement of the valve being aided by the blast of air which intermittently enters the reservoir. Preferably, and as herein shown, the reservoir is located at approximately the center of the machine and is provided with an extension 86, which is tapped by a main pipe 87, extending transversely of the machine, some of the flexible tubes being connected to said main pipe.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the class described, a device for holding liquid pulp fiber, a perforated die and a coöperating die for molding said pulp fiber into a predetermined form, means for subjecting the face of said body of pulp fiber which is acted upon by the perforated die to air-pressure, and means for causing said air-pressure to force the liquid from said pulp fiber through said perforated die; substantially as described.

2. In a machine of the class described, a device for containing a quantity of liquid pulp fiber, means for molding said pulp fiber into the form of a disk, means for subjecting one face of said disk to an air-vacuum to withdraw the liquid from the fiber, means for subjecting the other face of said disk to a blast of compressed air, and means for causing said blast to force the liquid out through the face

of the disk which is subjected to the blast of air; substantially as described.

3. In a machine of the class described, a device for containing liquid pulp fiber, a perforated die, a coöperating die, means for closing said dies to mold the pulp fiber into a predetermined form, a pipe in communication with the perforated die, and means for subjecting the face of said pulp fiber which is acted upon by said perforated die to air-pressure whereby the liquid is forced from said fiber out through said pipe; substantially as described.

4. In a machine of the class described, a tank for holding liquid pulp fiber, means for measuring the pulp fiber into predetermined quantities, a cylinder for receiving the pulp fiber, means operating in said cylinder for molding said fiber into the form of a disk, means for extracting the liquid from said pulp fiber during the molding operation, and means for ejecting the disk from the machine; substantially as described.

5. In a machine of the class described, a cylinder for holding liquid pulp fiber, a perforated die for closing one end of said cylinder, a coöperating perforated die reciprocatingly mounted in said cylinder for molding the pulp fiber into the form of a disk, means for forcing air through said last-named die, and a pipe in communication with said die for carrying away the water which is forced through the outer face thereof; substantially as described.

6. In a machine of the class described, a cylinder for containing liquid pulp fiber, a perforated die for closing one end of said cylinder, a coöperating perforated die reciprocatingly mounted in said cylinder and operating to mold the pulp fiber into the form of a disk, a hollow rod on which said last-named die is mounted, a discharge-tube located in said rod, and an air-pressure for forcing the liquid out of the pulp material and into said discharge-tube; substantially as described.

7. In a machine of the class described, a cylinder for containing liquid pulp fiber, a perforated die for closing one end of said cylinder, a coöperating perforated die mounted in said cylinder, means for actuating said dies to mold the pulp fiber into the form of a disk, means for forcing the liquid in said pulp fiber through both of said dies, and automatic means for supplying the cylinder with predetermined quantities of liquid pulp fiber; substantially as described.

8. In a machine of the class described, a cylinder for containing liquid pulp fiber, upper and lower dies coöperating with said cylinder for molding the pulp fiber into the form of a disk, actuating mechanism for said dies, means for holding the disk in engagement with one of said dies when they are separated, a carrier, means for moving said carrier into position between the dies, means for ejecting the disk onto said carrier, and means for actuating said carrier to remove the disk from the machine; substantially as described.

9. In a machine of the class described, a cylinder for holding liquid pulp fiber, perforated dies for molding said pulp fiber into a disk, an air-pressure operating upon one side of the body of pulp, means for causing said air-pressure to force the liquid through the die which operates upon that side of the fiber to force the liquid therefrom, a vacuum operating upon the other side of the body of pulp fiber to draw the liquid therefrom and into a reservoir, and means for automatically discharging the liquid from said reservoir; substantially as described.

10. In a machine of the class described, a cylinder for holding liquid pulp fiber, a perforated die, a rod carrying said die and provided with a bore, a tube communicating with the bore of said rod, means for creating a vacuum in said tube, a coöperating perforated die, a rod carrying said die and provided with a bore, a supply of compressed air communicating with the bore of said rod, a block mounted in said bore and provided with perforations, a tube extending from said block to the die on said rod, a transversely-extending bore in said block leading from said tube, and a slot in said cylinder adapted to register with the transversely-extending bore of the block; substantially as described.

11. In a machine of the class described, a tank for holding liquid pulp fiber, a plurality of cylinders, a plurality of measuring devices for apportioning the liquid pulp fiber into predetermined quantities, means for conveying the pulp fiber in its liquid state from said measuring devices into said cylinders, coöperating dies for each cylinder to mold the pulp fiber into the form of a disk, and means for extracting the liquid from said pulp fiber during the molding operation; substantially as described.

12. In a machine of the class described, a tank for holding liquid pulp fiber, a measuring device, means for operating said device intermittently to measure the liquid pulp fiber into predetermined quantities, a cylinder, means for conveying the pulp fiber in its liquid state from the measuring device to the cylinder, molding-dies for pressing the pulp fiber in the cylinder into the form of a disk, means for actuating said dies intermittently, and means for extracting the liquid from the pulp fiber during the molding operation; substantially as described.

13. In a machine of the class described, a vertically-disposed cylinder for holding liquid pulp fiber, reciprocating dies for pressing said pulp fiber into the form of a disk, a plurality of rock-shafts provided with arms, connecting-links between said arms and said dies, a yielding connection between one die

and its actuating-link, and means for operating said rock-shafts; substantially as described.

14. In a machine of the class described, means for molding pulp fiber into the form of a disk, a tilting table for receiving said disk as it leaves the molding-dies, said table having a receiving-face which is formed of fibrous material, and means actuated by the mechanism which moves one of said dies for moving said table into and out of operative position; substantially as described.

15. In a machine of the class described, a tank for holding liquid pulp fiber, a plurality of automatically-actuated measuring devices for measuring the liquid pulp fiber into predetermined quantities, a plurality of cylinders which receive the pulp fiber in its liquid state, a plurality of automatically-actuated dies coacting with said cylinders for molding the pulp fiber into disk form, a compressed-air supply, and an air-vacuum coöperating with each set of dies for extracting the liquid from the pulp fiber during the molding operation, means for ejecting said disks from the dies, and means for conveying said disks out of the machine; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 30th day of January, 1906.

RUDOLPH W. GOEB.

Witnesses:
F. R. CORNWALL,
GEORGE BAKEWELL.