

(No Model.)

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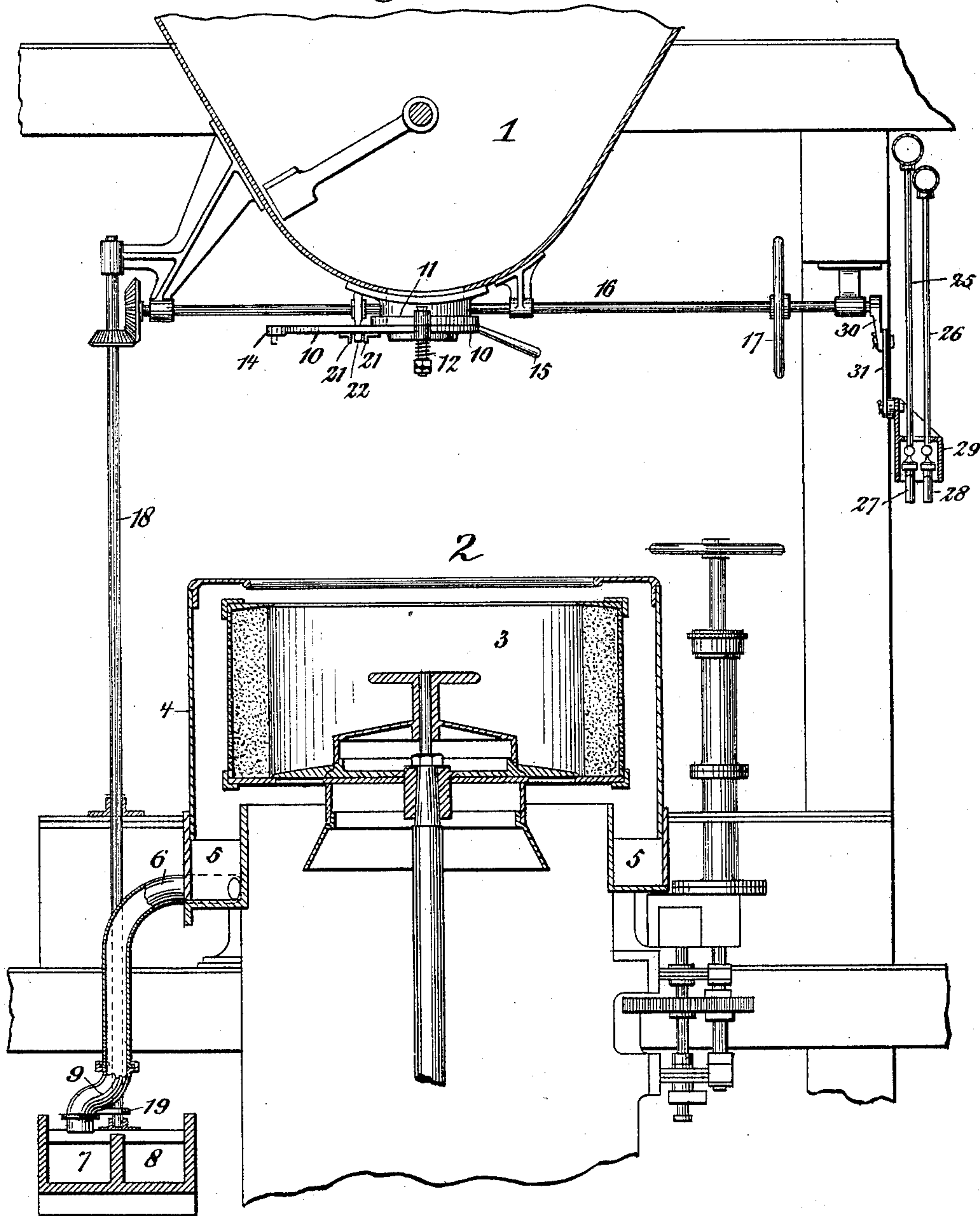
A. E. KRAUSE.

CONTROL APPARATUS FOR CENTRIFUGAL MACHINES.

No. 592,546.

Patented Oct. 26, 1897.

Fig. 1,



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(No Model.)

4 Sheets—Sheet 2.

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CONTROL APPARATUS FOR CENTRIFUGAL MACHINES.

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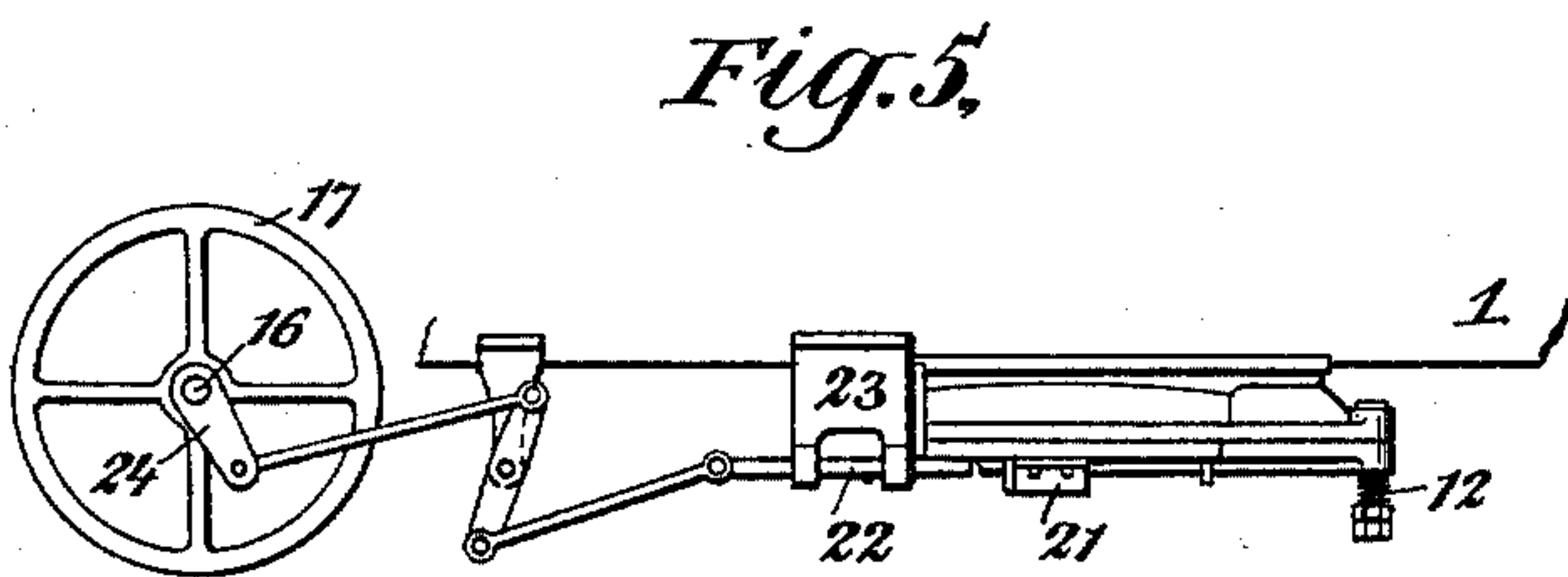
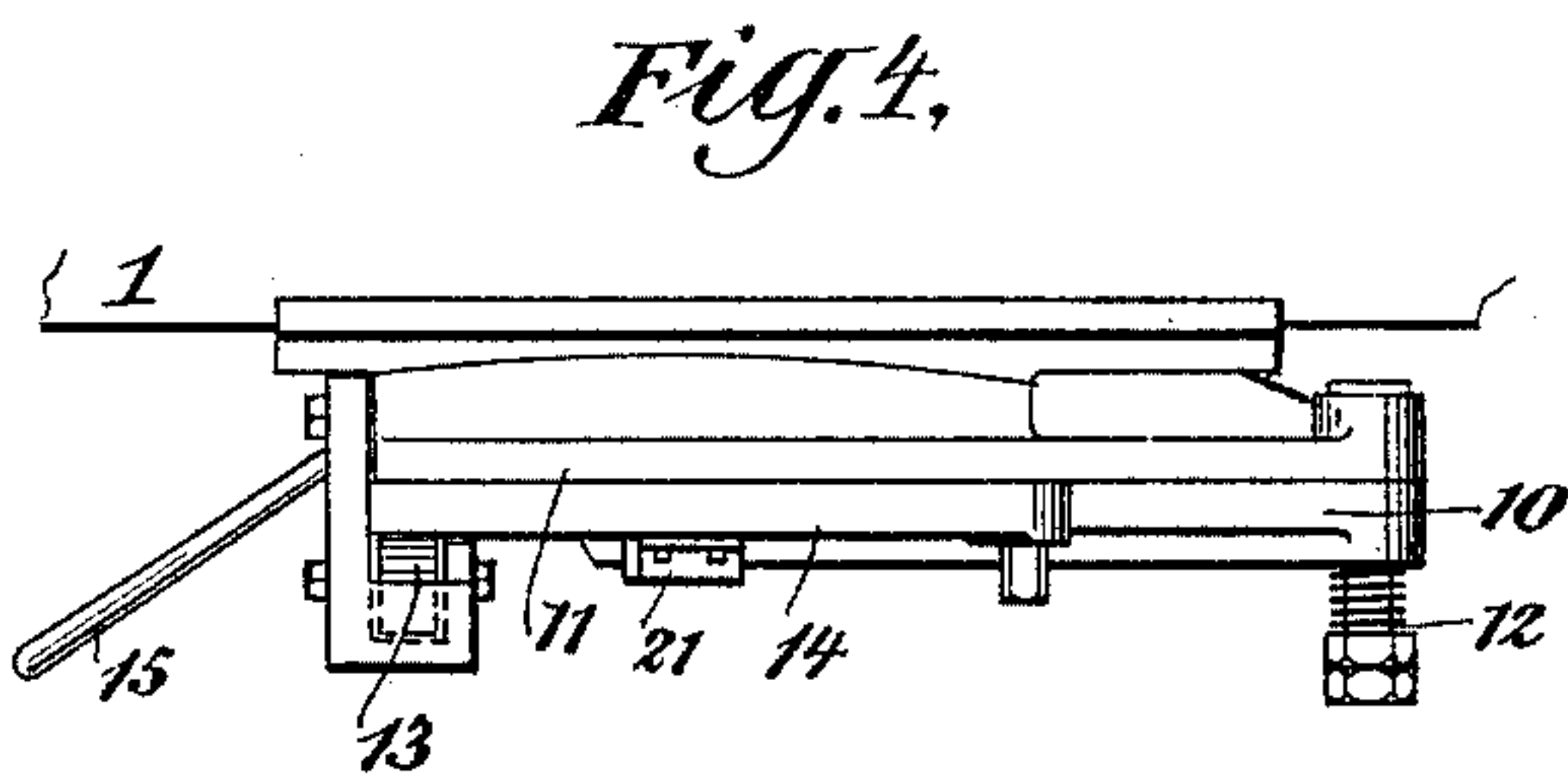
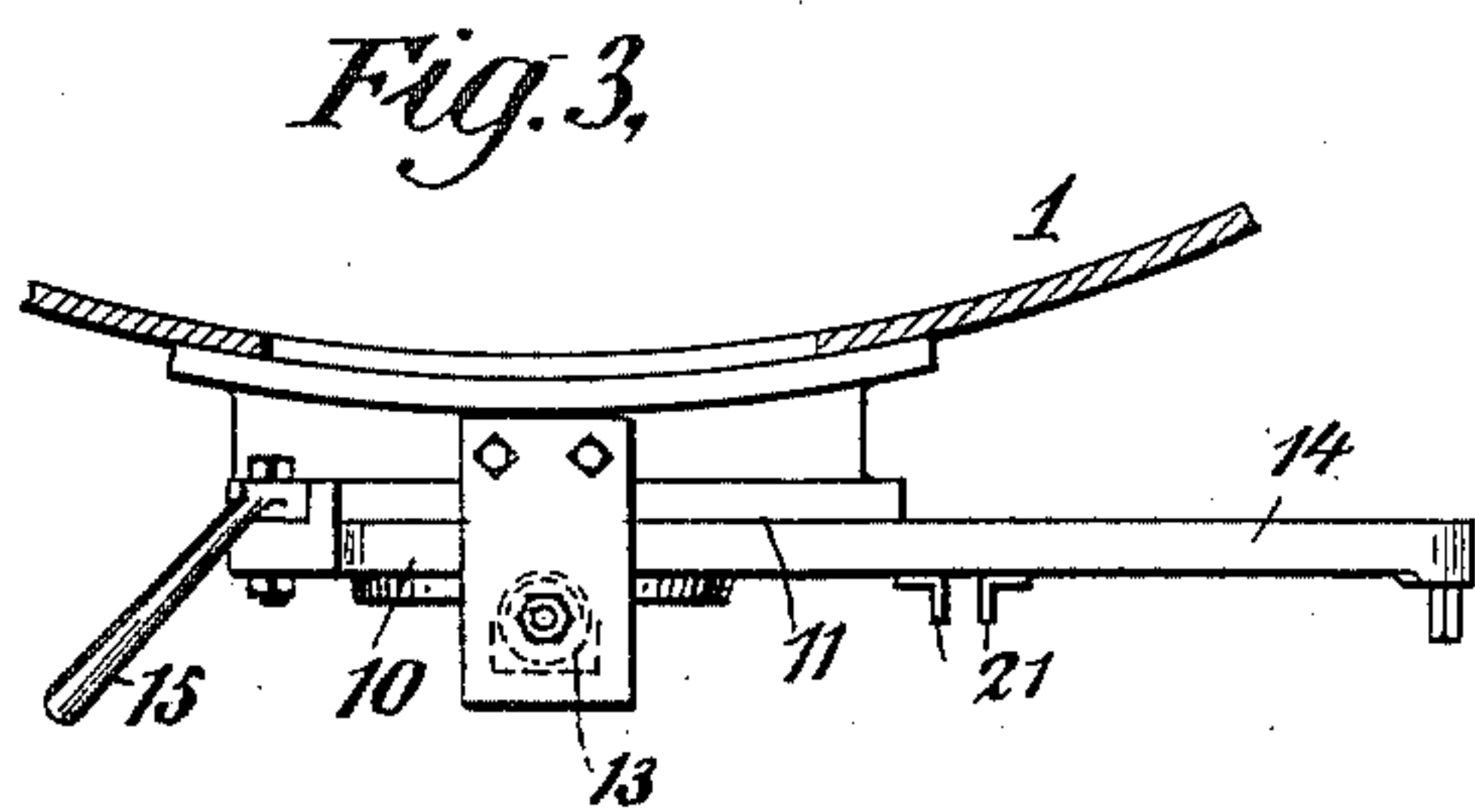
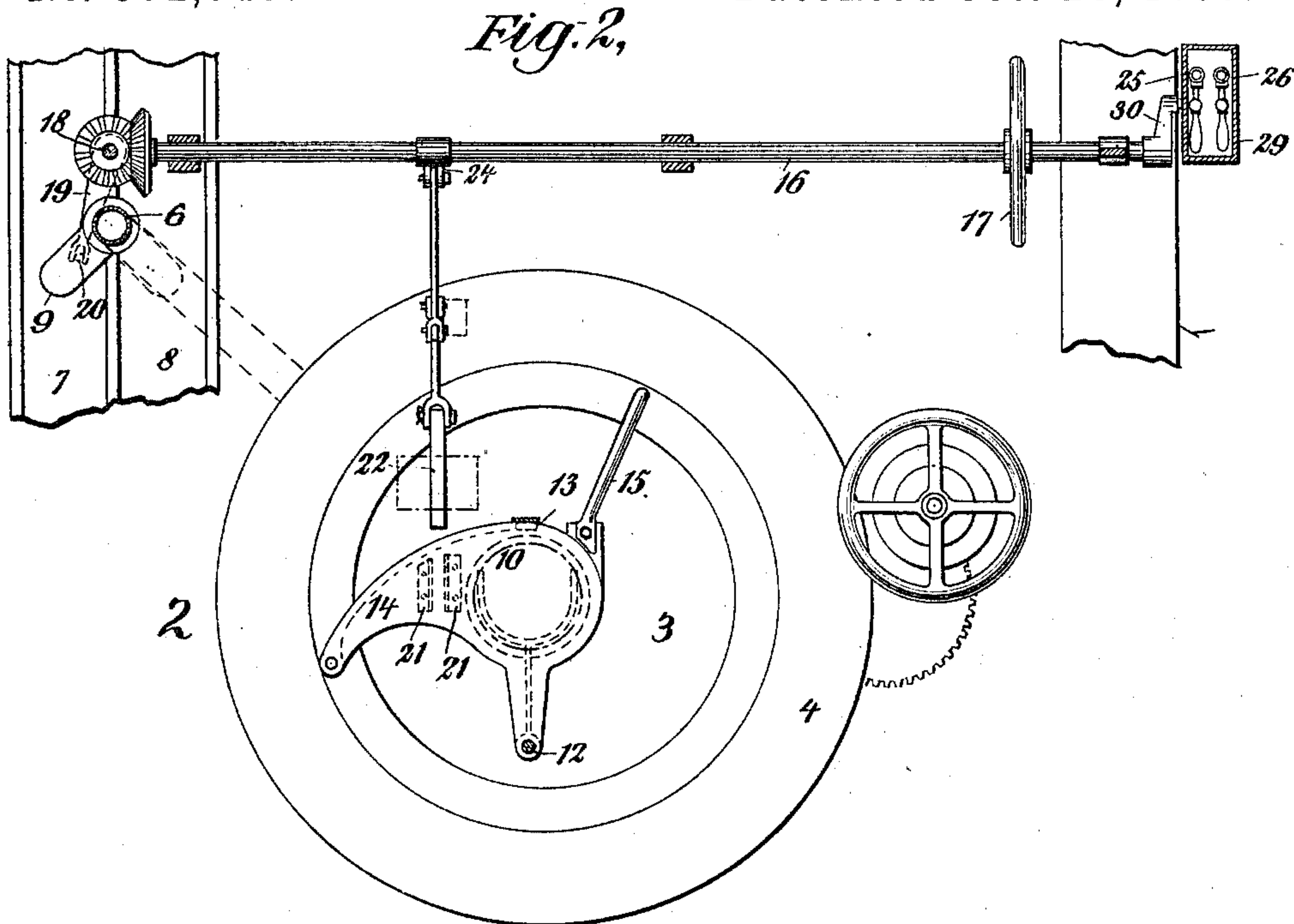
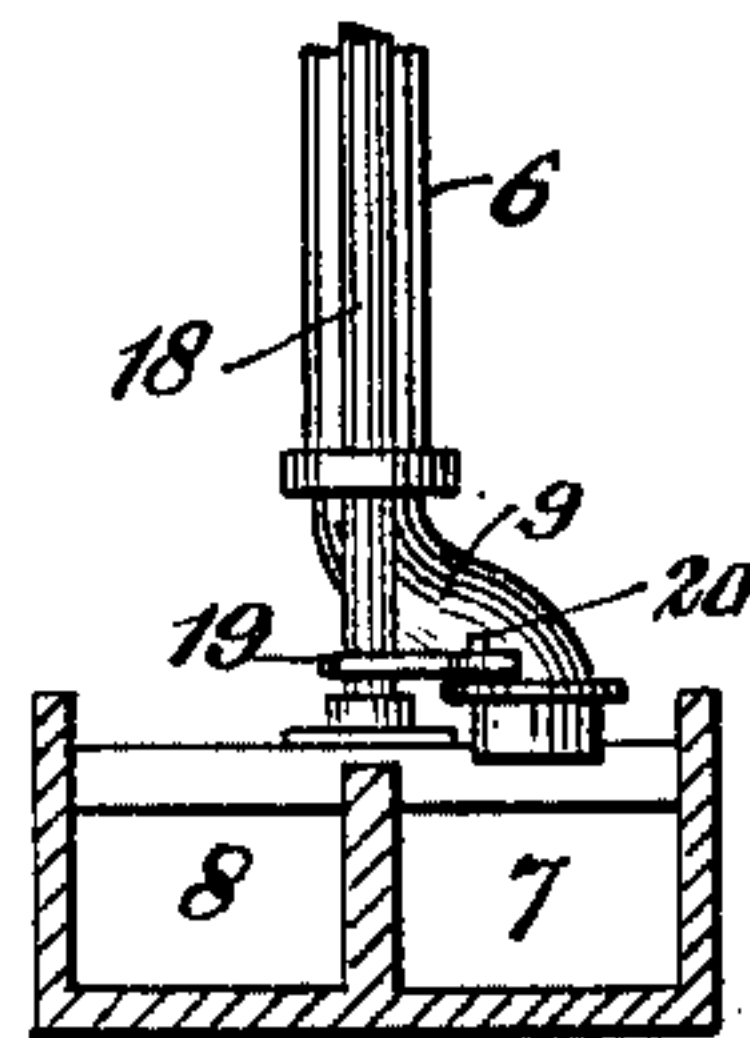


Fig. 6



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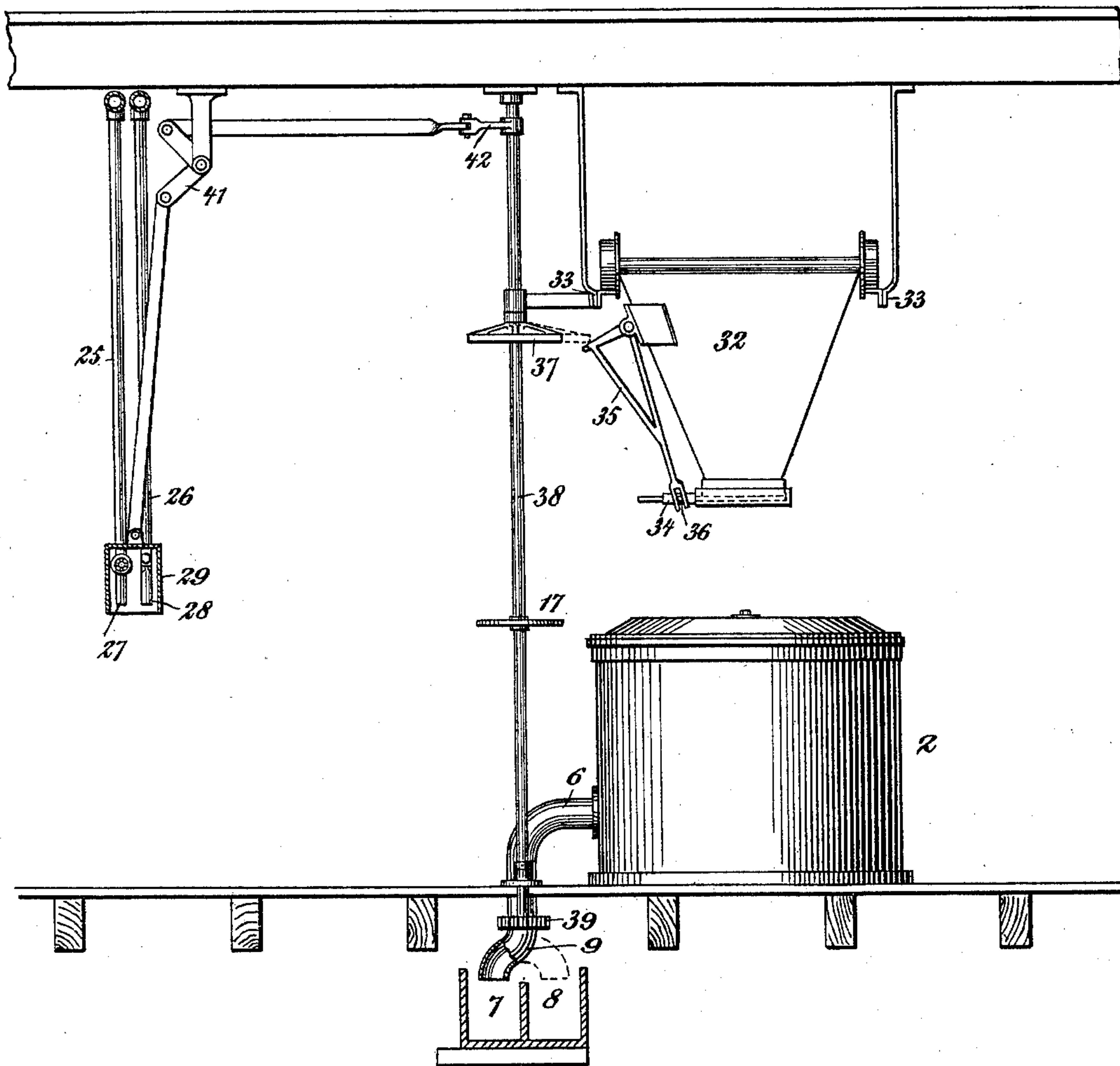
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CONTROL APPARATUS FOR CENTRIFUGAL MACHINES.

No. 592,546.

Patented Oct. 26, 1897.

Fig. 7,



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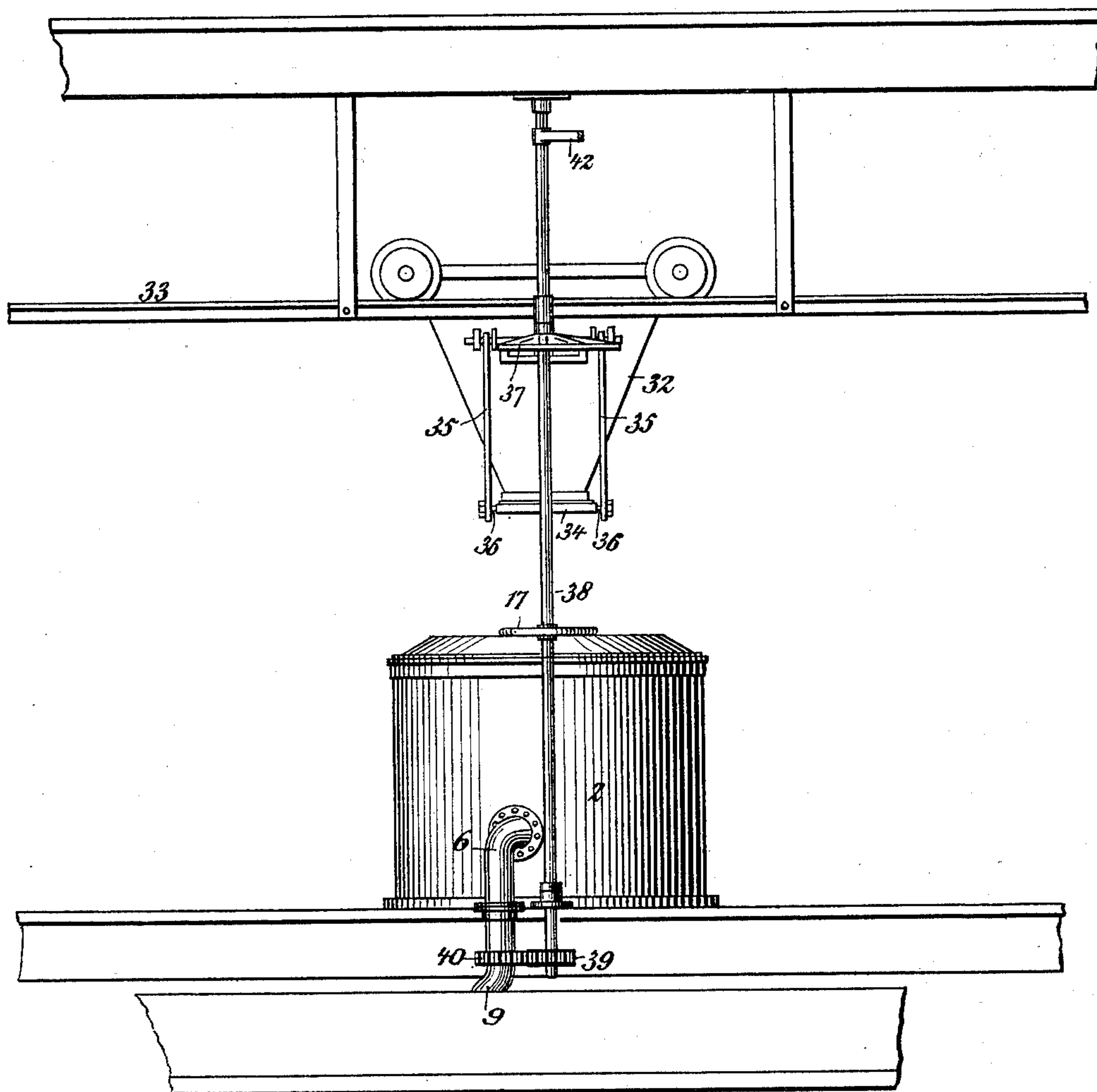
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CONTROL APPARATUS FOR CENTRIFUGAL MACHINES.

No. 592,546.

Patented Oct. 26, 1897.

Fig. 8.



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UNITED STATES PATENT OFFICE.

ARTHUR E. KRAUSE, OF JERSEY CITY, NEW JERSEY.

CONTROL APPARATUS FOR CENTRIFUGAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 592,546, dated October 26, 1897.

Application filed March 1, 1897. Serial No. 625,562. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. KRAUSE, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Apparatus for Separating the Drainings from Centrifugal Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to apparatus for washing sugar and other substances, and particularly to an apparatus for automatically separating the washing liquor used to purify or wash crystallized sugar from the green syrup flowing from the centrifugal or other machine used for extracting the green syrup from the magma, or mixture of crystallized sugar and green syrup as it comes from the vacuum-pan or other similar apparatus.

My invention consists in the novel means employed for automatically separating the green syrup from the washing liquor, and in the novel combination, construction, and arrangement of the parts of the apparatus.

In the operation of refining sugar after the sugar has been boiled to the required grain in the vacuum-pan the mixture of solid sugar and syrup, which is termed "magma," is run into a vessel, known as a "heater" or "mixer," which is usually placed directly over the centrifugal or other separating-machine by which the crystallized sugar is separated from the syrup. The centrifugal machine is charged from the mixer by opening a valve in the bottom of the latter. When the centrifugal machine has been charged, it is set in operation, and the green syrup, which consists largely of non-crystallizable sugar, is forced through the screen of the centrifugal machine by centrifugal action and falls into a gutter surrounding the machine. This gutter is usually provided with a discharge-pipe leading to a trough which receives the green syrup thus discharged from a number of centrifugal machines and serves to carry this syrup to a suitable tank. After the greater part of the green syrup has thus been separated from the crystallized sugar in the centrifugal machine this sugar is washed by introducing clear wa-

ter or a solution of purer sugar into the centrifugal machine. By the operation of the centrifugal machine this water or purer sugar liquor thus introduced is driven through the crystallized sugar, carrying with it any impurities or green liquor still clinging to the crystals, the result being to cleanse the sugar to the required degree. The washing liquor, together with any sugar dissolved from the crystals, then falls into the gutter surrounding the machine.

Since the green syrup contains most of the impurities and the non-crystallizable sugars, while the washing liquor after it has passed from the centrifugal machine is much purer and, moreover, contains a large amount of crystallizable sugar, it is extremely desirable to separate this washing liquor from the green syrup and convey it to a separate tank. Attempts have been made to do this by using hand-operated gates, valves, or movable spouts or nozzles, the operation of which is quite independent of the other portions of the sugar-refining apparatus, by which the operator of the centrifugal machine may direct the green syrup into one trough and the washing liquor into another trough. Such apparatus has not proved satisfactory and reliable, however, since the operator is liable to turn the green syrup into the trough which should receive the washing liquor or to turn the washing liquor into the trough which should receive the green syrup.

The objects of my invention are, first, to provide an apparatus for automatically separating the washing liquor from the green syrup by automatically directing the one into one trough or receptacle and the other into another trough or receptacle and which shall make it impossible for the operator of the centrifugal machine to cause either the green syrup or the washing liquor to flow into the wrong receptacle, and, second, to make the apparatus simple, inexpensive, easily operated, and not liable to derangement. These objects are attained in the invention herein described, and illustrated in the drawings which accompany and form a part of this application, in which the same reference-numerals indicate the same or corresponding parts, and in which—

Figure 1 is a sectional elevation of a mixer and a centrifugal machine of ordinary construction with the automatic apparatus for separating green syrup and washing liquor, which constitutes this invention, applied thereto. Fig. 2 is a plan view of this separating apparatus so applied, showing the centrifugal machine and the valve of the mixer, but not showing the mixer itself, which has been removed in order to render the view more clear. Fig. 3 is a detail view of the valve of the mixer, taken from the side opposite to that shown in Fig. 1—that is, the side which is at the top of the sheet in Fig. 2. Fig. 4 is a side view of the mixer-valve, taken from the left of Figs. 1 and 2. Fig. 5 is a further detail view of the valve-locking mechanism, taken from the same position as Fig. 4. Fig. 6 shows in detail the movable nozzle of the discharge apparatus and the slotted lever by which the nozzle is moved. Fig. 7 illustrates the application of my invention to centrifugal machines where the centrifugal machine is not directly beneath the mixer, but is arranged to be charged by a trolley running on a track which leads from the mixer to the centrifugal machine, the view being a front elevation of the apparatus; and Fig. 8 is a side elevation of the apparatus shown in Fig. 7.

In the figures no attempt has been made to illustrate completely or in detail the mixer or centrifugal machine, since no novelty in their construction as illustrated is claimed. They have been illustrated merely to such an extent as suffices to identify them.

In the drawings, 1 is the mixer, the lower portion only of which is shown.

2 is the centrifugal machine.

3 is the perforated revolving basket of this machine, and 4 the casing which surrounds the revolving basket and serves to confine and direct downward the syrup or liquor thrown outward from the sides of the basket 3. This syrup or liquor falls into a gutter 5, which surrounds the machine and which is provided with a discharge-pipe 6.

7 and 8 are two troughs for receiving the drainings from the centrifugal machine. 7 is the trough intended to receive the green syrup, and 8 the trough intended to receive the washing liquor.

The centrifugal machine is provided with some form of discharge apparatus by which the drainings in the gutter 5 may be discharged either into the trough 7 or into the trough 8, such as the discharge-pipe 6, having upon its end a swinging nozzle 9, which may be revolved so as to discharge the drainings into either the trough 7 or the trough 8.

The valve at the bottom of the mixer consists of a plate 10, pivoted vertically to the valve-seat 11 by a pivot 12. The valve-plate is therefore arranged to swing to one side when it is desired to open the valve, so as to uncover the opening in the valve-seat. As

the valve-plate is pivoted at one side of this opening and there is considerable pressure upon it, it is supported opposite the pivot by a roller 13, suspended from the mixer and shown most clearly in Fig. 4. The valve-plate has a prolonged tail 14, which travels over this roller when the valve is open. A handle 15 is provided for moving the valve.

16 is a rock-shaft depending from the mixer 1 and which is provided with a hand-wheel 17, by which it may be rotated.

18 is another shaft, having suitable bearings. One end of the shaft is in close proximity to the swinging nozzle 9 on the discharge-pipe 6 of the centrifugal machine. Shafts 16 and 18 are geared together. Upon one end of the shaft 18 is a lever 19, which at the end has a slot in which travels a pin 20, (shown in Fig. 6,) which forms a part of the swinging nozzle 9. By rotating the wheel 17, therefore, the shafts 16 and 18 may be rotated and the nozzle 9 moved from the position over the trough 7 to the position over the trough 8, or vice versa.

The valve-plate 10 is provided with a lug or lugs 21. A bolt 22, mounted in a suitable sliding bearing 23, (shown particularly in Fig. 5,) is adapted to engage with these lugs 21. Upon the shaft 16 is a crank-arm 24, connected by suitable links with the sliding bolt 22, so that when the shaft 16 is rotated the bolt 22 will be moved into or out of engagement with the lugs 21 on the valve-plate 10, according to the direction in which the wheel 17 is turned. The position of the crank-arm 24 upon the shaft 16 is such that when the nozzle 9 is over the trough 7 the bolt 22 is out of engagement with the lugs 21 and when the nozzle 9 is over the trough 8 the bolt 22 is in engagement with the lugs 21.

Water or sugar solution to be used for washing the sugar in the centrifugal machine is drawn from pipes 25 and 26, having valves or faucets 27 and 28. It is customary to place these valves not directly over the centrifugal machine, but somewhat to one side, and watering-pots or other portable vessels are used to convey the washing fluid to the centrifugal machine, so that the operator may know the quantity of fluid used and may not use an excessive amount and may apply the washing fluid directly to the sugar piled up against the screen of the centrifugal machine. There may be one or more pipes, such as 25 and 26, according as it is desired to wash the sugar with plain water simply or with sugar-syrup, or both, or with some other fluid.

A box or cage 29 incloses the valves 27 and 28 and when in the position shown in the drawings prevents access to these valves. This box or cage 29 is vertically movable, and a crank-arm 30, mounted upon the shaft 16, is connected to the cage 29 by a link 31, so that when the shaft 16 is rotated the cage 29 may be raised so as to permit access to the valves 27 and 28. The position of the crank

30 upon the shaft 16 is such that when the nozzle 9 is over the green-syrup trough 7 the cage 29 surrounds the valves 27 and 28 and prevents their being opened, and when the
 5 nozzle 9 is over the washing-liquor trough 8 the cage 29 is raised above the valves 27 and 28 so that they can be opened. The box or cage 29 constitutes a locking device to prevent or to permit at will the flow of washing
 10 liquor from the source of supply.

In Fig. 1 the parts of the apparatus are shown in the position which they occupy after the centrifugal machine has received a charge of magma from the mixer and has driven the
 15 green syrup out of the sugar. The sugar is shown banked up against the sides of the basket 3 and the movable nozzle 9 is shown over the trough 7, which is the trough intended to receive the green syrup. The apparatus
 20 is therefore in readiness for the washing of the sugar. In order to wash the sugar, the operator must first uncover the valves 27 and 28, so that he may gain access thereto and turn on the fluid to be used in washing. He
 25 does this by rotating the hand-wheel 17, which raises the cage 29, so that access to the valves 27 and 28 is permitted; but this revolution of the hand-wheel 17 also moves the sliding bolt 22 into engagement with the lugs 21 on the
 30 valve-plate 10, thus locking the mixer-valve closed and at the same time moves the nozzle 9 over the washing-liquor trough 8. The washing liquor is then sprayed over the sugar in the centrifugal machine in the usual way
 35 and is driven through the mass of sugar by centrifugal force, thus washing the crystals to any extent desired. The washing liquor falls into the gutter 5 and is thus carried by the pipe 6 and nozzle 9 to the trough 8. After
 40 the washing is completed the sugar is removed in the ordinary manner through valves in the bottom of the basket 3, and the centrifugal machine is ready to be charged again, which is done by opening the mixer-valve and
 45 permitting a charge of magma to flow into the centrifugal machine; but before the operator can open the mixer-valve he must first unlock the valve by moving the hand-wheel 17 in the reverse direction, so as to move the sliding
 50 bolt 22 out of engagement with the lugs 21 on the valve plate 10. When this has been done, he can move the valve-plate 10 to one side, so as to permit a charge of magma to flow into the centrifugal machine; but in rotating the
 55 hand-wheel 16 to unlock the mixer-valve the shaft 18 has been rotated and the nozzle 9 has been moved into the position over the trough 7, so that when the centrifugal machine is operated after it has received its new charge the
 60 green syrup which is then expelled from the sugar by the centrifugal machine falls into the proper trough 7.

It will thus be seen that by the apparatus above described the operation of the nozzle 9
 65 which directs the drainings from the centrifugal machine into the one trough or the other

is effected automatically by the operations which are incident to the charging of the centrifugal machine or to the washing of the sugar in the centrifugal machine. The unlock-
 70 ing of the mixer-valve necessarily places the nozzle 9 over the trough designed to receive the green syrup. The unlocking or uncovering of the valves in the washing-liquor pipes moves the nozzle 9 over the trough which is
 75 designed to receive the washing liquor as it flows from the centrifugal machine.

In some sugar-refineries the centrifugal machines are not placed directly below the mixers, but are at some distance therefrom, and
 80 the magma is conveyed to the centrifugal machines from the mixers by trolleys running on tracks which are above the centrifugal machines but below the mixers. Where this is the case, the separating apparatus may be ar-
 85 ranged as shown in Figs. 7 and 8. In these figures 32 is the trolley by which the centrifugal machine 2 is charged. The trolley runs on overhead rails 33. 34 is the valve in the bottom of the trolley, which is opened when
 90 the centrifugal machine is to be charged. In the drawings a valve which slides in a straight line is indicated, but the arrangement of parts shown is equally applicable to a swinging valve such as is shown in Figs. 3 and 4. A
 95 bell-crank lever 35 is pivoted to the trolley, one arm of which is slotted and engages a pin 36 on the valve, while the other is adapted to engage a projecting arm 37 on the vertical shaft 38 when this shaft is in the proper po-
 100 sition. When the bell-crank 35 engages this arm 37, the valve 34 cannot be opened, since the bell-crank cannot be moved. The shaft 38 is the operating-shaft of the separating apparatus, only one shaft being used in this form
 105 of the apparatus. At its lower end the shaft carries a pinion 39, engaging a gear on the movable discharge-nozzle 9. By turning the shaft the nozzle 9 may be shifted from the one trough to the other. The gear and pin-
 110 ion are mere equivalents for the pin and slotted-lever construction shown in Figs. 1 and 2, and either device may be used in either form of the apparatus. The cage or box 29, which locks the valves 27 and 28, is operated from
 115 the shaft 38 by a bell-crank lever 41, an arm 42 on the shaft 38, and connecting-links. The shaft 38 is rotated by means of a hand-wheel 17. The operation of this form of apparatus is precisely the same as the operation of the
 120 apparatus shown in Figs. 1 and 2. When the trolley 32 is over the centrifugal machine, the bell-crank 35 is in position to be engaged by the arm 37 on the operating-shaft 38. Therefore the valve 34 can be opened only when
 125 the nozzle 9 is over the green-syrup trough 7. When the operator desires to obtain washing liquor, he must turn the hand-wheel 17 to raise the cage 29, and in so doing he moves the nozzle 9 over the washing-liquor trough 8.
 130 In this position of the nozzle 9 and shaft 38 the arm 37 is in engagement with the bell-

crank 35, as indicated in dotted lines in Fig. 6, and since the valve 34 cannot be opened without moving the upper arm of the bell-crank the valve is locked and will remain locked so long as the arm 37 is in that position. To unlock it, the hand-wheel 17 must be turned in such a manner as to move the nozzle 9 over the green-syrup trough 7 and to move the cage 29 over the valves 27 and 28.

I do not limit myself to the use of the particular mechanical devices illustrated and described, nor to the particular arrangement of parts employed, nor do I limit myself to the application of my invention to centrifugal machines simply. The invention may be applied equally well to other types of machines employed for extracting water or other fluid and for washing the solid residue. Neither do I limit my invention to use in separating fluids from sugar and similar substances.

Centrifugal machines and other machines which extract fluids are used in the treatment of many articles and substances quite different from sugar, but which nevertheless require washing in the machine after the separation, and in such cases it is frequently desirable to separate the washing liquor from the fluid which first drains off from the machine.

In the following claims I intend the term "locking device" (referring both to the locking device which engages the supply-valve of the mixer or movable trolley and to the cage 29) to include any device for preventing the opening of a valve which controls the flow of magma or of washing liquor or for otherwise preventing or permitting at will the supplying to the machine of magma or washing liquor. I intend the term "discharge apparatus" to include any device for directing the drainings from the machine into either of two or more troughs or receptacles, and I intend the term "washing liquor" to include any liquor which it may be desirable to force or "wash" through the mass within the machine, whether that liquor has merely a cleansing action or whether it has some chemical or other action.

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

1. The combination, with a machine for separating fluids from solids and washing the solids so separated, and a plurality of receptacles adapted to receive the drainings from the machine of a discharge apparatus adapted to direct the drainings into either of said receptacles, a source of supply of washing liquor, a locking device adapted to prevent or to permit the supplying of washing liquor to the machine, at will, and an operating device connected with said discharge apparatus and locking device, and arranged to cause the discharge apparatus to direct the drainings into the one receptacle or the other according as the flow of washing liquor is prevented or per-

mitted by the locking device, substantially as described.

2. The combination, with a machine for separating fluids from solids and washing the solids so separated, a plurality of receptacles adapted to receive the drainings from the machine, and a charging-receptacle having a supply-valve by which the mixture of solid and fluid matter may be supplied to the machine, of a discharge apparatus adapted to direct the drainings into either of the drainings-receptacles, a source of supply of washing liquor, a locking device adapted to prevent or to permit the supplying of washing liquor to the machine, at will, a second locking device adapted to engage the supply-valve of the charging-receptacle and prevent the opening thereof, and an operating device connected with and adapted to operate said locking devices and said discharge apparatus, and arranged to cause the discharge apparatus to direct the drainings into the one receptacle or the other according as the flow of washing liquor is prevented or permitted, and to cause the locking device to lock the supply-valve when the flow of washing liquor is permitted, substantially as described.

3. The combination, with a machine for separating solids from fluids and washing the solids so separated, and two or more receptacles adapted to receive the drainings from the machine, of a discharge apparatus adapted to direct the drainings into either of said receptacles, a source of supply of washing liquor having a valve, a movable cage inclosing said valve and preventing the opening thereof, but adapted to be removed therefrom, and an operating device, connected with and adapted to operate both said cage and said discharge apparatus, and arranged to cause the discharge apparatus to direct the drainings into the one receptacle or the other according as the opening of the washing-liquor valve is prevented or permitted, by said cage, substantially as described.

4. The combination, with a machine for separating solids from fluids and washing the solids so separated, and two or more receptacles adapted to receive the drainings from the machine, of a discharge-pipe having a movable nozzle by which the drainings may be directed into either of said receptacles, a source of supply of washing liquor, a locking device adapted to prevent or to permit the flow of washing liquor, at will, and an operating device connected with said locking device and with said movable nozzle, and arranged to cause said nozzles to direct the drainings into the one receptacle or the other according as the flow of washing liquor is prevented or permitted, substantially as described.

5. The combination, with a machine for separating solids from fluids and washing the solids so separated, two or more receptacles adapted to receive the drainings from the machine, and a charging-receptacle having a

supply-valve by which the mixture of solid and fluid matter may be supplied to the machine, of a discharge apparatus adapted to direct the drainings into either of the drainings-receptacles, a source of supply of washing liquor, a locking device adapted to prevent or permit the supplying of washing liquor to the machine, at will, a second locking device adapted to engage the supply-valve of the charging-receptacle and prevent the opening thereof, and an operating-shaft, revolvably mounted, and connected with and adapted to operate said locking devices and discharge apparatus, and to cause the discharge apparatus to direct the drainings into one receptacle, to cause the first locking device to pre-

vent the flow of washing liquor, and to cause the second locking device to unlock the supply-valve, when said shaft is rotated in one direction, and to cause the discharge apparatus to direct the drainings into the other receptacle, to cause the first locking device to permit the flow of washing liquor, and to cause the second locking device to lock the supply-valve, when said shaft is rotated in the other direction, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR E. KRAUSE.

Witnesses:

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