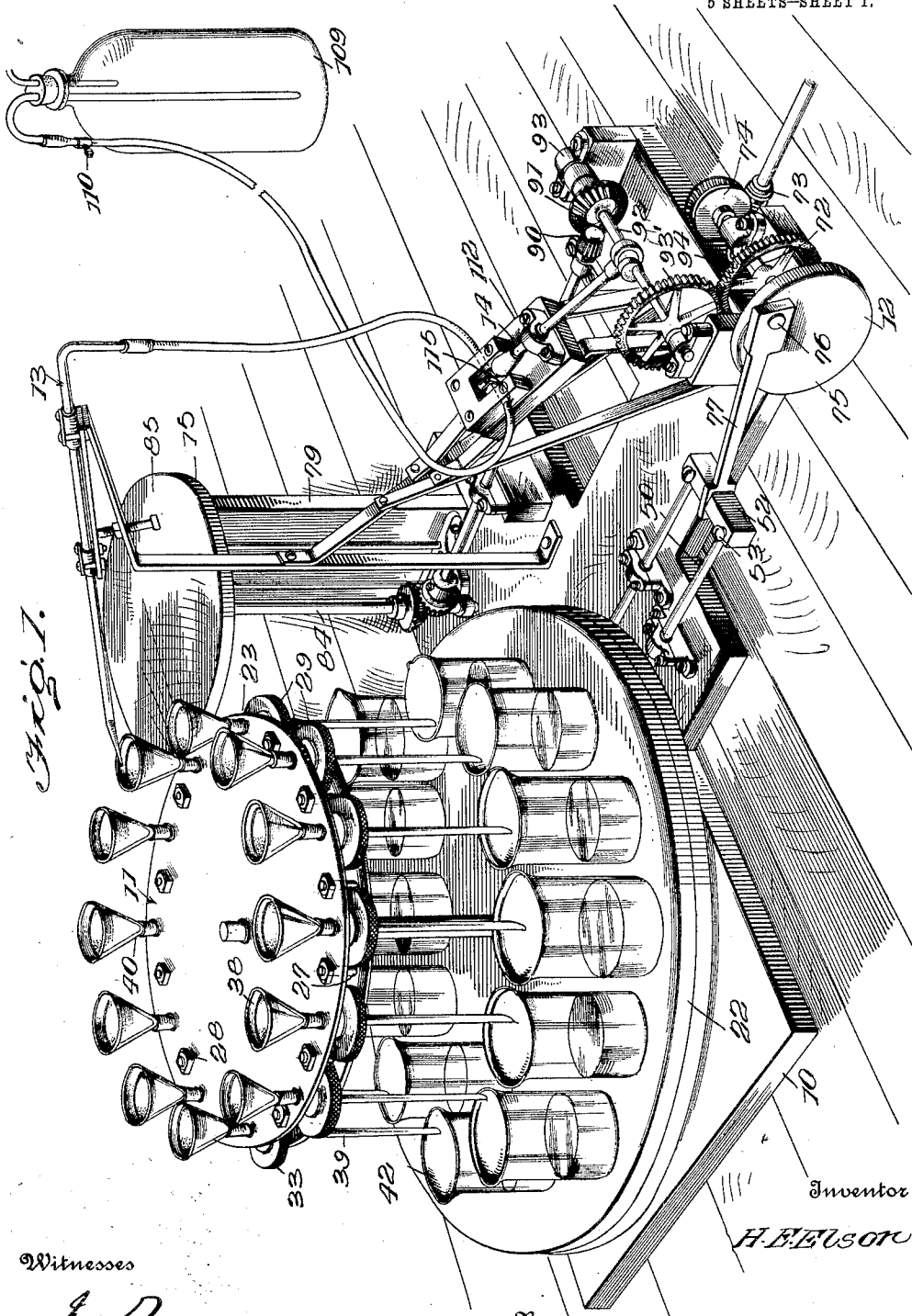


H. E. ELSON.
MACHINE FOR WASHING PRECIPITATES.
APPLICATION FILED NOV. 18, 1913.

1,097,708.

Patented May 26, 1914.

5 SHEETS—SHEET 1.



Witnesses

W. H. Woodman.

By

H. E. Elson, Attorneys.

Inventor

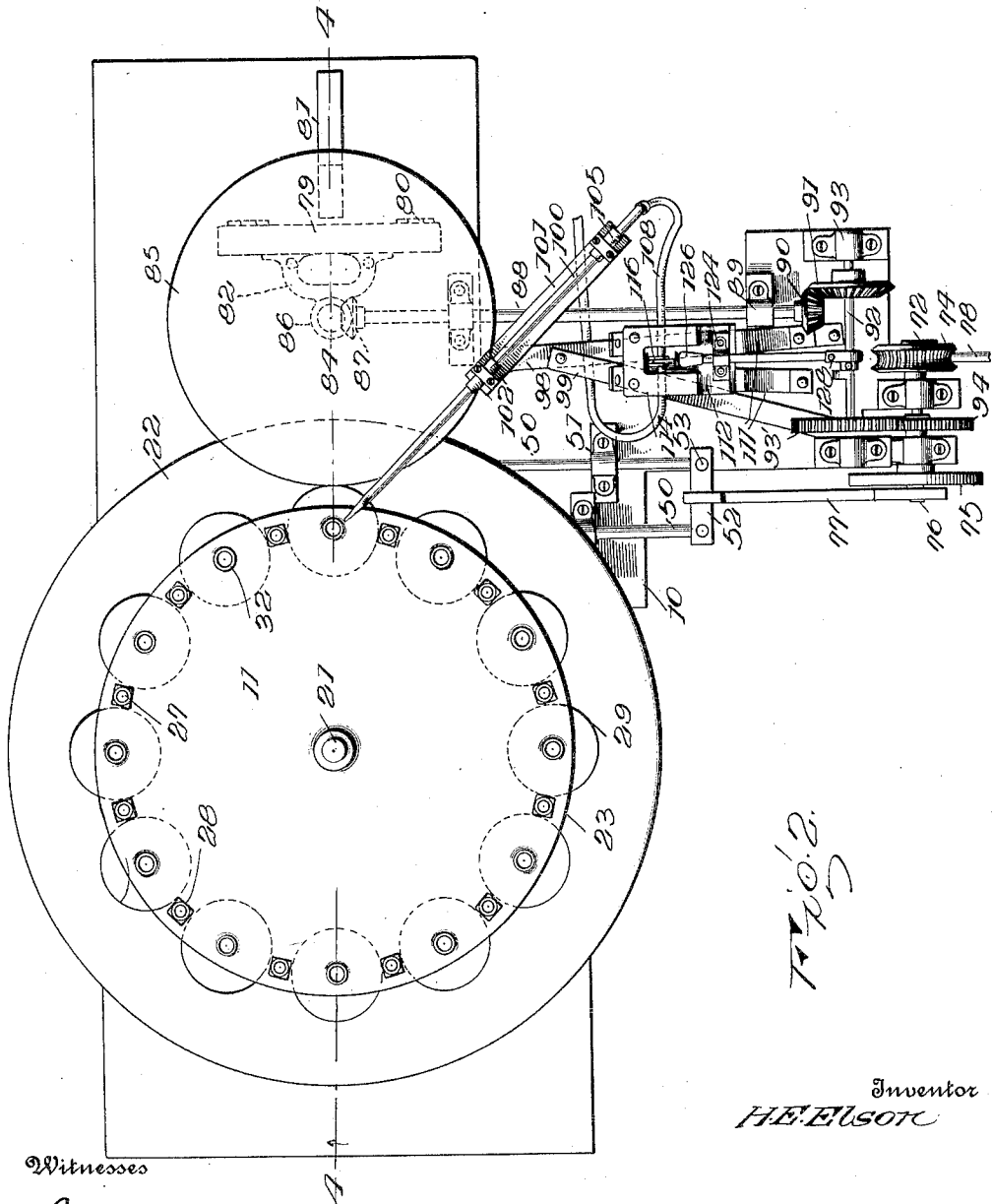
H. E. ELSON

H. E. ELSON.
MACHINE FOR WASHING PRECIPITATES.
APPLICATION FILED NOV. 18, 1913.

1,097,708.

Patented May 26, 1914.

5 SHEETS-SHEET 2.



Witnesses

W. H. Woodman

By

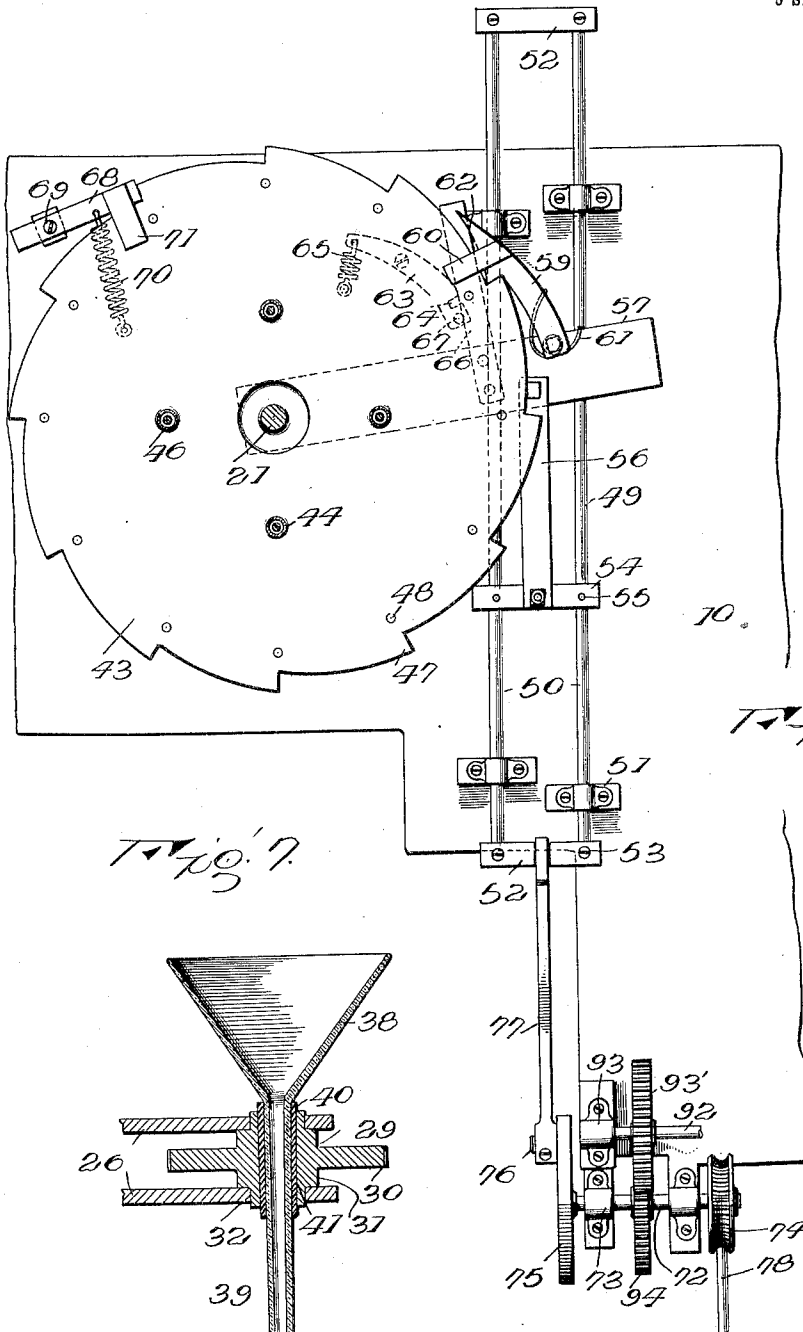
H. E. Elson, Attorneys.

H. E. ELSON.
MACHINE FOR WASHING PRECIPITATES.
APPLICATION FILED NOV. 18, 1913.

1,097,708.

Patented May 26, 1914.

5 SHEETS-SHEET 3.



Witnesses

J. H. Hume
W. H. Woodman.

Inventor

H. E. ELSON

By

W. H. Hume, Attorneys.

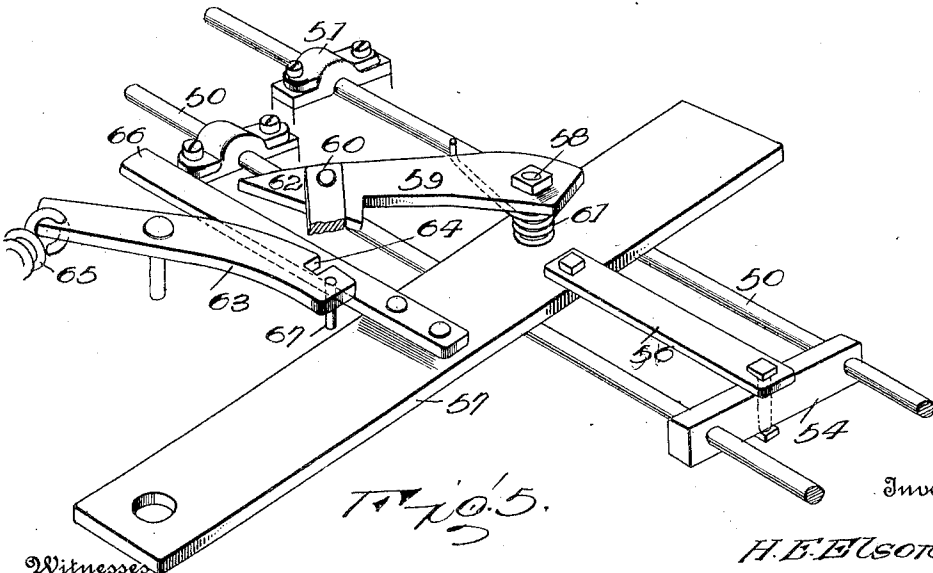
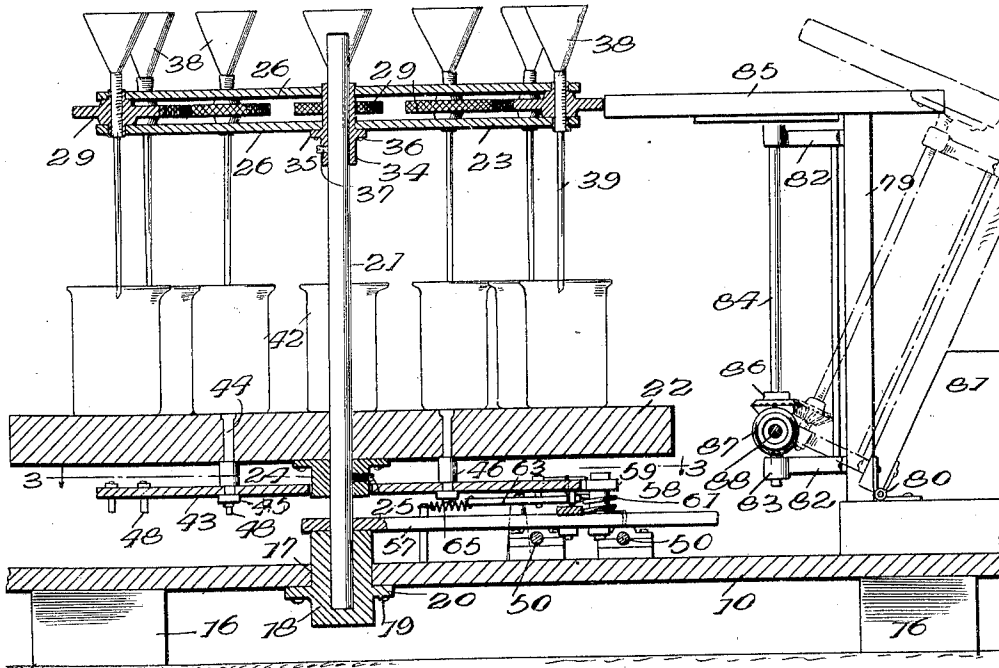
H. E. ELSON.
MACHINE FOR WASHING PRECIPITATES.
APPLICATION FILED NOV. 18, 1913.

1,097,708.

Patented May 26, 1914.

5 SHEETS—SHEET 4.

Fig. 4.



Witnesses

W. H. Woodman.

By

H. E. Elson

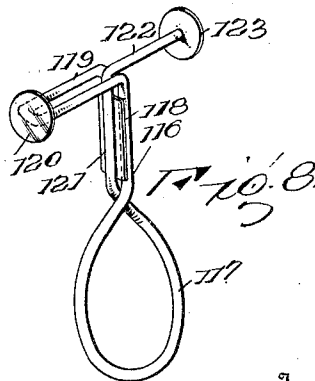
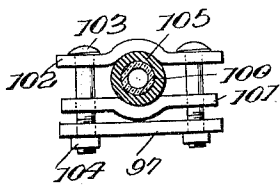
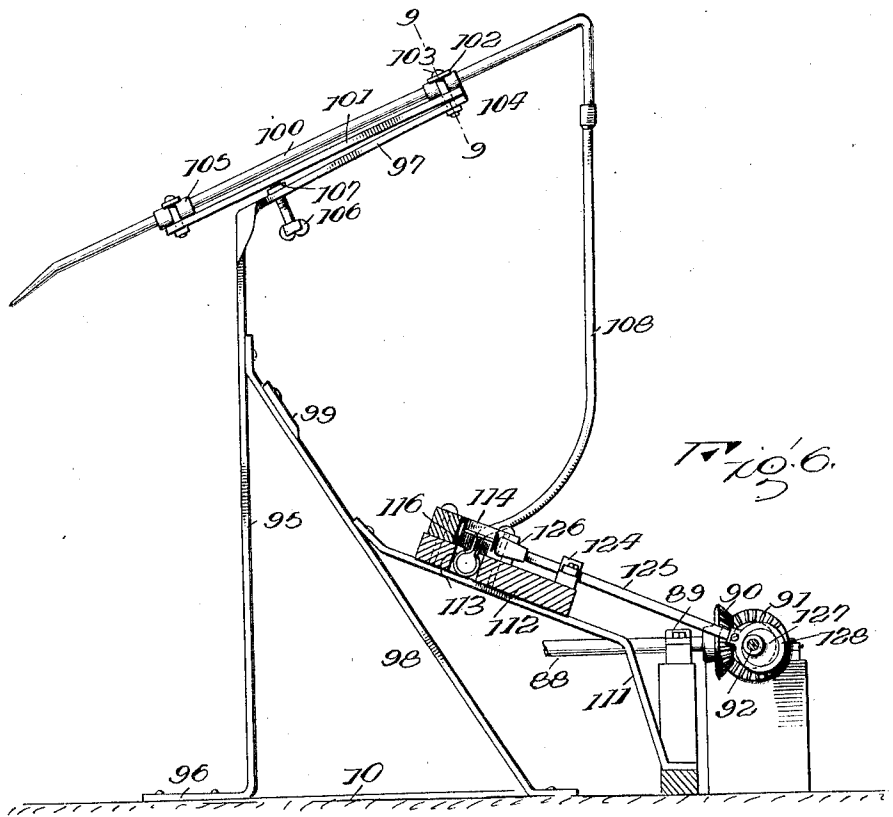
Attorneys.

H. E. ELSON.
MACHINE FOR WASHING PRECIPITATES.
APPLICATION FILED NOV. 18, 1913.

1,097,708.

Patented May 26, 1914.

5 SHEETS—SHEET 5.



Inventor

H. E. ELSON

Witnesses

W. H. Woodman.

By

Attorneys,

UNITED STATES PATENT OFFICE.

HARRY E. ELSON, OF MASONTOWN, PENNSYLVANIA.

MACHINE FOR WASHING PRECIPITATES.

1,097,708.

Specification of Letters Patent.

Patented May 26, 1914.

Application filed November 18, 1913. Serial No. 891,752.

To all whom it may concern:

Be it known that I, HARRY E. ELSON, citizen of the United States, residing at Mason-town, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Washing Precipitates, of which the following is a specification.

My invention relates to improvements in washing machines, the primary object of my invention being the provision of a machine by means of which any filtrate residue or other impurities may be washed from chemical precipitates without removing the precipitates from the filter papers or the filter papers from their funnels.

Heretofore, to the best of my knowledge, precipitates have been washed by the manual employment of a blow bottle or other similar device, requiring the constant attention of the chemist or an assistant. As many precipitates wash slowly and require repeated washings, it will be apparent that with the methods now in vogue, large laboratories require the service of one or more men for this work.

The aim of my invention is to provide a machine which will automatically perform this labor in a thorough and efficient manner, irrespective of the type of precipitate being washed.

A further object of my invention is to provide a machine by means of which precipitates in a number of filter funnels may be simultaneously washed, the washing liquid being successively supplied to the funnels.

In carrying out the above objects, I employ an adjustable device including a discharge nozzle for supplying the wash liquid to the precipitates being washed and a filter funnel holding stand revolubly mounted in such a manner that the filter funnels supported thereby may be successively brought into position to receive the wash liquid passing through the nozzle. In order to render the machine automatic in its operation, I provide means for intermittently rotating this stand to successively move the funnels into operative position with respect to the nozzle, and means for automatically cutting off the flow of the washing liquid to the nozzle during rotation of the stand.

In washing precipitates, the precipitates should be washed as much as possible into the point of the filter paper and with this object in view I mount the discharge nozzle supplying the washing liquid in such a manner as to discharge the washing liquid in a fine jet in a direction tangent to the surface of the filter paper. Furthermore, to accomplish the same object I provide means for constantly rotating the filter funnel while the wash liquid is being discharged therein.

With these and other objects in view, my invention will be more fully described, illustrated in the accompanying drawings, and then specifically pointed out in the claims which are attached to and form a part of this application.

In the drawings:—Figure 1 is a perspective view of my improved precipitate washing machine, showing the same in use; Fig. 2 is a top plan view of the machine, the filter funnels being removed to more clearly show certain details in construction; Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 4 and showing the stand rotating mechanism in top plan; Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 2, showing further details of stand construction; Fig. 5 is a fragmentary perspective view of part of the mechanism employed in rotating the stand; Fig. 6 is a side elevation, partially in section, of the device employed to supply the wash liquid to the filter funnels, clearly disclosing the means employed in cutting off the supply of wash liquid to the nozzle during rotation of the stand; Fig. 7 is a detail sectional view taken through a portion of the stand and one of the filter funnels, clearly showing the manner in which the funnels are supported in the machine for rotation; Fig. 8 is a perspective view of the pinch cock employed to automatically cut-off flow of washing liquid through the nozzle; Fig. 9 is a detail sectional view taken on the line 9—9 of Fig. 6.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The preferred embodiment of my invention includes a supporting base 10, filter funnel stand 11 rotatably mounted upon the base, a drive mechanism 12 for intermit-

tently rotating said stand, a device 13 for delivering the washing liquid to the filter funnels, a mechanism 14 for controlling the flow of water or other washing fluid, this mechanism being controlled by the drive mechanism, and a filter funnel revolving mechanism, indicated as a whole by the numeral 15, this mechanism being also driven through connection with the drive mechanism 12.

The base 10 may be formed of wood or other suitable material and is preferably supported upon feet 16. This base is apertured as at 17 to receive a vertically disposed socket bearing 18 which is secured in place by screws or other fastening devices 19 passed through an encircling flange 20 and into the lower face of the base 10. A vertically disposed shaft 21 is journaled at one end in this socket bearing and supports the filter funnel stand, previously indicated as a whole by the numeral 11. This filter funnel stand includes a lower table 22 and upper table, indicated as a whole by the numeral 23. The lower table is preferably circular in shape, as best shown in Figs. 1 and 2 of the drawings and may be formed of any suitable material. If formed of wood it is preferably constructed in two thicknesses with the grain of the wood in one thickness running at an angle to the grain of the wood in the other to prevent warping. This lower table 22 is apertured to receive the shaft 21 and secured to the lower face of the table is a sleeve 24 through which the shaft extends, the table being supported in suitable spaced relation above the base 10 by means of a set screw 25 threaded through this sleeve to engage the shaft 21. The upper table 23 is also preferably circular in shape, being somewhat smaller than the lower table and consisting of two parallel spaced apart plates 26 which are secured together by a plurality of bolts 27 and nuts 28. These plates are held in proper spaced relation by means of a plurality of filter funnel holders arranged concentrically about the plates and each indicated as a whole by the numeral 29. Each of these filter funnel holders includes a disk 30 having a hub portion 31 which forms a spacing element between the plates 26 and which is reduced at its terminals as shown at 32 to extend through aligned openings formed in said plates. It will be seen that the bolts 27 and filter funnel holders 29 co-act to secure the plates in proper spaced relation and against any independent movement. At the same time, the filter funnel holding members are free to rotate in the bearings formed by the plates. As best shown in Fig. 2 of the drawings, these filter funnel holding members are not only concentrically arranged with respect to the upper table 23, but are further so arranged that the disks 30 thereof extend

peripherally beyond the periphery of the upper table, for a reason which will be hereinafter explained. The peripheral edges of these disks are knurled or otherwise roughened as shown at 33.

The plates 26 forming the upper table 23 are provided centrally with openings to receive a sleeve 34 through which the shaft 21 extends and which is provided with an encircling flange 35 forming a support for the upper table and also providing, in connection with the screws 36, means for securing the said table member to the sleeve. The upper table member is secured to the shaft 21 in proper spaced relation above the lower table member 22, by means of a set screw 37 threaded through the sleeve 34 and engaging the shaft 21.

From the foregoing description it will be apparent that the shaft 21 and upper and lower table members 23 and 22, which in effect constitute the stand 11, are free to rotate as a whole. In use, the filter funnels 38 have their stems 39 passed through pieces of rubber tubing 40 in such a manner that when the stems are passed through the bores 41 of the funnel holding members the tubing will form a packing between the funnels and holders to prevent injury to the funnels and also to insure rotation of the funnels upon rotation of the holders. The lower table 22 forms a support for a plurality of beakers 42 or other suitable receptacles to catch the wash liquid as it passes from the filter funnels, it of course being understood that a beaker is disposed immediately beneath each of the funnel holders.

As previously stated, the stand 11 is to be intermittently rotated to successively bring the filter funnels carried thereby into operative position with respect to the nozzle of the wash liquid discharge device 13. In order to provide means for intermittently rotating the stand 11, a ratchet wheel 43 is secured below the lower table 22 by a plurality of bolts 44 passed through the table and wheel and provided with nuts 45, spacer sleeves 46 encircling the bolt shanks between the lower table 22 and ratchet wheel to properly space the latter below the table. This ratchet wheel is concentrically arranged with respect to the shaft 21 and is preferably so disposed as to engage about the sleeve 24, as shown in Fig. 4 of the drawings to insure such concentric arrangement. A plurality of teeth 47 of uniform size, are formed in the peripheral edge of this ratchet wheel, there being as many teeth in the wheel as there are funnel holders in the upper table 11. The ratchet wheel is further provided adjacent the base of each tooth with a downwardly depending pin or bolt 48, the purpose of which will be later explained. Co-acting with the above described ratchet wheel is a reciprocating carriage, in-

indicated as a whole by the numeral 49 and including spaced parallel rods 50 slidably mounted in bearings 51 carried by the base 10 and connected at their ends by cross heads 52 secured by set screws 53. These rods carry a cross head 54, adjustably secured in place by set screws 55 and a link 56 is pivotally connected at one end to the cross head 54 and at its other end to the free end portion of a pawl carrying arm 57. This pawl carrying arm is swingingly mounted at its opposite end upon the shaft 21, resting at said end upon the upper end of the socket bearing 18 and is consequently spaced a sufficient distance below the ratchet wheel to provide clearance for the pins 48.

A stud 58 is carried by the arm 57 and terminates at its upper end in a reduced portion to pivotally receive an actuating pawl 59. The stud is so proportioned as to bring the pawl on a level with the ratchet wheel in position to engage the teeth thereof and said pawl is held against swinging movement out of the plane of the ratchet wheel by a plate 60 carried by the pawl and sliding over the upper face of the ratchet wheel. A spring 61, coiled about the stud with its ends engaging the arm 57 and pawl 59, holds the pawl in constant engagement with the peripheral or toothed edge of the ratchet wheel and that face of the pawl engaging the ratchet wheel is cut-away arcuately as shown at 62 to prevent disengagement of the pawl from the teeth of the ratchet wheel during rotation of the wheel, due to reciprocation of the carriage 49. A locking pawl 63 is pivotally mounted intermediate its length below the ratchet wheel and is provided adjacent one end with a notch 64 adapted to receive one or the other of the pins 48, a spring 65 connecting the opposite end of this pawl with the base serving to normally hold the pawl in active position.

A release finger 66 carried by the arm 57, extends in such a manner that upon reciprocation of the carriage to move the actuating pawl 59 into active engagement with the next tooth of the ratchet wheel, it will engage a downwardly depending pin 67 carried by the locking pawl 63 to swing the locking pawl 63 out of engagement with the pin 48 and so free the ratchet wheel in order that it may be turned by the actuating pawl 59 upon return movement of the carriage 49. In order to hold the ratchet wheel against counter-rotation, during movement of the actuating pawl 59 to active position, I have provided a second locking pawl 68 which is pivotally mounted adjacent one end as shown at 69 and the opposite end of which is constantly held against the peripheral edge of the ratchet wheel by a spring 70. It will of course be understood that this pawl 68 is mounted in the same plane with the ratchet wheel and in order to hold the

same against swinging movement into another plane, the said pawl is provided with a finger 71 which bears upon the upper face of the ratchet wheel.

From the foregoing description, it will be apparent that for each complete reciprocation of the carriage 49, the ratchet wheel will be turned through a distance equal to the length of one of the teeth, that is, through a distance equal to the distance between adjacent funnel holders. In order to provide means for automatically reciprocating the carriage, a shaft 72 is journaled in suitable bearings 73 carried by the base and this shaft carries a worm wheel 74 and a disk 75 having an eccentric pin 76. A connecting rod 77 is operatively secured at its ends to the eccentric pin 76 and the adjacent cross head 52. Power is supplied to the shaft 72 by a worm gear 78 meshing with the worm wheel 74 and leading to any suitable source of power, such as an electric motor. By regulating the speed of the motor, the interval of time which will elapse between successive movements of the ratchet wheel 43 and consequently of the funnel stand 11 may be regulated.

A supporting frame 79 is hingedly connected as at 80 to the base 10 to normally extend in vertical position, said frame being free to swing away from the funnel stand as shown by dotted lines in Fig. 4 until limited in such movement by a stop block 81 carried by the base of the machine. Spaced brackets 82 are secured to that face of the frame 79 adjacent the funnel stand and these brackets are formed with bearings 83 to receive a shaft 84 upon the upper end of which is secured a drive disk 85 proportioned to engage by its peripheral edge the peripheral edges of the disks of the funnel holders. The frame 79 is so positioned with respect to the funnel supporting stand 11 that when the latter is stationary, the disk of one of its funnel holders will always be in tangential engagement with the driving disk 85. For this reason, if the driving disk 85 is constantly rotated, one of the funnel holders will be rotated whenever the funnel supporting stand is stationary. At the same time, because of the fact that the frame 79 is swingingly mounted, the driving disk 85 may at any time be moved to inactive position and rotation of the funnel holder thereby avoided.

The shaft 84 carries a miter gear 86 which, when the frame 79 is in vertical or active position, meshes with a miter gear 87 carried by a shaft 88 which is journaled in bearings 89 carried by the base of the machine. This shaft 89 is provided at its opposite end with a second bevel gear 90 which meshes with a bevel gear 91 carried by a shaft 92. The shaft 92 is journaled in bearings 93 in parallel spaced relation to the shaft 72 and is pro-

vided with a spur gear 93' which meshes with a spur gear 94 carried by the shaft 72. It will therefore be seen that whenever the shaft 72 is rotated, the carriage 49 will be reciprocated to give a step by step rotary movement to the funnel stand 11 and the drive disk 85 will be rotated to rotate one of the funnel holders whenever the funnel stand is stationary. Swinging of the frame 79 to inoperative position moves the bevel gear 86 out of mesh with the bevel gear 87 and consequently stops rotation of the driving disk 85.

As a means for supporting the discharge nozzle through which the wash liquid passes to the filter funnel, I provide a standard 95, preferably formed of strip metal having a laterally bent foot 96 by which it is secured to the base 10 and an angular extension 97 at its upper end. A diagonally extending brace 98 is secured by one end to the base of the machine and by the other end to the intermediate portion of the standard, while a second diagonal brace 99 is secured by one end to the base of the machine and by its opposite end to the upper portion of the first brace, the braces 98 and 99 diverging at their lower ends and firmly supporting the standard 95.

The discharge nozzle proper, indicated by the numeral 100, is preferably formed of glass tubing, one end of which is drawn out in order that the liquid passing therethrough may be delivered in a fine jet. This nozzle is secured intermediate its length along a supporting arm 101, preferably formed of metal, by means of clips 102, bolts 103 passed through the ends of the clips and through the arm 101, and nuts 104 threaded upon the bolts. Two of these clips are employed one at each end of the arm 101 and the bolts in each instance passed one upon either side of the nozzle. Pieces of rubber tubing 105, or other suitable packing devices, are positioned on the nozzle between the clips and arm 101 to avoid breakage of the nozzle. As clearly shown, the bolts 103 of the clip more remote the discharge end of the nozzle are also passed through the free end of the angular extension 97 of the supporting standard 95. Because of this, the supporting arm 101 and nozzle normally bear along the extension 97, in which position the discharge terminal of the nozzle extends in position to discharge its contents into that filter funnel, the holder of which is in engagement with the driving disk 85. In order to provide means for adjusting the discharge nozzle vertically, to adapt it for use with filter funnels and papers of various sizes, a wing bolt 106 is passed through the angular extension 97 of the standard and through a nut 107 to engage by its end against the lower face of the intermediate portion of the arm 101. It will of course be clear that by proper ma-

nipulation of this wing bolt, the arm 101 may be swung vertically to raise and lower the discharge terminal of the nozzle 100. A flexible tube 108, preferably formed of rubber, leads from any source of liquid supply 109 to the receiving end of the nozzle 100, a valve 110 being preferably interposed between this tube and the source of supply in order that the flow of liquid to the nozzle may be manually controlled at any time.

In order to automatically control the discharge of wash liquid through the nozzle and prevent discharge of the same during turning of the funnel holding stand, I provide the cut-off mechanism, previously indicated as a whole by the numeral 14. Brackets 111 are secured at one end to the base of the machine and at their opposite ends to the intermediate portions of the braces 98 and 99 and form a support for this cut-off device. The device proper includes a supporting block 112 which is secured to the brackets 111 and which is provided with a socket 113. A U-shaped guide block 114 is mounted upon the upper face of the block 112 with its arms extending along the sides of the socket 113. The arms of this guide block are provided with aligned bores 115 through which the supply tube 108 passes. This supply tube also passes between the clamping jaws 95 of a pinch cock 116. This pinch cock is of conventional type being formed from a piece of spring wire bent to form a spring loop 117 and having one end doubled upon itself to form a jaw 118 and laterally directed shank 119 provided with a finger piece 120. The other end of the wire crossing the first end is bent to form a co-acting jaw 121 and laterally directed shank 122 having a finger piece 123. This pinch cock is mounted with its spring loop in the socket 113 and with one finger piece bearing against the bight portion of the U-shaped block 114, the tube 108 passing between the co-acting jaws 118 and 121. A bearing 124 is mounted transversely of the supporting block 112 and a plunger rod 125 is reciprocally mounted in this bearing, said rod terminating at one end in a head 126 engaging the finger piece 123. It will therefore be seen that reciprocation of this rod will open and close the pinch cock and so control the flow of liquid through the tube 108. An eccentric disk 127 is keyed or otherwise secured upon the shaft 92 and is provided with an eccentric strap 128 to which the free end of the plunger rod 125 is attached. It will therefore be seen that reciprocation of the shaft 92 will act to automatically open and close the pinch cock.

By proper proportioning of the gears 93' and 94 and proper setting of the eccentric disk 127 upon the shaft 92, the pinch cock operating mechanism may be adjusted to open the pinch cock the moment a filter fun-

nel is moved into position beneath the nozzle and to close the pinch cock as soon as the filter funnel stand starts to turn.

From the foregoing description, taken in connection with the drawings, the operation of my improved precipitate washing machine will be readily understood and but a slight description is therefore necessary. The filter funnels containing the precipitates to be washed are positioned in the funnel holders 29, the cut-off valve 110 opened to permit flow of the washing liquid as far as the pinch cock 116 and the motor started to drive the shaft 72, the speed of the motor being regulated to correspond to the time required for the wash liquid to pass through the particular kind of precipitate being washed.

Rotation of the shaft 72 causes an intermittent rotation of the funnel holding stand 11, constant rotation of the driving disk 85 which rotates the funnel holders and automatic control of the pinch cock 116. As soon as the filter stand has been turned to position one of the funnels beneath the nozzle 100, the filter holder carrying such funnel will be rotated at a high rate of speed by the driving disk 85. At the same time, the pinch cock 116 will be opened to permit discharge of the washing liquid into the funnel. After a predetermined lapse of time, which in such time as will permit the proper quantity of washing liquid to pass to the funnel, the stand 11 will again be moved to bring the next adjacent filter funnel beneath the nozzle. During this movement of the stand, the pinch cock 116 will be closed and all discharge of wash liquid avoided. When the next filter funnel is beneath the nozzle, the pinch cock will again open and discharge the washing liquid into the funnel. This operation will be continued until the motor is stopped. It will therefore be clear that precipitates contained in a number of filter funnels may be washed any desired number of times without any attention upon the part of the chemist or his assistant other than starting the machine and later stopping the same.

I do not wish however, to limit myself to the employment of the machine for washing precipitates as it may be employed with equal efficiency as a means for supplying the mixture to be filtered to the filters. This is of great importance as many precipitates, particularly those of a gelatinous nature filter very slowly and if a large quantity of mixture containing such precipitates must be filtered, require a great deal of time and attention to continually supply fresh mixture as the filtrate passes through. When so employed, the tube 108 will be connected to a vessel containing the mixture to be filtered and the frame 79 swung to move the driving disk 85 out of active position. The

machine will then be operated in a manner previously described, the speed of the machine being adjusted according to the rate at which the filtrate will pass through the filters. In other words, I do not wish to be limited to the use of my machine for any particular purpose, nor do I wish to be limited to the specific details of construction illustrated in the drawings and described in the specification, as various minor changes within the scope of the appended claims, may be made at any time, without in the slightest degree departing from the spirit of my invention.

Having thus described the invention, what is claimed as new is:

1. A machine for washing precipitates including a filter funnel holding stand, means for rotating the stand, and means for supplying a wash liquid to a filter supported in the stand.

2. A machine for washing precipitates including a filter funnel holding rotatable stand, means for supplying a wash liquid to a funnel supported in the stand, and means for controlling the supply of liquid.

3. A machine for washing precipitates including a rotatable stand, a plurality of filter holders carried by the stand, and means for supplying a wash liquid to filter funnels mounted in the holders.

4. A machine for washing precipitates including a rotatable stand, a plurality of funnel holders carried by the stand, and means for successively supplying a wash liquid to funnels carried by said holders.

5. A machine for washing precipitates including a rotatable stand, a plurality of funnel holders carried by the stand, means for intermittently turning the stand to successively bring the funnel holders to a predetermined position, and means for supplying a wash liquid to a funnel carried by a funnel holder in such position.

6. A machine for washing precipitates including a rotatable stand, a plurality of funnel holders carried by the stand, means for intermittently turning the stand to successively bring the funnel holders to a predetermined position, means for supplying a wash liquid to a funnel carried by a funnel holder in such position, and means for cutting off the flow of wash liquid during movement of the stand.

7. A machine for washing precipitates including a stand, a plurality of funnel holders mounted in the stand, means for intermittently turning the stand to successively bring each funnel holder to a predetermined position, and means for rotating each funnel holder when in such position.

8. A machine for washing precipitates including a stand, a plurality of funnel holders mounted in the stand, means for intermittently turning the stand to successively

bring each funnel holder to a predetermined position, means for rotating each funnel holder when in such position, and means for supplying a wash liquid to a funnel mounted in such holder while the holder is rotated.

9. A machine for washing precipitates including a rotatable stand, a plurality of funnel holders rotatably mounted in the stand, means for intermittently rotating the stand, means for rotating one of the funnel holders when the stand is stationary, and means for supplying liquid to a funnel mounted in that funnel holder which is rotated.

10. A machine for washing precipitates including a rotatable stand, a plurality of funnel holders rotatably mounted in the stand, and means for supplying a wash liquid to funnels mounted in said funnel holders.

11. A machine for washing precipitates including a liquid discharging nozzle, a rotatable stand, a plurality of funnel holders mounted in the stand, and means for intermittently rotating the stand to successively bring the funnel holders in operative position with respect to the nozzle.

12. A machine for washing precipitates including a liquid discharging nozzle, a rotatable stand, a plurality of funnel holders mounted in the stand, means for intermittently rotating the stand to successively bring the funnel holders in operative position with respect to the nozzle, and means for rotating that funnel holder operatively disposed with respect to the nozzle.

13. A machine for washing precipitates including a liquid discharging nozzle, a rotatable stand, a plurality of funnel holders mounted in the stand, means for intermittently rotating the stand to successively bring the funnel holders in operative position with respect to the nozzle, and means for cutting off flow of liquid through the nozzle during movement of the stand.

14. A machine for washing precipitates including a discharge nozzle, a movable stand, funnel holders mounted in the stand, means for moving the stand to successively bring the funnel holders into operative position with respect to the nozzle, means for successively rotating the funnel holders when they are brought to such position, means for controlling the normal flow to the discharge nozzle, and means for automatically cutting off such flow during movement of the stand.

15. A machine for washing precipitates including a stand, a plurality of funnel holders concentrically arranged upon the stand, means for intermittently turning the stand through a distance equal to the distance between adjacent funnel holders, and means for supplying liquid to funnels supported in said holders.

16. A machine for washing precipitates including a filter funnel holding stand, means for intermittently rotating the stand, means limiting the amount of rotation of the stand, and means for supplying a wash liquid to a filter funnel supported in the stand.

17. A machine for washing precipitates including a stand adapted to hold a plurality of filter funnels, a nozzle adapted to discharge liquid at a predetermined point over the stand, and means for intermittently rotating the stand to successively bring the filter funnels beneath the nozzle.

18. A machine for washing precipitates including a stand adapted to hold a plurality of filter funnels, a nozzle adapted to discharge liquid at a predetermined point over the stand, means for intermittently rotating the stand to successively bring the filter funnels beneath the nozzle, and means for preventing over-rotation of the stand.

19. A machine for washing precipitates including a stand adapted to hold a plurality of filter funnels, a nozzle adapted to discharge liquid at a predetermined point over the stand, means for intermittently rotating the stand to successively bring the filter funnels beneath the nozzle, and means preventing counter-rotation of the stand.

20. A machine for washing precipitates including a stand adapted to hold a plurality of filter funnels, a nozzle adapted to discharge liquid at a predetermined point over the stand, means for intermittently rotating the stand to successively bring the filter funnels beneath the nozzle, means preventing counter-rotation of the stand, and means preventing over-rotation of the stand.

21. A machine for washing precipitates including a stand, a plurality of funnel holders mounted in the stand, means for intermittently turning the stand to successively bring each funnel holder to a predetermined position, and means driven by said latter means for rotating each funnel holder when in such position.

22. A machine for washing precipitates including a filter funnel holder, means for rotating the holder, and means for supplying liquid to a funnel supported in the holder during its rotation.

23. A machine for washing precipitates including a discharge nozzle, a plurality of funnel holders, means for successively bringing the funnel holders into position beneath the nozzle, means for rotating the holders when in such position, and means for cutting off flow of liquid through the nozzle during movement of the funnel holders.

24. A machine for washing precipitates including a discharge nozzle, a plurality of funnel holders, and means for successively bringing the funnel holders into position beneath the discharge nozzle.

25. A machine for washing precipitates including a filter funnel holding stand, a discharge nozzle adapted to discharge a wash liquid into a funnel held in said stand, and means for adjusting said discharge nozzle.

26. A machine for washing precipitates including a filter funnel holding stand, a support positioned adjacent the stand, a discharge nozzle mounted adjacent one end upon one end of the support, means for raising and lowering the free end of said discharge nozzle with respect to the support, and means for supplying a wash liquid to the nozzle.

27. A machine for washing precipitates including a filter funnel holding stand, a support, a nozzle adapted to discharge the wash liquid into a filter carried by the stand, a member carrying said nozzle swingingly connected by one end to the support, a nut interposed between the support and the opposite end of said member, and an adjusting screw passed through the support and threaded through the nut to engage said member to adjust the same.

28. A machine for washing precipitates including a filter funnel holding stand, means for intermittently rotating the stand, a nozzle arranged to discharge a wash liquid into filter funnels held in the stand as they are brought beneath the nozzle, a flexible tubing leading from a source of liquid supply to the nozzle, a pinch cock through which said tubing extends, and means for automatically opening and closing the pinch cock.

29. A machine for washing precipitates including a filter funnel holding stand, means for intermittently rotating the stand, a nozzle arranged to discharge a wash liquid into filter funnels held in the stand as they are brought beneath the nozzle, a flexible tubing leading from a source of liquid supply to the nozzle, a pinch cock through which said tubing extends, and means for automatically opening and closing the pinch cock, said means being actuated by the stand rotating means to close the cock during rotation of the stand.

30. A machine for washing precipitates including a filter funnel holding stand, means for intermittently rotating the stand, a nozzle arranged to discharge a wash liquid into filter funnels held in the stand as they are brought beneath the nozzle, a flexible tubing leading from a source of liquid supply to the nozzle, a pinch cock through which said tubing extends, and means for automatically opening and closing the pinch cock, said means including a shaft driven by the stand rotating means, an eccentric carried by the shaft, an eccentric strap carried by the eccentric, and a plunger carried by the eccentric strap and operatively engaging the pinch cock.

31. A machine for washing precipitates including a stand, a filter funnel holder rotatably mounted in the stand, a drive disk rotatably mounted in peripheral engagement with the funnel holder to rotate the same, and means for rotating the drive disk.

32. A machine for washing precipitates including a stand, a filter funnel holder rotatably mounted in the stand, a drive disk rotatably mounted in peripheral engagement with the funnel holder to rotate the same, and means for rotating the drive disk, said drive disk being movable out of engagement with the funnel holder.

33. A machine for washing precipitates including a rotatable stand, a plurality of funnel holders concentrically mounted in the stand for independent rotation, a drive disk rotatably mounted adjacent the stand with its peripheral edge extending in the path of the funnel holders as the stand rotates, means for intermittently rotating the stand to successively bring the funnel holders in engagement with the drive disk, and means operable by the stand rotating means for rotating the drive disk.

34. A machine for washing precipitates including a vertically disposed shaft mounted for rotation, a pair of spaced plates mounted upon the shaft, a plurality of funnel holders rotatably mounted between the plates, each of said funnel holders including a disk, the peripheral edge of which extends beyond the plates, means for rotating the shaft, together with the plates, a drive disk mounted for rotation with its peripheral edge positioned in the path of the peripheral edges of the disks of the funnel holders as the plates carrying said holders are rotated, and means for rotating said drive disk.

35. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle arranged to discharge into funnels carried by the holders as they are successively brought beneath the same through rotation of the stand, and means for intermittently rotating the stand.

36. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle arranged to discharge into funnels carried by the holders as they are successively brought beneath the same through rotation of the stand, and means for intermittently rotating the stand, said means including a reciprocally mounted carriage, mechanism operating between the carriage and stand, and means for reciprocating the carriage.

37. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle ar-

5 ranged to discharge into funnels carried by the holders as they are successively brought beneath the same through rotation of the stand, a ratchet wheel carried by the stand, a reciprocally mounted carriage, and a swingingly mounted pawl movable by the carriage and engaging the teeth of the ratchet wheel.

10 38. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle arranged to discharge into funnels carried by the holders as they are successively brought
15 beneath the same through rotation of the stand, and means for intermittently rotating the stand including a ratchet wheel carried by the stand, a reciprocally mounted carriage, an arm pivoted by one end and
20 having swinging connection at its opposite end with the carriage, and a spring pressed pawl carried by said arm and engaging the ratchet wheel.

25 39. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle arranged to discharge into funnels carried by the holders as they are successively brought
30 beneath the same through rotation of the stand, and means for intermittently rotating the stand including a ratchet wheel carried by the stand, a reciprocally mounted carriage, an arm pivoted by one end and having
35 swinging connection at its opposite end with the carriage, a spring pressed pawl carried by said arm and engaging the ratchet wheel, and a second pawl engaging the ratchet wheel to prevent counter-rotation.

40 40. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle arranged to discharge into funnels carried by
45 the holders as they are successively brought beneath the same through rotation of the

stand, and means for intermittently rotating the stand including a ratchet wheel carried by the stand, a reciprocally mounted carriage, an arm pivoted by one end and having swinging connection at its opposite end with the carriage, a spring pressed pawl carried by said arm and engaging the ratchet wheel, a pin carried by the ratchet wheel adjacent each tooth thereof, a swingingly
55 mounted locking pawl notched for engagement about the pins to lock the ratchet wheel against rotation, and means carried by the arm for releasing said pawl upon reciprocation of the carriage.

60 41. A machine for washing precipitates including a rotatably mounted stand, a plurality of funnel holders concentrically arranged in the stand, a wash fluid nozzle arranged to discharge into funnels carried by
65 the holders as they are successively brought beneath the same through rotation of the stand, and means for intermittently rotating the stand including a ratchet wheel carried by the stand, a reciprocally mounted carriage, an arm pivoted by one end and having
70 swinging connection at its opposite end with the carriage, a spring pressed pawl carried by said arm and engaging the ratchet wheel, a pin carried by the ratchet wheel adjacent each tooth thereof, a swingingly mounted
75 locking pawl notched for engagement about the pins to lock the ratchet wheel against rotation, means carried by the arm for releasing said pawl upon reciprocation of the carriage, a pin carried by the locking pawl, and
80 a releasing member carried by the arm and engaging the pin to move the locking pawl to inoperative position during certain phases of carriage movement.

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

HARRY E. ELSON. [L.S.]

Witnesses:

FRANK J. CONNELL,
EARL D. LONGENECKER.