

908,966.

2 SHEETS—SHEET 1.



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CONCENTRATING APPARATUS.
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2 SHEETS—SHEET 2.

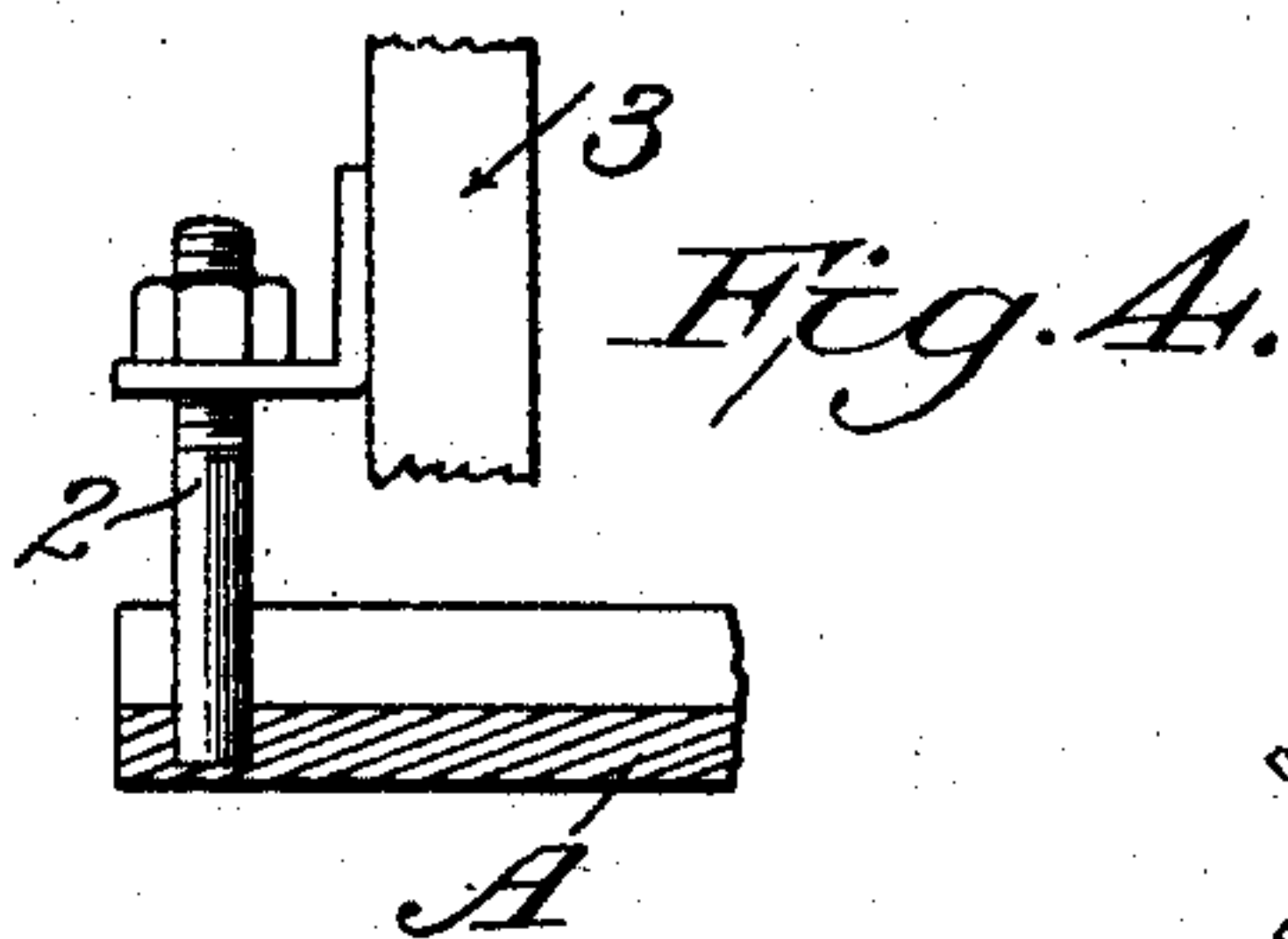
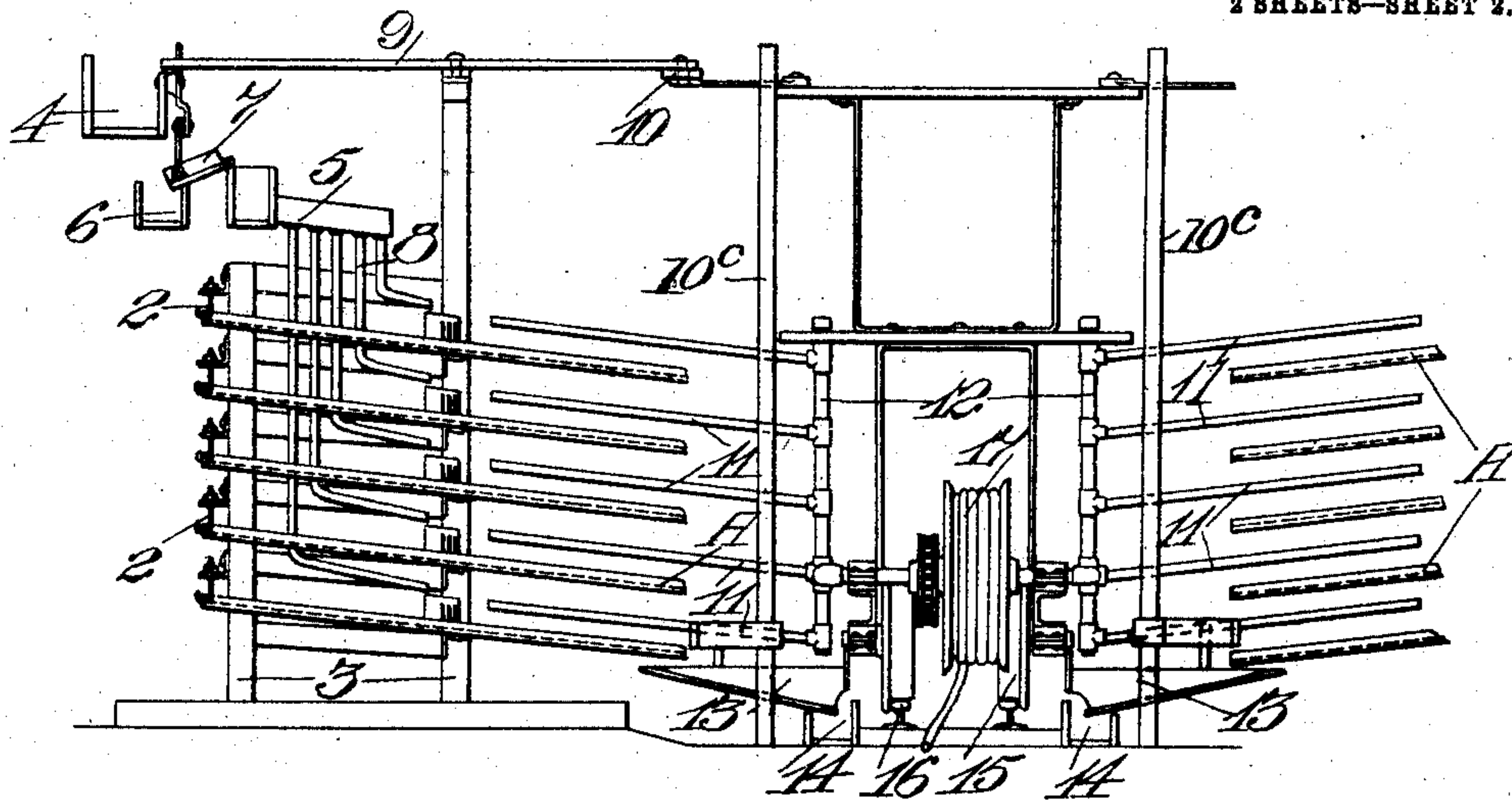


Fig. 2.

Fig. 4.

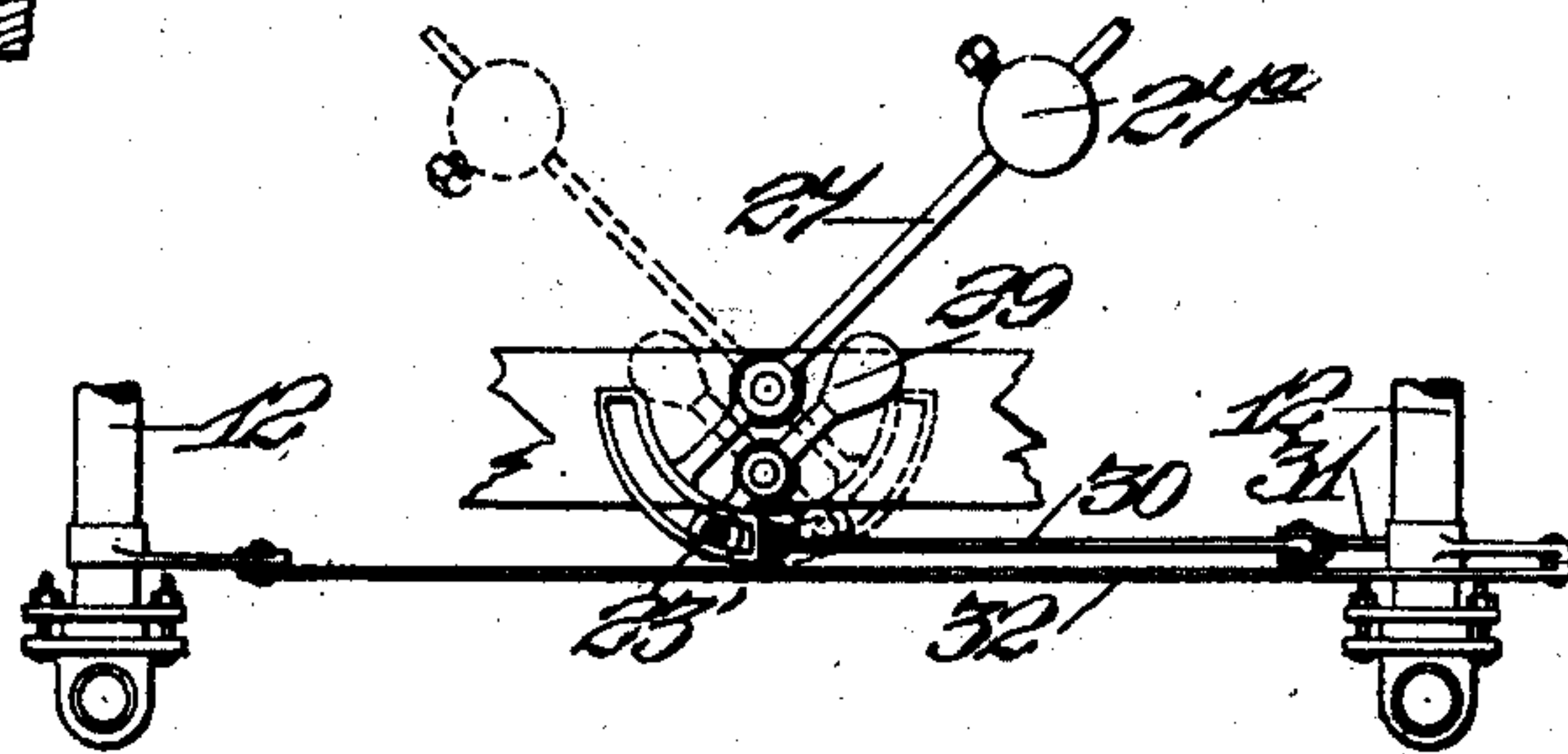


Fig. 3.

WITNESSES

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CONCENTRATING APPARATUS.

No. 908,966.

Specification of Letters Patent.

Patented Jan. 5, 1909.

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To all whom it may concern:

Be it known that I, WILTON E. DARROW, a citizen of the United States, residing at Sutter Creek, in the county of Amador and State of California, have invented new and useful Improvements in Concentrating Apparatus, of which the following is a specification.

My invention relates to an apparatus for automatically separating heavier, valuable material from the lighter slimes and waste with which it may be associated.

It consists in a plurality of tables arranged in line either upon one or both sides of an intermediate track upon which a car is caused to travel, and a combination of parts in connection therewith, and in details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a plan view showing the arrangement of my concentrating apparatus. Fig. 2 is an end view of same. Fig. 3 is a detail showing the arrangement of the reversing levers. Fig. 4 is a sectional detail showing a portion of one of the concentrating surfaces showing means for changing the inclination of the table.

A represents a series of inclined concentrating surfaces, which may be made of wood or other suitable material, extending in a line; or there may be parallel lines of such tables, with an intermediate space; and a car is adapted to travel contiguous to the discharge ends of one or both series of said tables, as will be hereafter described. These tables are supported along the edges by sections of angle-iron to which the lumber or other material is securely fastened. The angle-iron or steel structures extend back to the rear of the concentrating surfaces, and are so constructed as to engage set screws or equivalent devices 2, by means of which the inclination of the table may be adjusted. The connection between the set screws and the table attachments may be in the form of slotted parts into which the set screws may be hooked or otherwise attached, so that they can be removed entirely, or the tables may be moved forward so as to be exposed for repairs, as may be required, and then pushed back into place. These tables are supported upon a stationary frame-work, as represented at 3.

4 is a main pulp sluice which conducts the material along at the rear or upper sides of

the tables at a suitable elevation, so that it may be delivered from this sluice upon the tables by distributors, as shown at 5. These tables may be superposed in series of as many as may be found desirable, as plainly shown in the vertical end view.

6 is an auxiliary sluice that receives the pulp from the main sluice and conveys it to the last of the tables in the series, when it is temporarily diverted from the main tables during the time they are being washed or repaired. This diversion is effected by means of a short tilting sluice 7, which is fulcrumed at such a point that when tilted in one direction the material from the main sluice 4 will pass over these short sluices upon the distributors 5; and whenever it is desired to divert the material from the tables, this sluice 7 is tilted in the opposite direction, and the material will then be delivered into the auxiliary sluice 6 which conducts it to some point further along, and from which it may be temporarily delivered upon one or more of the last tables of the series, which will take care of the material while the tables from which the material has been diverted are being cleaned up, repaired, or subjected to any desired treatment.

8 are conductors which receive the pulp from the distributors 5, and deliver it to the tables of the different vertical sections. These conductors may be of pipe or any other suitable material.

The tilting sluices 7 are controlled by levers fulcrumed upon some part of the main frame, and these may be controlled by shifting levers, as shown at 10. These levers are actuated by the travel of the car, as will be hereafter described.

11 are spray-pipes so disposed that when the tables are to be cleaned, the water from these pipes serves to remove the concentrates from these tables. These pipes branch out from main stand-pipes 12 which are fitted with swinging valves at the bottom, so that they can be swung back to clear the tables at either end and shut off the supply of water at the same time, as will be more fully described hereafter.

A short sluice 13 is fastened to or suspended from the lower spray-pipe, and serves to collect the mineral and convey it to a saving launder 14, as fast as it is washed off from the canvas surface of the tables by the spray-pipes. There may be one of these sluices on each side, and they swing with the

spray-pipes. The saving launders 14 convey the material to any desired point for further treatment.

15 is a car traveling upon a track, as at 16, between two rows of the tables, if the tables are constructed in pairs, or contiguous to the discharge of one row of tables, if only one is employed. This car carries a reel of hose, as at 17, which is connected with a supply of water under pressure at the head end of the track, as shown at 18. Water admitted into the hose from the stand-pipe under sufficient pressure, may be conducted through suitable connections and discharged upon a water-wheel 19 which is fixed upon the end of a shaft carrying the bevel gears 20 and 21.

22 is a bevel pinion fixed upon a shaft 23, which extends at right angles with the shaft of the water-wheel, and the rear end has a worm gear 24 which transmits a slow motion to the wheels 25 of the car. The distance between the gear wheels 20 and 21 is such that the pinion 22 may be out of mesh with both, or it may be in mesh with either one. By means of a suitable shifting lever, the shaft 23 may be moved transversely to an extent which will cause it to either engage with the bevel gear 20 or the bevel gear 21; and one of these gears will transmit motion to move the car forward, and the other to reverse its movement.

Water from the hose 17 passes into the shaft 17^a of the hollow hose reel, and thence into the pipe 17^b, which conducts the water to the wheel 19. A stuffing-box joint between the end of the shaft 17^a and the pipe 17^b allows the shaft to revolve without interrupting the course of the water. Sprockets 26 are fixed upon the shaft of the worm wheel and upon the tubular shaft of the reel, and by means of an endless intermediate chain, power is imparted to rotate the reel in unison with the movements of the car upon the track, which movements are effected by the action of the worm gear, and the hose is thus unwound or wound up, as the car advances in one direction or the other.

The ends of the levers 9 project into line with the shifting bars or levers 10 which are carried upon the car. These levers 10 are supported parallel with the travel of the car, as shown in the plan view, and are connected by links 10^a similar to those of a parallel ruler, so that when the car is traveling forward, these bars 10 are in the position shown in the dotted lines. When the car reaches the further end of the tables, these bars encounter fixed obstructions 10^b, and as the car continues to move, the arms 10 move about their fulcrum points, and are shifted to the position shown in full lines, so that while the car is returning to the starting point, these arms will not engage the levers 9 which change the position of the tilting sluice 7, previously described.

27 is a fulcrum lever having the lower end fitting loosely around the shaft 23, and having a counterweight 27^a upon its upper end. This lever is tiltable so as to pass over a vertical center, and its upper end will be caused to drop to one side or the other by the action of the counterweight 27^a. The lower end connecting with the shaft 23 will thus act to force the shaft into engagement with either one or the other of the gears 20 or 21. This lever may be moved by hand and in unison with the movement of the bars 10, and when these bars have contacted with the stationary post or posts 10^b, the lever may be turned so as to disengage the pinion 22 from the forward driving gear and connect it with the gear which reverses the movement of the car and returns it.

29 is a pivoted lever weighted at the upper end, and movable in unison with the movement of the lever 27. This auxiliary counter-poised lever is so disposed that it also tilts over a vertical center and falls to one side or the other, and it acts to lock the pinion 22 with either of the gears 20 or 21, as the case may be, and maintain it in engagement while the forward or backward movement is taking place.

The lever 27 has one end connected by means of a rod or pitman 30 with an arm 31, and this is in turn connected by a pitman 32 with the valves controlling the supply of water into the stand-pipes 12, so that when the car has finished its forward movement, and the parts are shifted for the return movement, as previously described, these levers will act to shut off the supply of water to the spray-pipes until the car has returned to its starting point. At this point the bars 10 will contact with other fixed stops, as at 10^c, and the levers 29 being restored to the first position, will shift the pinion 22 to engage with the forward driving pinion, and will again open the spray-pipes, so that the car may again advance, and the parts be placed so as to act as previously described.

By the construction herein described, it will be seen that any number of tables may be disposed, either in a single plane, or in a plurality of superposed planes, and the pulp may be distributed over the canvas or other retaining surface of said tables and water supplied to produce the desired washing; and the car, traveling in proper relation with said tables, will, at the beginning of its forward movement, place all parts of the apparatus in operating condition. The car then moving forward to the end of its travel, this operation will continue until the car has reached the end, when the forward driving gear being automatically shifted by the stops at this end, the sluices 7 will be tilted to discharge into the supplemental sluices 6, while the car is returning to its normal position; and during this time the main tables

may be cleaned up while the material delivered into the sluices 6 may be temporarily treated upon another series of tables, which can be subsequently cleaned after the
 5 main tables are again placed in operation, the whole operation being automatic and needing no care except for cleaning.

The tables and their supports are so designed that any table will fit any other support, and no especial care is necessary in removing and assembling the apparatus.

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

15 1. A concentrating apparatus consisting of a line of concentrating surfaces, means for supplying material and water thereto, and automatic means whereby the supply may be periodically suspended, said means including
 20 a horizontally reciprocable car and levers and valves actuated thereby.

2. A concentrating apparatus comprising a series of tables in a substantially continuous line and inclined transversely to said
 25 line, means for supplying pulp and water upon said tables, an automatically movable device adapted to travel along the line of the tables, connections whereby said apparatus is reversed and returned at each end
 30 of its traverse, and mechanism controlled by said automatic device whereby the supply of material to the tables is periodically opened and closed, said mechanism including members carried by the reciprocating
 35 car, and tilting sluices and fulcrumed levers connected therewith, said levers projecting into the path of the members carried upon the car.

3. In a concentrating apparatus, a plurality
 40 of tables extending in line, said tables being inclined transverse to their line, a main sluice, and distributors whereby material is delivered upon the tables, a supplemental sluice adapted to deliver material to a sup-
 45 plemental set of tables, tilting sluices located between the main sluice and supplemental sluice, and an automatically moving device and intermediate levers whereby the tilting
 50 sluices are alternately shifted to discharge upon the main tables, or to the supplemental sluice.

4. In a concentrating apparatus of the character described, a series of inclined concentrating tables, means for supplying ma-
 55 terial thereon, and automatic mechanism controlling said supply means, said mechanism including a car, means by which it is caused to travel parallel with the tables, and mechanism carried by the car whereby the
 60 supply devices are periodically opened and closed.

5. In a concentrating apparatus of the character described, a series of tables, means for supplying material thereto, a car moving
 65 substantially parallel with the line of the ta-

bles, power and reversing mechanism carried by the car, stop mechanisms at each end of the line of travel, and levers actuated by the stop mechanism and a water supply for the tables opened and closed periodically, by said
 70 levers.

6. In an apparatus of the character described, a series of tables, means for supplying material thereto, a car moving substantially parallel with the line of the tables,
 75 mechanism carried by the car to advance and reverse its motion, said mechanism including a water-wheel, a nozzle adapted to discharge water upon the wheel, a flexible and extensible pipe connection carried upon the car hav-
 80 ing one end connected with a stationary supply, and the other with the nozzle, and means for transmitting power from the water-wheel to the bearing-wheels of the car.

7. In an apparatus of the character de-
 85 scribed, a series of concentrating tables with means for supplying material thereto, a car adapted to travel parallel with the line of tables, a water-wheel mounted upon said car, and a nozzle adapted to discharge water to
 90 impel the wheel, a flexible hose having one end connected with the nozzle pipe, and the other with a stationary supply, bevel-gears mounted upon the water-wheel shaft, a shaft journaled longitudinally upon the car
 95 having a screw or worm engaging with a worm-gear upon the bearing-wheel shafts of the car, and a bevel-pinion upon the opposite end of said shaft, and means by which said shaft is moved so that the pinion may engage
 100 either of the bevel-gears to advance or reverse the car.

8. In an apparatus of the character described, a series of concentrating tables with means for supplying material thereto, a car
 105 mounted upon wheels to travel parallel with the line of tables, a water-wheel mounted upon the car, a pipe and nozzle through which water is discharged to drive the wheel, bevel-gears carried upon the wheel-shaft, a longitu-
 110 dinally mounted shaft having a pinion, said shaft being movable to engage the pinion with one or the other of the gears to reverse the travel of the car, a worm mounted upon the opposite end of the shaft, a gear with
 115 which it engages carried upon the bearing-wheel axle, a flexible hose, a reel upon which it is coiled, one end of said hose being connected with the nozzle pipe, and the other with a stationary water supply, and sprocket-
 120 wheels and chain mounted upon the hose drum shaft and the bearing-wheel shaft respectively whereby the hose is coiled or uncoiled in unison with the backward or forward movements of the car.
 125

9. In an apparatus of the character described, concentrating tables, a car adapted to travel parallel with said tables, a water-wheel having its shaft journaled upon the
 130 car, a flexible hose mounted upon a hollow

shaft having one end connected therewith, and the other end with a stationary source of water supply, a pipe with which the drum shaft connects, a nozzle by which water is discharged there-through to drive the wheel, bevel-gears carried upon the water-wheel shaft, a shaft at right angles therewith having a pinion adapted to alternately engage one or the other of the gears, a worm-gear through which motion is transmitted to drive the supporting wheels and connections by which the hose-drum or reel is revolved in unison with the movements of the car, mechanism by which the supply devices for the tables are actuated, said mechanism consisting of levers controlling the table supply and shifting bars carried by the car and adapted to engage said levers when the car is moving in one direction, and to be disengaged therefrom when the car is moved in the opposite direction.

10. In an apparatus of the character described, concentrating tables, with means for supplying material thereto, a car adapted to travel parallel with the tables, a water-wheel and gearing through which motion is transmitted to propel the car, levers controlling the supply of material to the tables, shifting bars carried upon the car and adapted to engage and actuate said levers when the car is moving forwardly, a fixed stop mechanism against which the bars contact at the end of the forward motion of the car whereby the bars are moved out of engagement with the controlling levers and the driving mechanism of the car is reversed so as to return the car to its first position, and other stops whereby the shifting bars are again moved and the driving mechanism is reversed to again advance the car.

11. In an apparatus of the character described, a series of concentrating tables, means whereby pulp and water are supplied thereto, a car adapted to travel parallel with the tables, a water-wheel carried by the car, reversing gears and propelling mechanism actuated by the wheel, means for reversing the

direction of travel automatically at each end of the course traveled by the car, a tiltable weighted lever having one end engaging the driving and reversing shaft, and the other actuated by the shifting mechanism.

12. In an apparatus of the character described, concentrating tables and means for supplying material thereto, a car adapted to travel parallel with the tables, mechanism whereby the movement of the car is automatically reversed at the end of its travel, shifting bars and stationary stops, a weighted lever turnable in a vertical plane and actuated by said shifting mechanism, said lever engaging and actuating the reverse mechanism, and a second lever actuated in unison therewith and forming a lock to prevent the disengagement of the reversing mechanism.

13. A concentrating table consisting of a plurality of superposed and interchangeable concentrating surfaces, arranged in line, means for supplying material and water thereto, and automatic means whereby the supply may be periodically suspended, said means including a car movable contiguous to the discharge ends of the tables, a power mechanism and reversing gear carried by the car, and stops at the ends of travel whereby the car is arrested, and the mechanism reversed.

14. A concentrating apparatus comprising a series of interchangeable concentrating surfaces, arranged in a continuous line and inclined transversely to said line, means for supplying pulp and water upon said surfaces, a device automatically movable and reversible with relation to the surfaces, and mechanism controlled thereby, to periodically open and close the supply means.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILTON E. DARROW.

Witnesses:

CHAS. THOMAS,
E. C. JONES.