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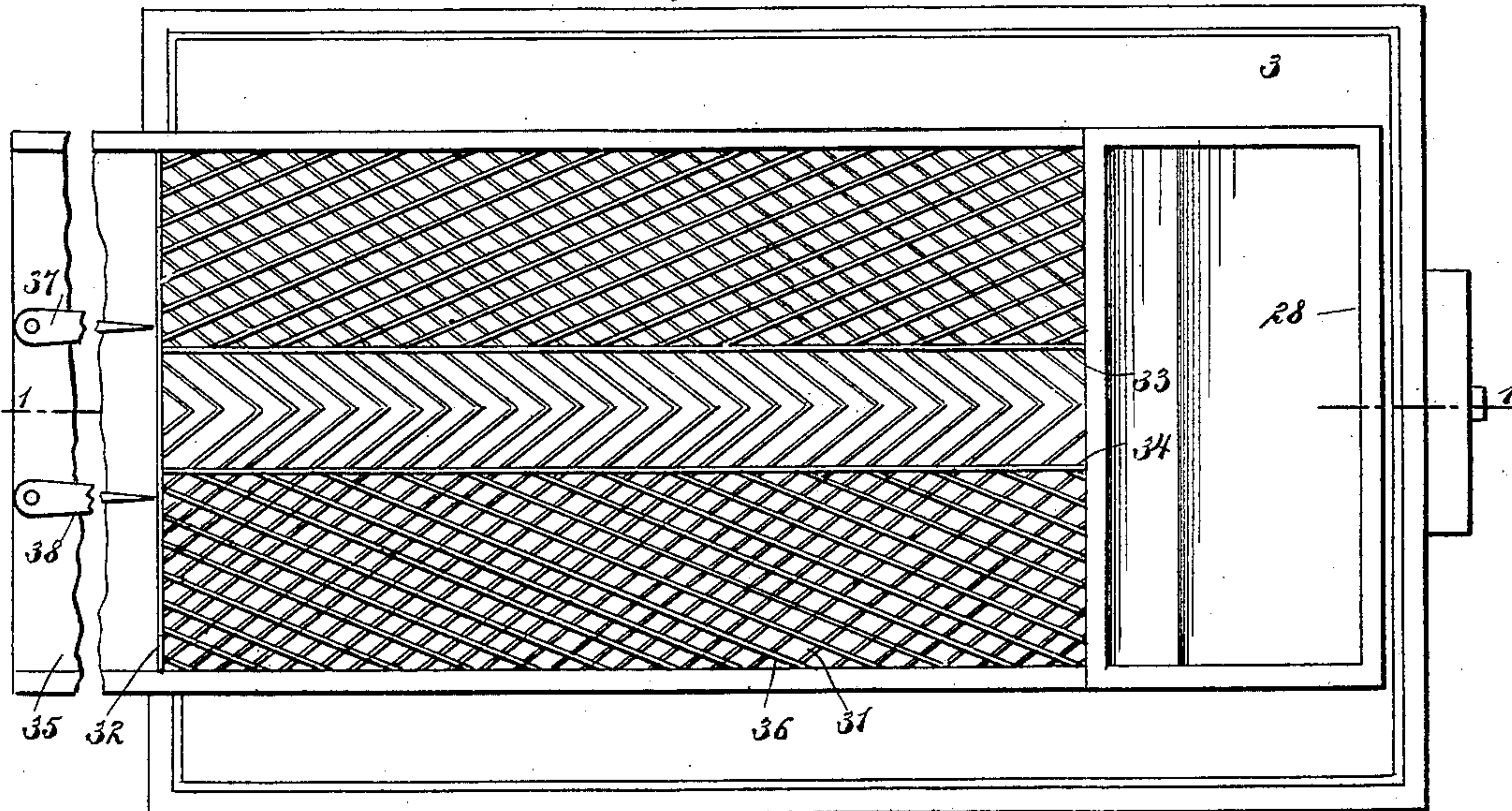
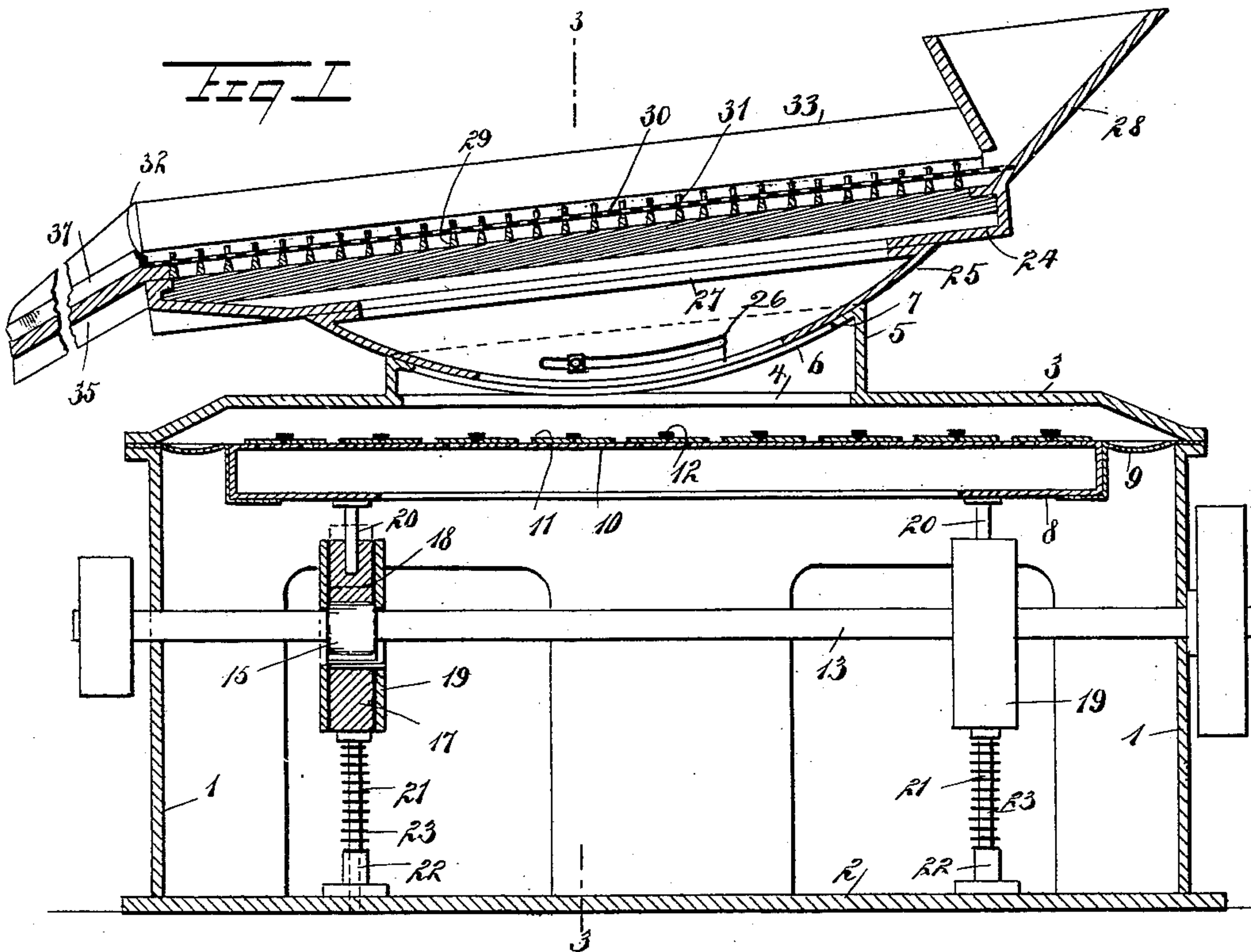
Patented Sept. 19, 1899.

W. HOOPER.
ORE SEPARATOR.

(Application filed Feb. 10, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

H. Walker
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Fig 2

INVENTOR

W. Hooper.

BY

M. H. Hooper

ATTORNEYS.

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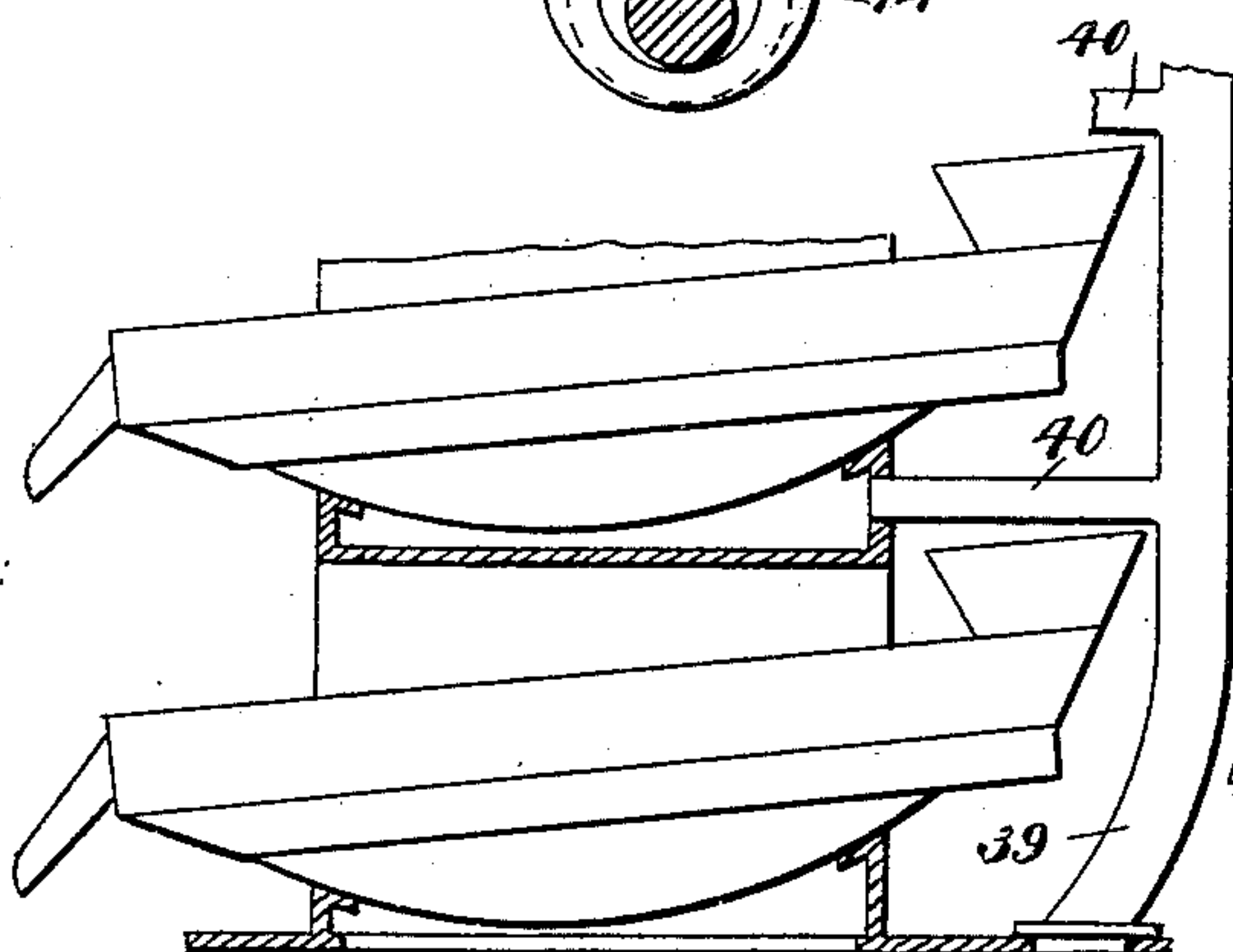
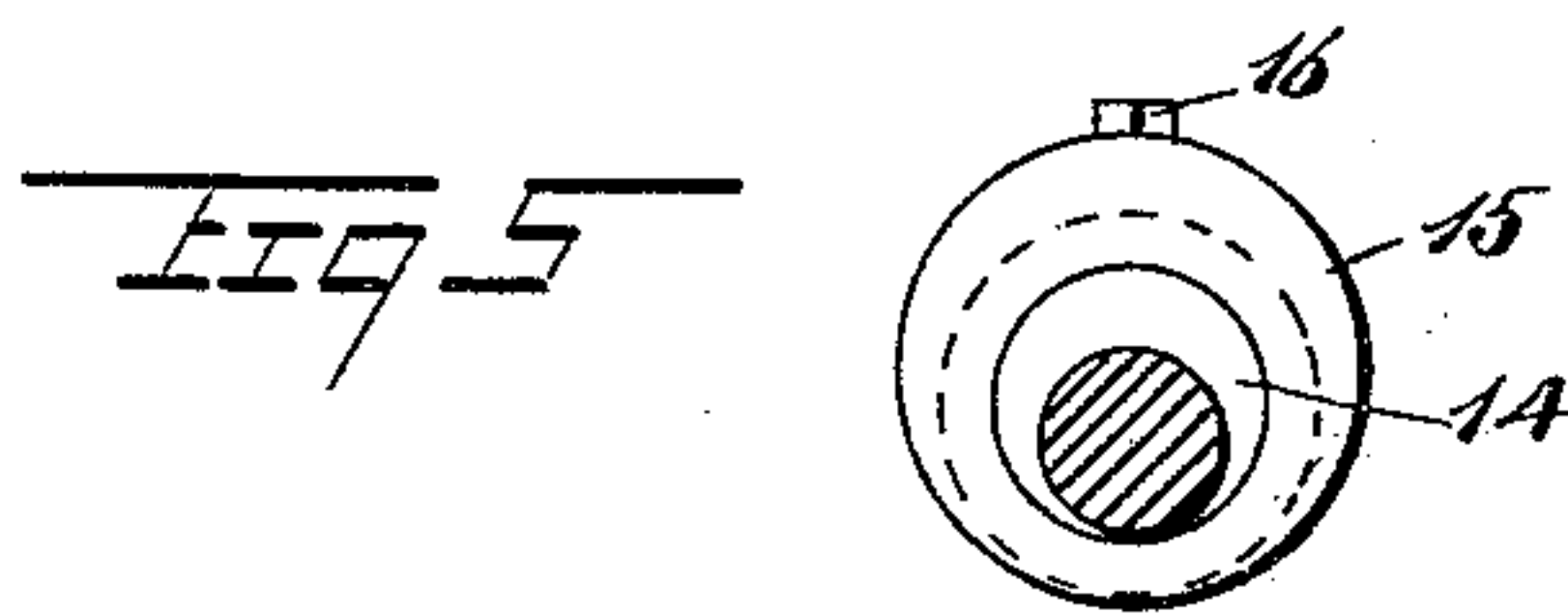
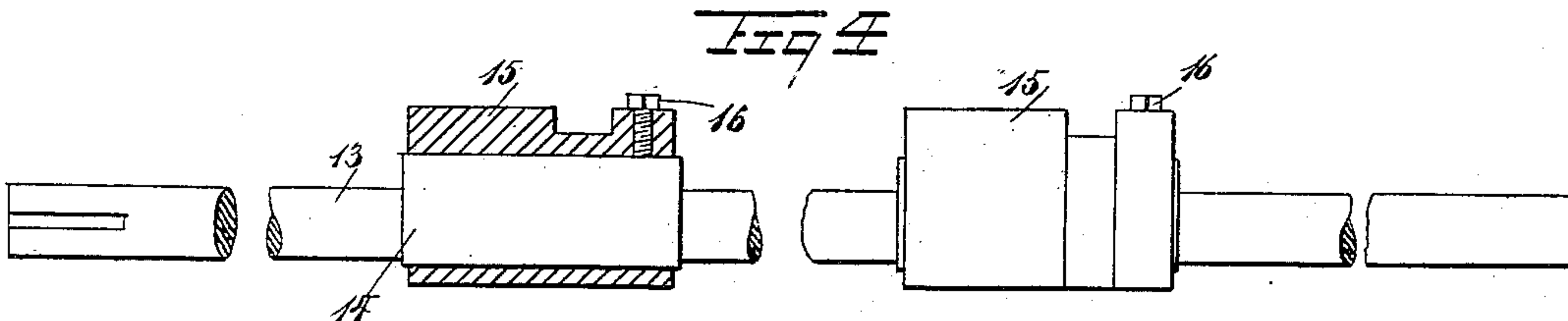
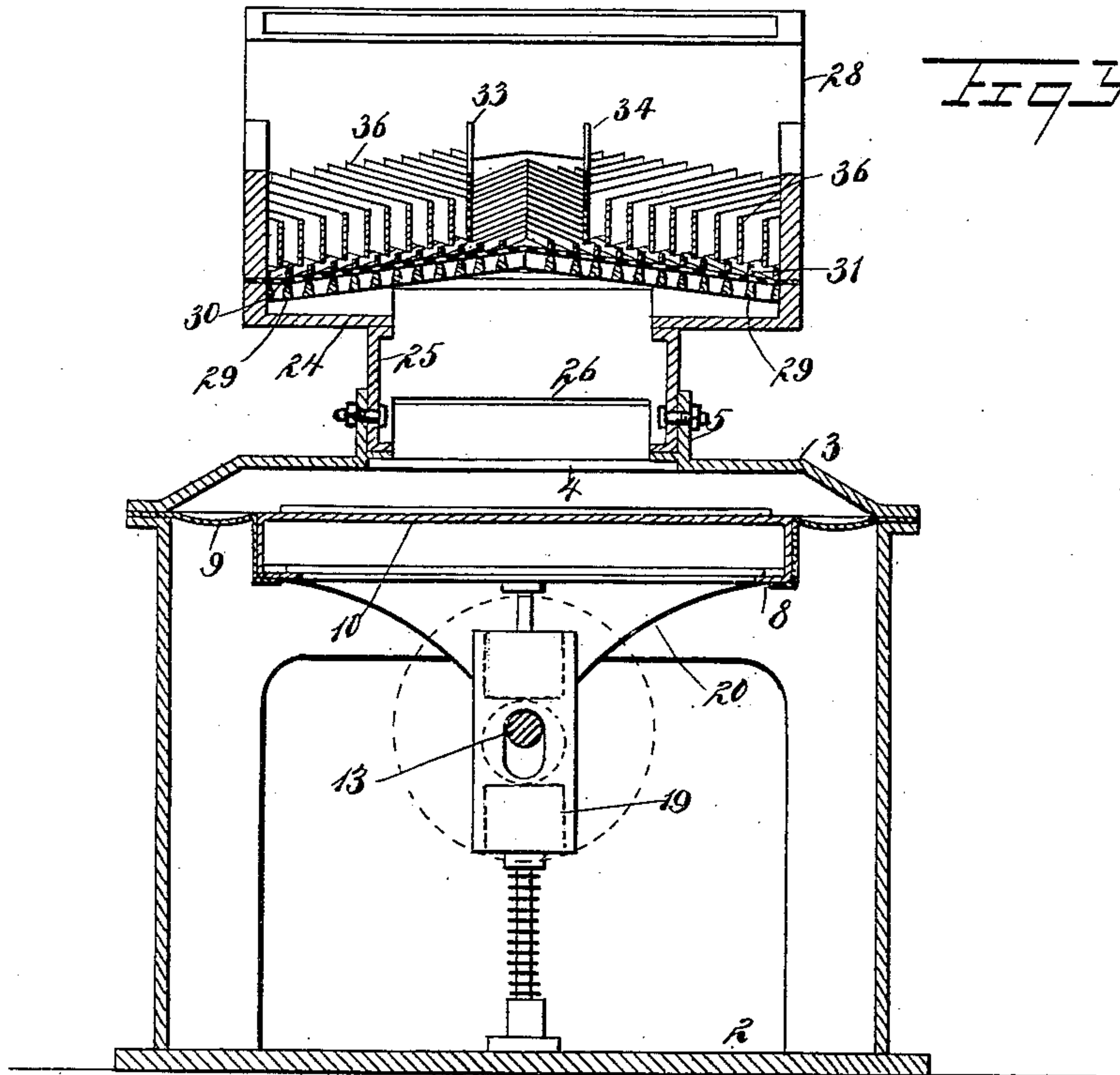
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WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM HOOPER, OF TICONDEROGA, NEW YORK, ASSIGNOR TO CHARLES H. UNVERZAGT, OF BALTIMORE, MARYLAND.

ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 633,456, dated September 19, 1899.

Application filed February 10, 1898. Serial No. 669,814. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HOOPER, of Ticonderoga, in the county of Essex and State of New York, have invented a new and Improved Ore-Separator, of which the following is a full, clear, and exact description.

This invention relates more particularly to machines for separating gold from placer gravels and sand; and the object is to provide a machine by means of which the gold may be rapidly separated from the sand or gravel without the use of water, as in the usual method, thus making the machine of especial advantage in mining districts where water cannot be obtained in sufficient quantities for a washing process.

A further object is to so construct the machine that the bed may be quickly adjusted to any desired angle.

I will describe an ore-separator embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a section on the line 1 1 in Fig. 2 of a separator embodying my invention. Fig. 2 is a top plan view. Fig. 3 is a section on the line 3 3 in Fig. 1. Fig. 4 is a partial elevation and partial section of a shaft and eccentrics thereon for operating an agitating device. Fig. 5 is an end view of one of the eccentrics, and Fig. 6 is a side elevation of a modified construction and arrangement of separator-bed.

The machine comprises a frame having the end pieces 1, a base 2, and a top plate 3. The frame and top plate may consist of any desired material. The top plate 3 is provided with an opening 4, and surrounding this opening is a frame 5, having longitudinally-curved flanges 6 at the inner sides of its side pieces and the transverse flanges 7 on the inner sides of the end pieces of the frame.

Arranged beneath the top plate 3 is a bellows consisting of a frame 8, having its sides and ends connected by flexible strips 9—such, for instance, as leather—to the main frame of the machine. As here shown, the edges of

the leather are extended between flanges at the top of the main frame and flanges on the top plate 3. These parts may be secured together by any suitable means—such, for instance, as by bolts. Supported on the bellows-frame 8 is a perforated plate 10, and on the upper side of this perforated plate and designed to control the passage of air through the openings is a series of butterfly or flap valves 11. The flap-valves may consist of flexible material—such, for instance, as leather—formed in strips and secured at their center by means of metal bars 12.

Having bearings through the end walls of the main frame is the bellows-operating shaft 13, to which rotary motion may be imparted by any desired means. Mounted on the shaft 13 are eccentrics, each consisting of an inner portion 14 eccentric with the shaft and an outer portion 15 on the portion 14 and eccentric thereto. This outer portion 15 may be adjusted rotatively with relation to the portion 14 and held as adjusted by a set-screw 16. This adjustment may be necessary to give a greater or less motion to the bellows, as the nature of the material operated upon may require. The eccentrics operate against blocks 17 18 in a boxing 19, having openings at its opposite sides, through which the shaft 13 passes. From the upper blocks 18 struts 20 extend to the frame 8 and are connected thereto. Stems 21 extend from the lower blocks 17 and are movable through sockets 22 on the base 2. Springs 23 are arranged between the upper ends of the sockets 22 and the base of the blocks 17. Obviously as the shaft 13 is rotated the eccentrics will cause the bellows to move up and down and the springs 23 will prevent unnecessary jar. During the downward movement of the bellows the valves 11 will be lifted by the air-pressure, so as to admit a quantity of air to the interior of the bellows, and of course upon an upward movement of the bellows such admitted air will be forced upward against the flexible bed of the separator to be hereinafter described.

While I have shown and described an eccentric mechanism for operating the bellows, it is obvious that other means may be em-

ployed therewith—such, for instance, as the intermittent injection of steam—and therefore I do not restrict my invention in this particular.

5 The separator proper comprises a casing 24, mounted on a rocker-bed 25, having an opening 26 for the passage of air and also having an opening 27, providing communication to the under side of the flexible bed to be described. This rocker is curved longitudinally on its under side to conform to the flanges 6 of the frame 5. Therefore the separator may be adjusted to a greater or less longitudinal pitch, as may be required, by simply moving the rocker and the parts supported thereby along the strips or flanges 6. Then the parts may be held as adjusted by any desired means, such, for instance, as clamping-bolts.

At the upper end of the casing 24 is a hopper 28, and arranged in the casing is a spider 29, which is elevated at its longitudinal center, so that its upper surface inclines downward to the side boards of the casing. The several bars forming the spider are arranged at an acute angle relatively to the length of the machine—that is, from the central portion the bars at each side are extended at a forward and lateral angle. The several bars, as plainly indicated in Fig. 3, are substantially triangular in cross-section, so that a comparatively narrow bearing edge is provided at the top, but yet the necessary strength will be secured. This spider 29 of course extends the full length of the casing 24, and stretched across the upper side of the spider is a bed 30 of flexible material—such, for instance, as a closely-woven fabric.

The edges of this flexible bed 30 are secured in a suitable manner to the casing 24. On the upper side of the bed 30 is a series of strips 31, preferably of a non-magnetic metal, such as brass. These strips 31 are arranged directly over the bars of the spider 29, and they extend at the same angle as said bars. The strips 31 at one side of the bed engage with the strips at the other side of the bed at the longitudinal center of the bed, as plainly indicated in Fig. 2. The greater number of the strips 31 terminate against the inner side of the side pieces comprising the casing 24. The lower series, however, of these strips have their ends connected to a stop or dam strip 32, extended across the forward end of the bed and having a height equal to that of the strips 31. These strips 31 are to provide the side walls of channels for receiving the gold as it is separated from the sand or similar material. This separated gold will gather in the channels near the outer ends of the strips.

Extended longitudinally of the bed and near the center thereof are plates 33 34. These plates lead from the hopper 28 to the outlet end of the machine, and they are supported a short distance above the strips 31, so that openings are provided for the discharge of refuse matter or tailings into the space be-

tween the plates 33 and 34, which form the side walls of a conduit for leading off such refuse or tailings and discharging the same upon an inclined chute 35 at the outlet end of the machine. Extended across the strips 31, between the plates 33 34 and the sides of the casing 24, are separator-strips 36. These strips are of metal—such, for instance, as brass—and are arranged at a reverse angle to the strips 31. These strips 36, as shown in Fig. 3, are considerably wider than the strips 31. By making the strips or plates 36 wide they serve to bank up the sand and prevent its passing too freely through the machine, or, in other words, they hold the sand until the gold is thoroughly separated therefrom. On the inclined chute 35 are two deflector-fingers 37 and 38. These deflector-fingers are pivoted to the chute at their lower ends, so that their upper ends may be adjusted to a greater or less distance apart, as will be found necessary in the operation of the separator.

The operation is as follows: The gold containing sand or gravel is to be placed in the hopper 28, and then as the shaft 13 is put in motion the air-pressure caused by the bellows will impart a pulsating motion to the flexible bed 30. This pulsating motion will keep the sand and gold in constant agitation while moving down the inclined bed. The heavier particles—that is, the gold—will be caught by the metal strips 31 and will be retained in the channels or pockets formed thereby. Of course this gold will gravitate toward the sides of the bed. The sand or tailings, however, will be carried along the upper strips 36 and will be forced into the discharge-space between the plates 33 and 34 and subsequently discharged over the chute 35 between the fingers 37 and 38. Should any portion of the gold be discharged over the dam 32, it will move down the inclined chute into receptacles placed to receive it, and during such movement down the chute the gold will be prevented from mixing with the discharging sand or tailings by means of the deflector-fingers.

In Fig. 6 I have shown that a series of separator-beds may be placed one above another and all operated by a single bellows or other agitating device. As here shown, a pipe 39 extends upward from the air-chamber of the lower separators and has branches 40 communicating with the air-chambers of the upper separators. By inclining the bed from the center laterally in both directions a large separating area is produced, and therefore a large quantity of material may be run through the separator in a comparatively short period of time, and it is found that the constant agitation of the flexible bed thoroughly and effectually separates the gold from the sand or gravel. Further, it is obvious that the horizontal pitch of the separator may be adjusted without stopping the operation of the machine. The central channel or space between

the plates 33 and 34 enables a double discharge of the refuse, thus greatly increasing the output of the machine.

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

1. An apparatus for separating precious metals from sand or the like, comprising a frame or casing arranged at a longitudinal incline, a bed of flexible material secured in the frame or casing, and inclined from its longitudinal center downward to the sides, a series of separating-strips on the upper surface of the bed and arranged at an equal angle from the longitudinal center of the bed to the side edges, the said strips forming channels adapted to receive the heavier particles and direct them to the outer ends of the strips, plates extending longitudinally of the bed at each side of its longitudinal center and above the said strips and forming a central conduit, and a series of separator-strips of greater width than the first series and located above the same and at an opposite angle thereto, the said strips being arranged between the longitudinally-extending plates and the frame of the machine, and serving to direct the sand or tailings from each side of the bed to the central conduit, substantially as specified.

2. A separator comprising a frame or casing, a spider arranged in said frame or casing, the upper surface of the said spider inclining downward from the longitudinal center to the side walls of the casing, the corresponding bars of each side of the spider extending inward from the sides of the spider and meeting at the longitudinal center thereof at an acute angle, a bed of flexible material secured on said spider, strips of metal or the like on the upper side of the bed above the bars of the spider and arranged at the same angle therewith, plates extending longitudinally of the bed, at each side of its longitudinal center and above the said strips forming a central conduit, separator-strips extending from the outer sides of each of said longitudinally-extending plates to the frame or casing and at an opposite angle to the first-named strips, and means for agitating the flexible bed, substantially as specified.

3. A separator comprising a frame or casing, a bed of flexible material secured in said frame or casing and inclined from its longitudinal center to each side of the casing, strips of metal or the like on the upper side of the bed, the said strips being extended from the center of the bed laterally at an acute angle, plates extending longitudinally of the bed near the upper part of the inclined surface thereof and at each side of its longitudinal center, forming a central conduit, separator-strips on the first-mentioned strips and arranged at a reverse angle thereto, the said strips extending from the outer side of each longitudinally-extending plate to the frame or casing, and a dam extending across the

frame or casing at its outlet end, the said dam being connected to the lower series of the first-named strips and of equal height therewith, means for adjusting the longitudinal incline of the separator, and means for agitating the flexible bed, substantially as specified.

4. A separator, comprising a frame or casing, a hopper at the feed end of the separator, a chute at the outlet end, a flexible bed in said frame or casing, the said flexible bed being inclined from its longitudinal center downward to the sides, a series of separator-strips arranged on the bed at an acute angle, the spaces or channels between the strips forming pockets in which the heavier particles accumulate and by which they are conducted to the sides of the frame or casing, plates located at each side of the longitudinal center of the bed above the said strips and extending from the hopper to the outlet end of the machine, a second series of strips of greater width than the first-mentioned strips and extending from the outer sides of the longitudinal strips at a reverse angle to the first series of strips and serving to conduct the refuse and lighter materials from each side of the separator toward the said longitudinal plates, the space between the said longitudinally-extending plates forming a central conduit into which the said refuse is forced, and deflector-fingers adjustable in the chute and located at each side of the said conduit, substantially as specified.

5. A separator comprising a frame or casing, a bed of flexible material in said frame or casing, and inclined from its longitudinal center laterally in both directions, separating devices on said bed, a rocker-frame secured to the separator frame or casing, the said rocker-frame being curved longitudinally on its under side and having an opening through its bottom, and also communicating with the separator-casing under its bed, a main frame, a top plate on said main frame having an opening, a boxing or frame surrounding said opening and having longitudinally-curved flanges or plates at the inner sides of the side pieces, the said rocker-frame fitting within the boxing, and the flanges of the boxing conforming to the curved under side of the rocker-frame, and forming a bed for the same on which the rocker-frame and the parts supported thereby may be readily moved to adjust the separator-bed as to its longitudinal pitch or incline, bolts for holding the rocker-frame in the adjusted position on its bed, a bellows underneath the top plate, and means for operating said bellows to force air against the flexible bed, substantially as specified.

6. A separator having a flexible bed, a bellows for forcing air against said flexible bed for agitating the same, a shaft mounted to turn in the frame of the machine, boxings having openings at opposite sides through which the shaft passes, a spring-pressed

block fitting in the lower portion of each of said boxings, a block in the upper portion of each boxing, struts connecting the said upper blocks with the bellows-frame, and eccentrics mounted on the said shaft and operating against the said blocks, substantially as specified.

7. A separator having a flexible bed, a bellows for forcing air against said flexible bed for agitating the same, a shaft mounted to turn in the frame of the machine, boxings having openings at opposite sides through which the said shaft passes, a block fitted to slide in the upper part of each boxing and connected with the bellows-frame, a block fitted to slide in the lower portion of each boxing, stems extending from the lower blocks and movable in sockets on the base of the frame, springs pressing on the said lower blocks, and eccentrics on the said shaft operating against the said blocks, substantially as set forth.

8. A separator comprising a frame or casing, a bed of flexible material in said frame or casing, separating devices on said bed, a

rocker-frame upon which the frame or casing is mounted, the said rocker-frame being curved longitudinally on its under side and having an opening through its bottom, and also communicating with the separator-casing under its bed, a main frame, a top plate on said main frame having an opening, a boxing or frame surrounding said opening and having longitudinally-curved flanges or plates at its sides conforming to the curved under side of the rocker-frame and forming a bed for the same on which the rocker-frame and the parts supported thereby may be readily moved to adjust the separator-bed as to its longitudinal pitch or incline, bolts for holding the rocker-frame in the adjusted position on its bed and means for agitating the separating-bed, substantially as specified.

Dated at Ticonderoga, Essex county, New York, February 5, 1898.

WILLIAM HOOPER.

Witnesses:

GRACE G. QUINN,
ROBERT BIBBEY.