

No. 776,662.

PATENTED DEC. 6, 1904.

H. E. HORN.
CONCENTRATOR.

APPLICATION FILED DEC. 4, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

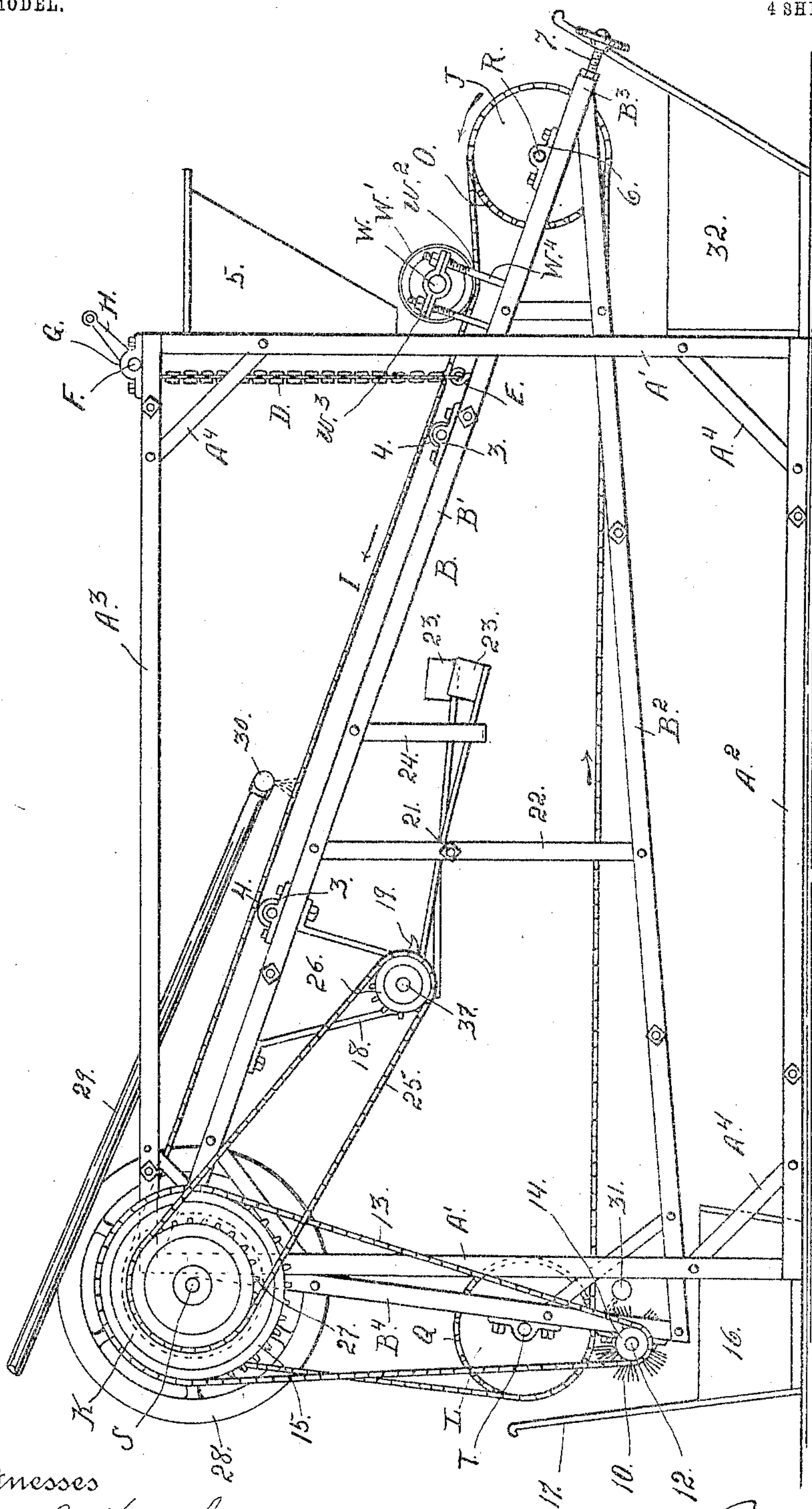


Fig. 1.

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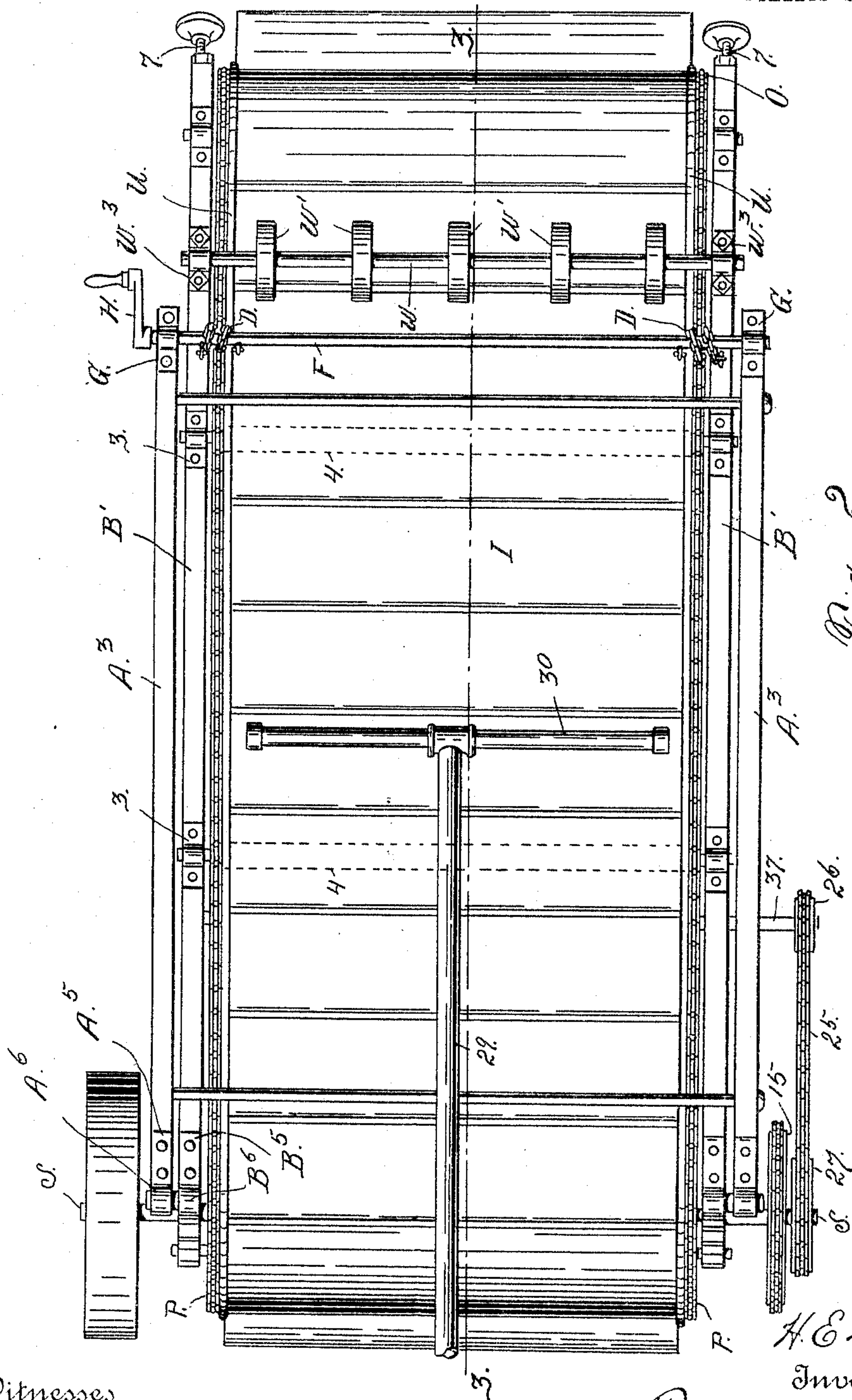
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

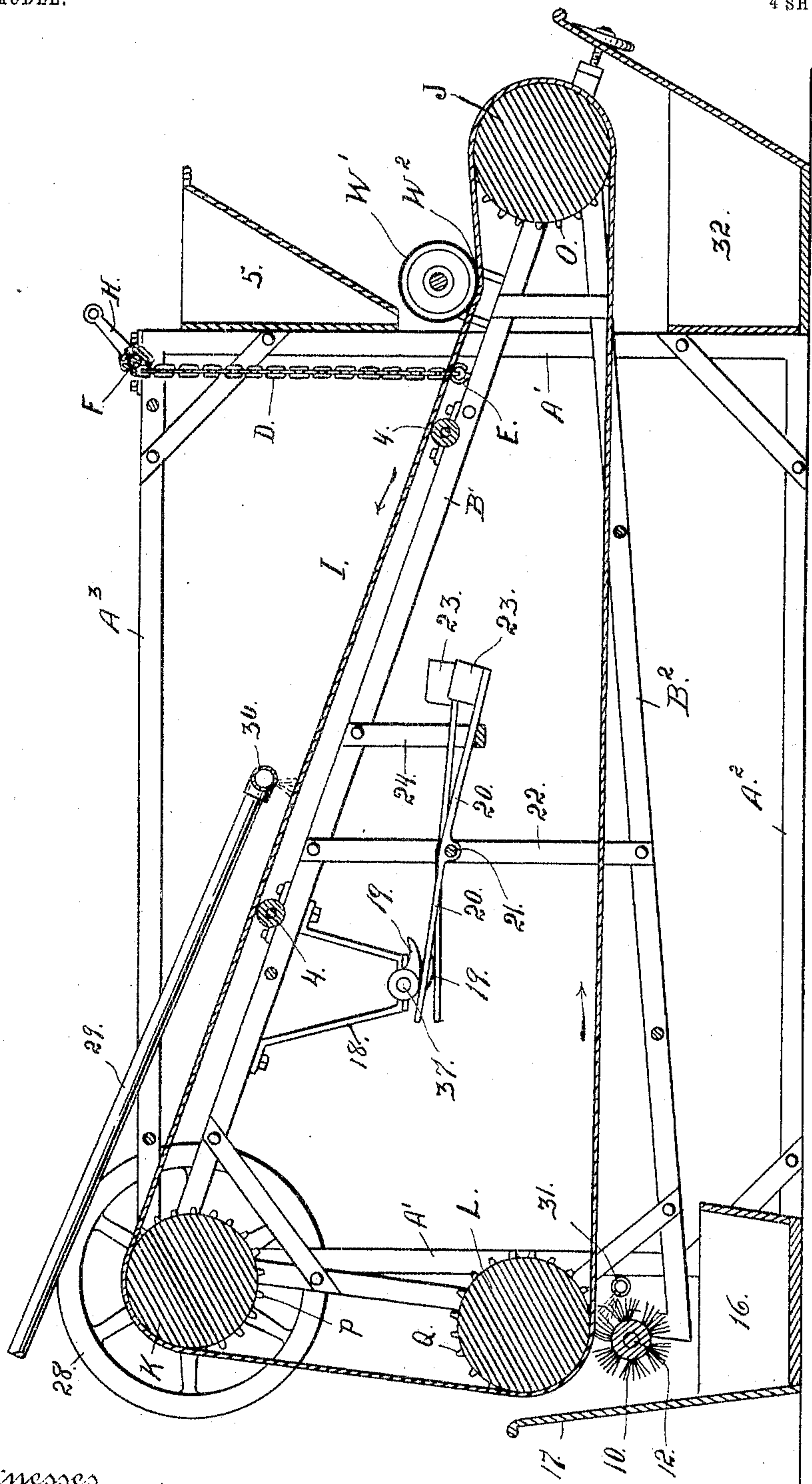


Fig. 3

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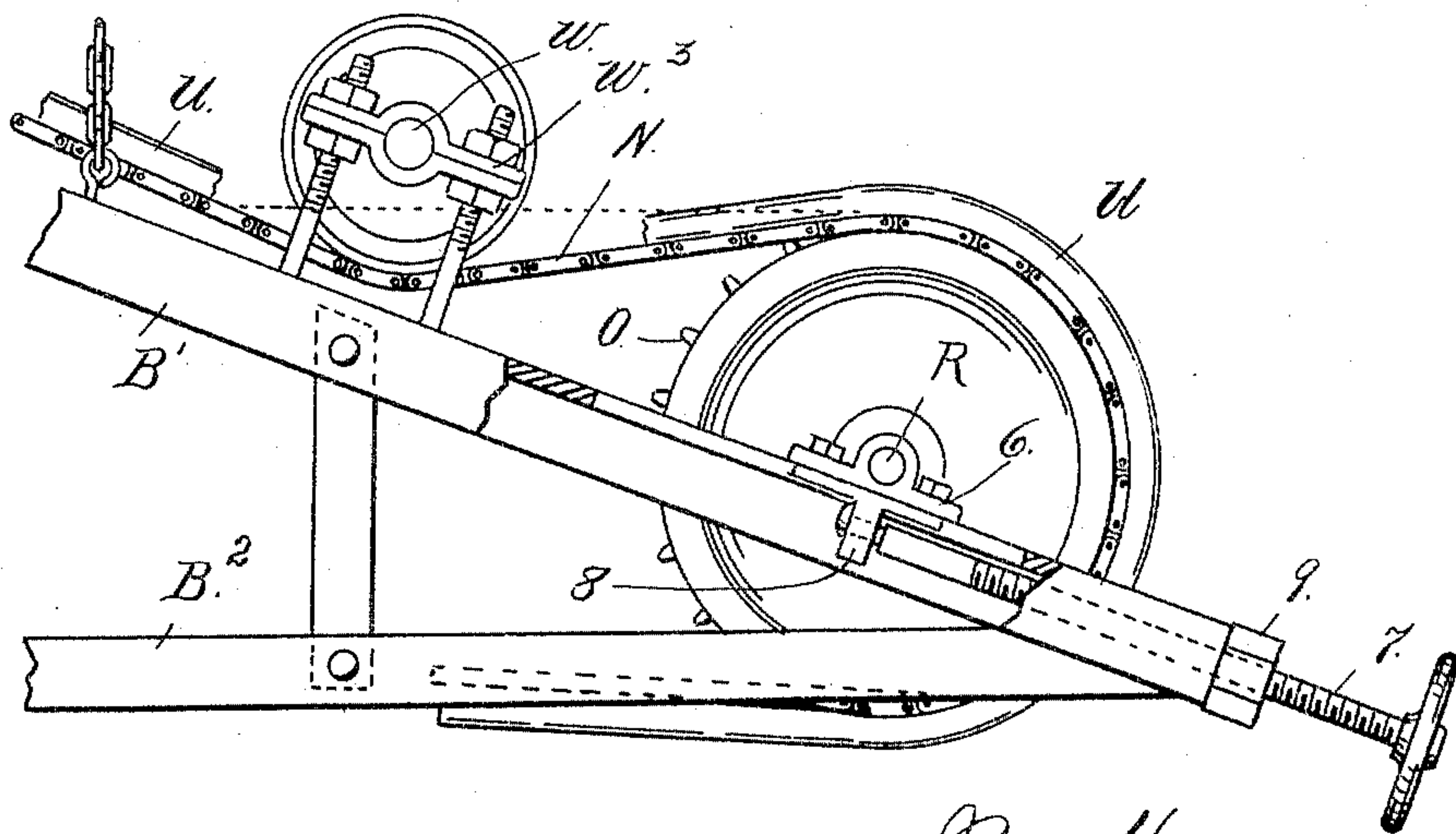


Fig. 4.

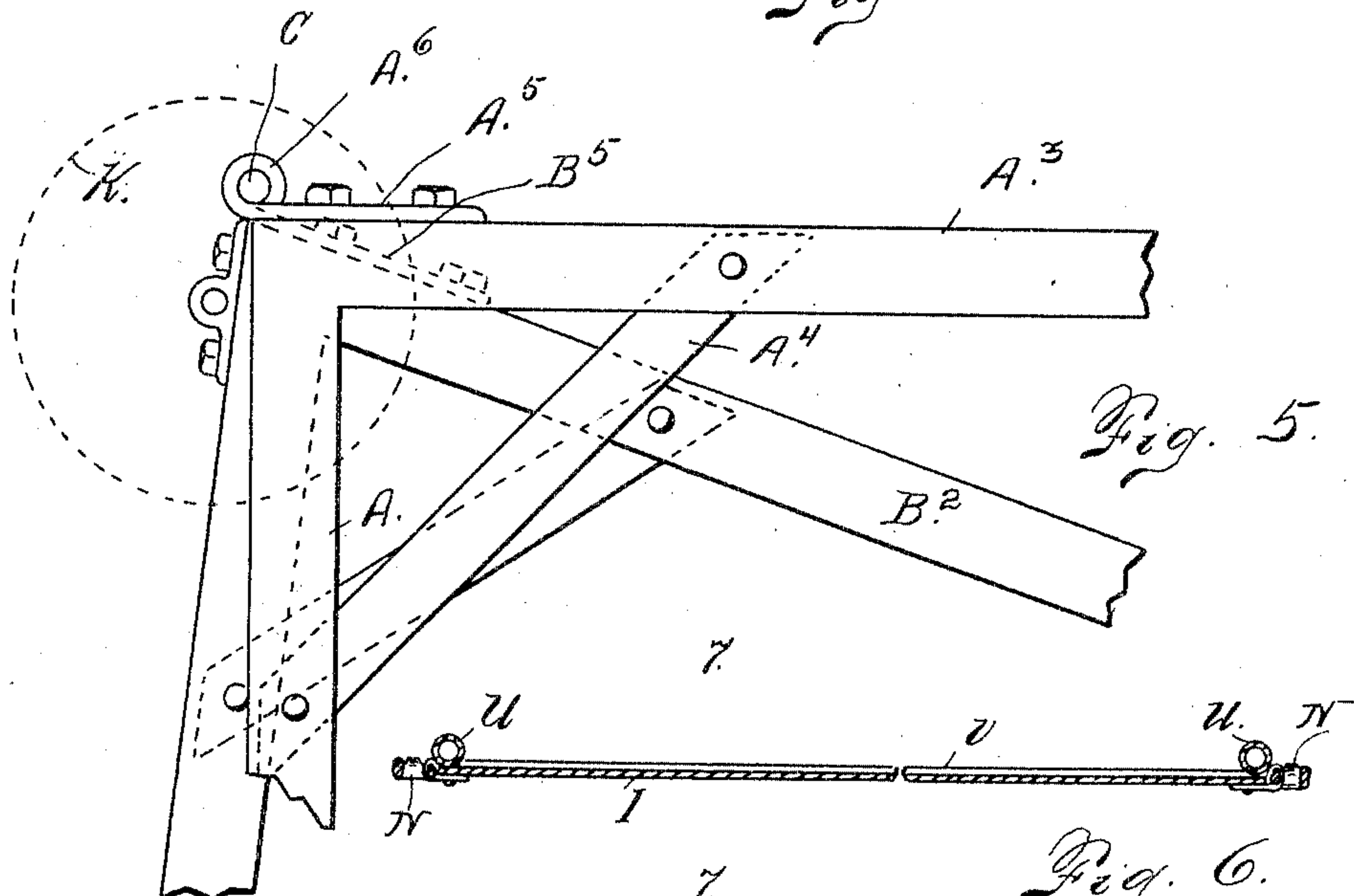


Fig. 5.

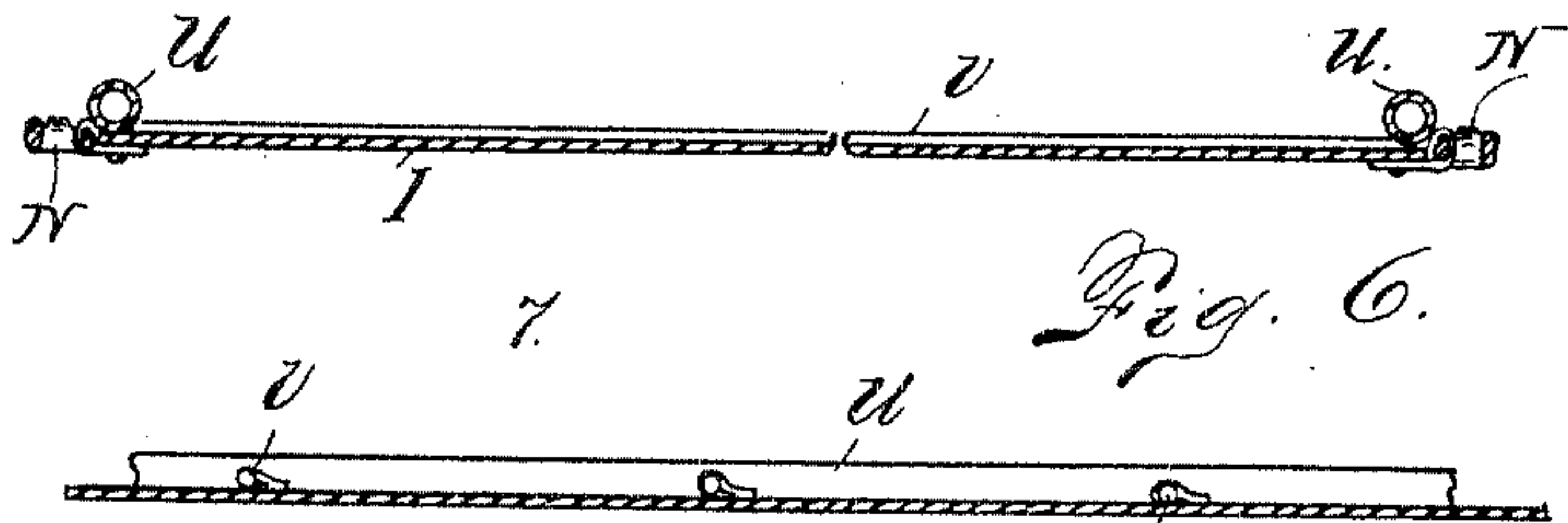


Fig. 6.

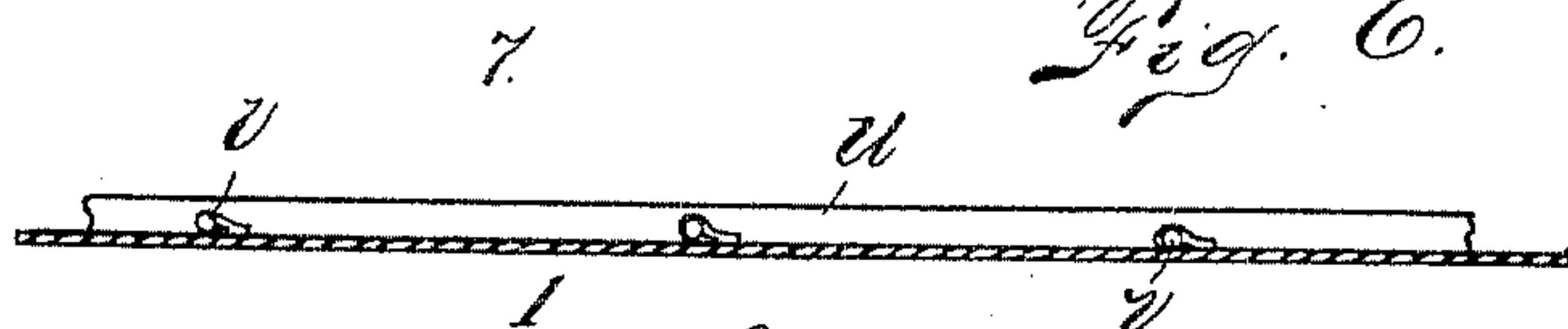


Fig. 7.

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UNITED STATES PATENT OFFICE.

HENRY E. HORN, OF DENVER, COLORADO, ASSIGNOR TO THE BRUSH
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CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 776,662, dated December 6, 1904.

Application filed December 4, 1903. Serial No. 183,810. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. HORN, a citizen of the United States of America, residing in the city and county of Denver, State of Colorado, have invented certain new and useful Improvements in Concentrators; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in concentrators, and, as the title indicates, is adapted for use in saving the metallic values contained in pulverized ore or placer material, as may be desired, my object being to provide an apparatus of this class which shall be simple in construction, economical in cost, reliable, durable, and efficient in use; and to these ends the invention consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of my improved machine. Fig. 2 is a top or plan view of the same. Fig. 3 is a section taken on the line 3-3, Fig. 2. Fig. 4 is an enlarged fragmentary view, partly in section, illustrating a portion of the rear extremity of the machine. Fig. 5 is a fragmentary view of the upper left-hand corner of the machine, referring to Figs. 1 and 3, illustrating the manner of connecting the movable frame with the stationary frame, the wheels being omitted to facilitate clearness of illustration. Fig. 6 is a cross-section taken through the concentrating belt or apron. Fig. 7 is a fragmentary longitudinal section showing the apron provided with transverse riffles.

The same reference characters indicate the same parts in all the views.

Let A designate in its entirety a stationary frame composed of upright front and rear end bars A', bottom side bars A², and top side bars A³. This frame, as shown in the draw-

ings, is of rectangular shape in side and plan view and is provided at its corners with suitable braces A⁴. Pivotaly mounted at the upper left-hand corner of the stationary frame, referring to Figs. 1 and 3, is a movable frame B, which is triangular in side view. This frame is composed of top bars B', these bars being, as shown in the drawings, downwardly inclined from the pivotal point of the frame, bottom side bars B², which are connected with the bars B' at their rear extremities, as shown at B³, and upwardly-projecting bars B⁴, which connect the side bars B' and B² at their forward extremities or at the head of the machine. Mounted on the upper left-hand corner of each side bar A³ (see Figs. 2 and 5) is a plate A⁵, which is bolted to each bar A³, its forward extremity being formed into an eye A⁶. Also mounted upon each side bar B² of the pivoted frame is a similar plate B⁵, bolted to each frame-bar and terminating at its forward extremity in an eye B⁶. The eyes of each pair of plates A⁵ and B⁵ of the two frames are located to register, and a pin C is passed through these eyes, whereby the frame is pivotaly mounted upon the stationary frame, as heretofore explained. This explains the connection of the two frames at the head of the machine. At the rear extremity of the machine the movable frame is suspended from the stationary frame by means of chains D, which are connected at their lower extremities with screw-eyes E, made fast in the side bars B', while their upper extremities are connected with a revoluble shaft or roller F, mounted in journal-boxes G and provided at one extremity with a hand-crank H, whereby the tail or rear extremity of the pivoted concentrating-frame may be raised or lowered as desired to give any necessary or required inclination to an endless traveling belt or apron I. This apron passes around drums J, K, and L, journaled in the movable frame approximately at the three angles of its triangular sides. Attention, however, is called to the fact that the axes of the drums are not located exactly at the angles of the triangular frame. The drum J is located at the rear extremity of the machine, the drum K at the upper left-hand cor-

ner, referring to Figs. 1 and 3, and the drum L at the lower left-hand corner of the machine, referring to the same figures. This belt or apron I may be composed of canvas or any other suitable material. Its opposite side edges are provided with sprocket-chains N, which engage sprocket-wheels O, P, and Q, connected with the shafts R, S, and T, upon which the respective drums are mounted.

Inside of these chains and at the outer edges of the belt or apron the latter is provided with suitable flexible flanges U, which, as shown in the drawings, are composed of hose-pipe, whereby the material on the apron, which is in the form of pulp, is prevented from flowing over the sides thereof. This apron may be riffled or smooth, as may be desired. In Fig. 7 the apron is shown provided with transverse riffles V, which, as shown in the drawings, are formed of pieces of rope covered with canvas and made fast to the outer surface of the apron. (See Fig. 7.) Of course the riffles V, as well as the side flanges U, may be formed or composed of any suitable material. Vertically adjustable on the frame-bars B' a short distance forward of the drum J is a shaft W, upon which are mounted and made fast a number of disks or wheels W', whose peripheries are preferably covered with leather. These wheels are made to engage the belt or apron O, whereby a depression is formed therein, as shown at W², at the point where the material to be treated is fed to the apron. As shown in the drawings, the stationary frame is provided with a feed-hopper 5, so located that its discharge-mouth is adapted to deliver the material to the apron I just forward of the wheels W'. The boxes W³, in which the shaft W is journaled, are vertically adjustable on bolts W⁴, whereby the degree of depression in the belt I given by the wheels W' may be regulated as desired. The boxes 6, in which the shaft R is journaled, are movable on the frame B through the instrumentality of screw-shafts 7, journaled in depending lugs 8 of the boxes 6 and threaded in nuts 9, mounted on the rear extremities of the side bars B', whereby the shaft R, together with the drum J, may be shifted to harmonize with the position of the shaft W. The boxes 6 are slidably mounted upon the side bars B' in the movable frame. Located below the drum L and outside of the belt B is a brush 10, mounted on a shaft 12, journaled in suitable boxes secured to the lower left-hand corner of the movable frame, referring to Figs. 1 and 3 of the drawings. This brush is rotated through the instrumentality of a chain 13, connecting a sprocket-wheel 14, fast on the shaft 12, with a sprocket-wheel 15, fast on the drum-shaft S. The function of this rotary brush is to remove the concentrates or values caught by the concentrating belt or apron. These concentrates when removed by the brush, as aforesaid, fall into a receptacle 16, mounted on

the stationary frame. This receptacle 16 is provided at its forward extremity with an upwardly-projecting part 17, adapted to catch any material which otherwise might be thrown forwardly by the centrifugal force, thus preventing any loss of values as the concentrates are removed from the apron.

A shaft 37 is journaled in depending brackets 18, secured to the bars B' of the movable frame. Upon this shaft are made fast cams 19, adapted to act on two levers 20, which are fulcrumed at 21 upon an upright part 22, mounted on the movable frame. At the extremities of these levers remote from the cams they are provided with weights 23. These weighted extremities of the levers are located above the transverse part of a depending U-shaped support 24, also mounted on the movable frame. During the rotary action of the shaft 17 the cams are made to act on the weighted levers 20, whereby their weighted extremities are alternately lifted and released. As the cams are disengaged from these levers their weighted extremities fall to engagement with the transverse part of the support 24, whereby the vibration or jarring action is imparted to the movable frame. This vibratory motion is calculated to facilitate the separation of the values from the gangue during the operation of the machine. The rotary movement is imparted to the cam-shaft 37 by means of a chain 25, connecting a sprocket 26, fast on the shaft 37, with a sprocket 27, fast on the drum-shaft S. Motion is imparted to all parts of the machine from the shaft S, which is provided at one extremity with a pulley 28, which may be connected with any suitable motor for the purpose stated. When the machine is in operation, the necessary pure water for the treatment of the material upon the apron I is supplied by means of a conduit 29, having a transverse perforated part 30, connected with its lower extremity and mounted a suitable distance above the endless traveling concentrating belt or apron. Also during the operation of the machine water is delivered to the belt or apron I at its lower left-hand corner, referring to Figs. 1 and 3, or to the brush 10 from a perforated pipe 31, mounted in suitable proximity to the brush. The object of this water-supply is to facilitate the removal of the values or concentrates from the belt or apron.

When the machine is in use, the material is delivered in the form of pulp from a feed-hopper 5 to the belt or apron I just forward of the wheels W' or in the immediate proximity to the apron-depression W². The apron is traveling in the direction of the arrows in Figs. 1 and 2 of the drawings. Hence the material so delivered has a tendency to move upwardly on the apron from the feed-point, and the water from the perforated pipe 30, acting thereon, carries the gangue or lighter material downwardly thereon over the drum J and into

the tailings-receptacle 32, while the values, being the heavier portion of the material, is carried upwardly on the apron and thence downwardly to the brush 12, where it is removed from the apron and falls into the trough or receptacle 16, as heretofore explained. The vibratory action of the movable concentrating-frame incident to the dropping of the weighted levers on the support 24 facilitates the separation of the metallic values from the gangue.

The bars B' of the concentrating-frame are provided with boxes 3, in which are journaled rollers 4, which engage the under surface of the belt or apron I and form a suitable support for the upper portion of the said belt or apron during the operation of the machine.

Having thus described my invention, what I claim is—

1. A concentrator provided with an endless traveling belt, in combination with means for forming a transverse valley in the upper portion of the belt, comprising a number of transversely-separated wheels whose peripheries engage the upper surface of the belt.

2. A concentrator provided with an endless traveling belt or apron, and adjustable means engaging the belt or apron from above to form a transverse valley or depression therein, comprising a shaft, vertically-adjustable boxes in which the latter is journaled, and a number of separated wheels mounted on the shaft and engaging the upper part of the belt from above between the head and tail extremities of the belt, the latter being mounted to give its upper portion a downward inclination from the head of the machine and actuated to cause it to travel upwardly.

3. In a concentrator, the combination with a suitable frame, of an endless traveling belt, drums mounted on the frame and engaged by the belt, and means mounted on the frame and acting on the belt or apron from above to form a valley therein extending parallel with the axis of the drums, comprising a number of transversely-separated rotary members.

4. In a concentrator, the combination with a suitable frame, of drums journaled thereon, an endless traveling belt or apron mounted on the drums, and a rotary device mounted on the frame and acting on the apron from above to form a transverse valley or depression therein, comprising a shaft and separated wheels mounted thereon.

5. The combination with a suitable frame, of an endless traveling concentrator belt or apron mounted thereon, means for actuating the said apron, and means for forming a transverse valley or depression in the upper portion of the apron, comprising a number of separated rotary members, substantially as described.

6. The combination with a stationary frame, of a concentrator-frame movably suspended on the stationary frame, drums journaled on

the movable frame, an endless concentrator belt or apron engaging the said drums, and a rotary device adjustably mounted on the movable frame and engaging the concentrating belt or apron from above to form an abnormal transverse valley or depression in the apron and maintain the same during the travel of the latter, comprising a number of transversely-separated rotary wheels.

7. The combination with a suitable stationary frame, of a concentrator-frame triangular in side view and pivotally mounted at its uppermost angle at the head of the machine on the stationary frame, flexible means connected with the movable frame near its opposite extremity and attached to the stationary frame above, suitable means for imparting a vibratory movement to the movable frame, drums mounted approximately at the respective angles of the concentrator-frame, an endless traveling belt or apron mounted on said drums, the upper portion of the belt traveling upwardly from the tail toward the pivoted corner at the head of the machine when the latter is in operation, means for forming a transverse valley in the upper part of the belt comprising a number of transversely-separated rotary members, and means for delivering the material to be treated as well as wash-water to the belt above the said valley.

8. The combination with a suitable stationary frame, of a concentrator-frame triangular in side elevation, one angle being considerably elevated at the head of the machine above the other two angles, the said concentrator-frame being pivotally mounted on the stationary frame at the uppermost angle of the concentrator-frame, flexible means for suspending the concentrator-frame at the opposite extremity of the stationary frame, means mounted on the movable frame for imparting a vibratory movement to the latter, drums mounted on the movable frame approximately at its respective angles, an endless traveling concentrator belt or apron engaging the drums, and rotary means comprising a number of transversely-separated members engaging the upper portion of the concentrator belt or apron from above to form a transverse valley or depression therein.

9. The combination with a stationary frame, of a movable frame pivotally connected with one extremity of the stationary frame, flexible means connected with the movable frame near the opposite extremity of the stationary frame, a shaft or roller journaled in the stationary frame and connected with the flexible suspension means whereby the position of the stationary frame may be adjusted at will, drums mounted on the stationary frame, an endless traveling belt or apron engaging the drums, and suitable means mounted on the movable frame and engaging the upper portion of the concentrator belt or apron from above to form a transverse valley or depression

sion comprising a number of transversely-separated rotary members, substantially as described.

10. The combination with a suitable frames
5 and drums journaled thereon, of an endless, traveling belt or apron mounted on the drums, means adjustably mounted on the stationary frame and engaging the upper portion of the concentrating belt or apron from above to
10 form a transverse valley or depression therein comprising a number of transversely-separated rotary members, the journal-boxes of one pair of drums being slidably mounted on the movable frame, and means for shifting
15 the said slidable journal-boxes, to compensate for the change in the depth of the valley or depression in the concentrator belt or apron, incident to the adjustment of the means acting on the said apron, whereby the latter may
20 be maintained at the proper tension at all times.

11. The combination with a suitable stationary frame, of a concentrator-frame pivotally connected with the stationary frame at one
25 extremity, flexible means suspending the concentrator-frame from the stationary at a point remote from the pivot, drums journaled in the concentrator-frame, an endless traveling belt or apron mounted on the said drums, the latter
30 being arranged to give the upper portion of the apron an upward inclination from the tail toward the head of the machine, means comprising a number of transversely-separated rotary members engaging the upper portion of the
35 belt and forming a transverse valley therein, and means for delivering the material to be treated as well as wash-water to the belt above the said valley, means mounted on the concentrator-frame for imparting a jarring or
40 vibratory movement thereto, and a brush also mounted on the concentrator-frame and engaging the outer surface of the belt or apron to remove the concentrates caught thereby.

12. The combination with a suitable stationary frame, of a concentrator-frame suspended
45 on the stationary frame, drums mounted on

the concentrator-frame, an endless traveling belt or apron engaging said drums, the latter being arranged to cause the upper part of the belt to have a downward inclination from the
50 head to the tail of the machine, means mounted on the concentrator-frame and engaging the belt or apron from above to form a transverse valley or depression in the upper portion of the apron near its rear and lower
55 extremity comprising a number of transversely-separated rotary members, and suitable means mounted between the said valley or depression and the head of the machine for discharging wash-water upon the apron. 60

13. The combination with a suitable stationary frame, of a frame pivotally mounted at one extremity of the stationary frame, flexible means for suspending the opposite extremity
65 of the concentrator-frame from the stationary frame, the upper portion of the concentrator-frame being downwardly inclined from the head of the machine, the suspension means being adjustable whereby its inclination may
70 be regulated at will, drums mounted on the concentrator-frame, an endless traveling belt or apron engaging said drums, a number of transversely-separated wheels mounted to rotate and engage the upper part of the belt or
75 apron from above whereby a transverse valley is formed therein, an outer shaft journaled in the concentrator-frame, suitable connections for imparting movement to the endless traveling belt or apron from the said shaft, means
80 actuated from the said shaft and mounted on the concentrator-frame for imparting a vibratory or jarring movement thereto, and means mounted on the concentrator-frame and also actuated from the said shaft for removing the concentrates from the belt or apron. 85

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

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Witnesses:

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A. J. O'BRIEN.