(No Model.)

3 Sheets—Sheet 1.

L. R. TULLOCH.

ORE CONCENTRATOR.

No. 583,519. Patented June 1, 1897.

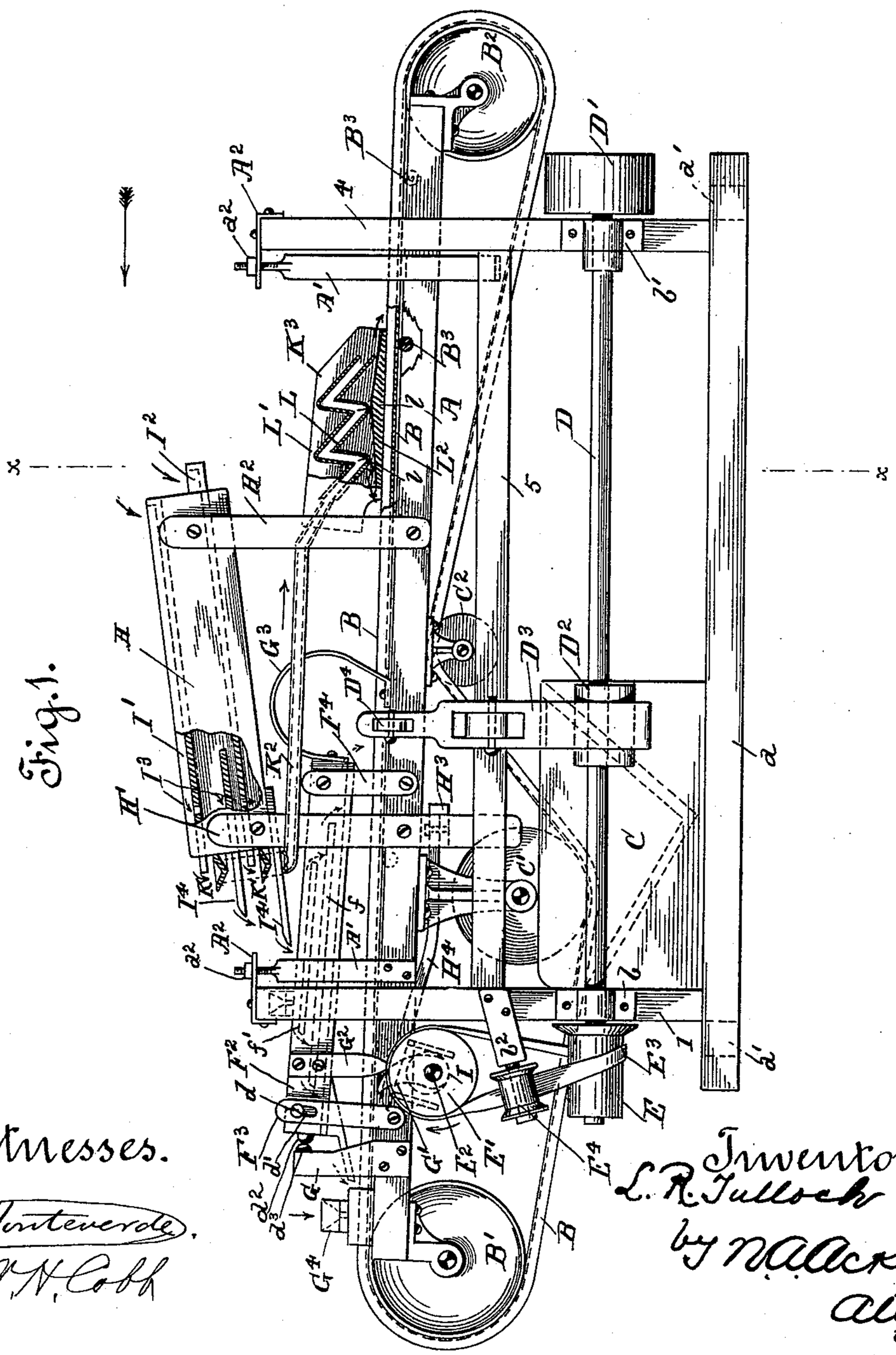

Fig. 1.

Witnesses.

F. Hunteverde.

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Inventor.

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by N. A. Acker

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(No Model.) 3 Sheets—Sheet 2.

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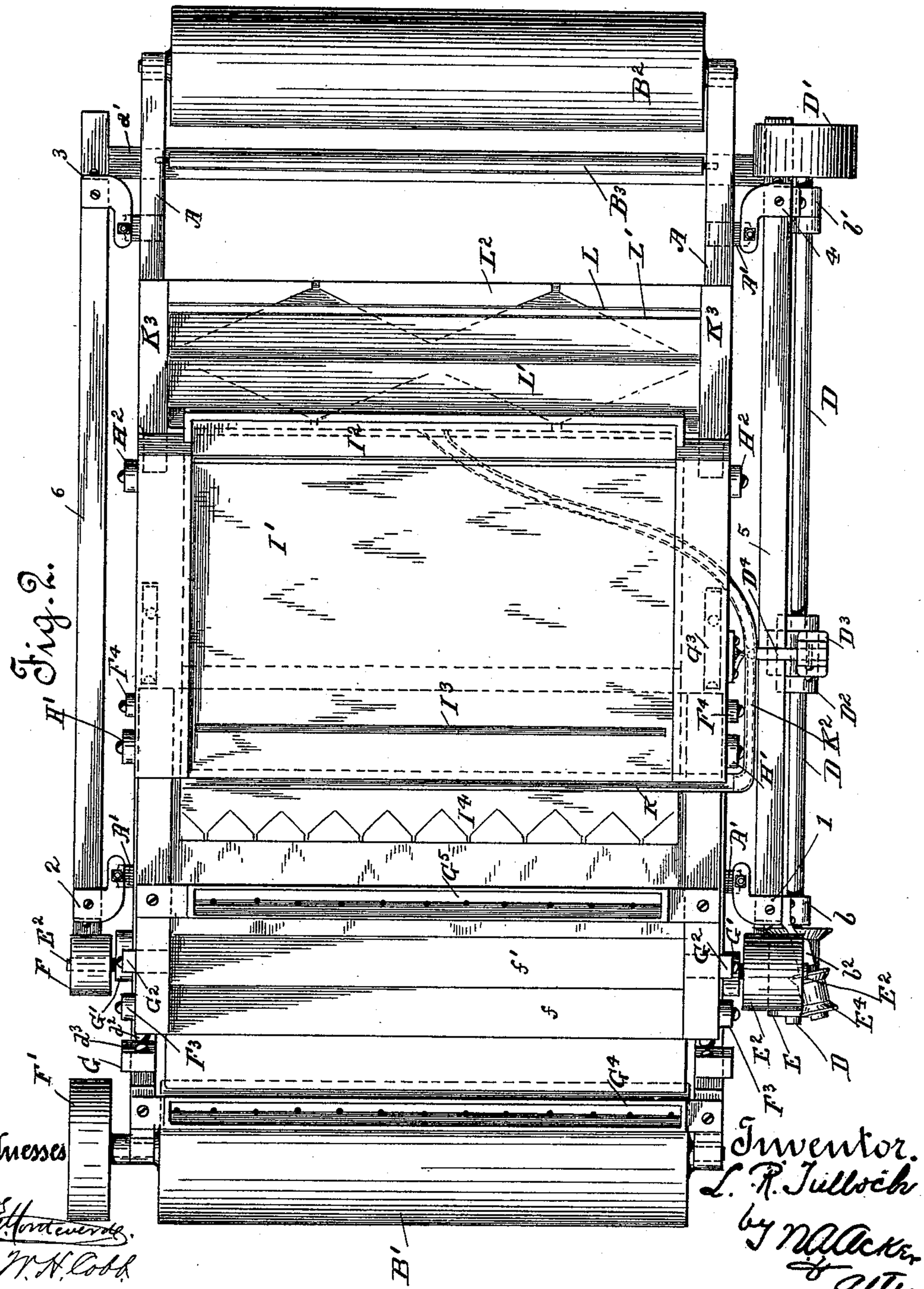
Fig. 2.



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L. R. TULLOCH.

ORE CONCENTRATOR.

No. 583,519. Patented June 1, 1897.

Fig. 3.

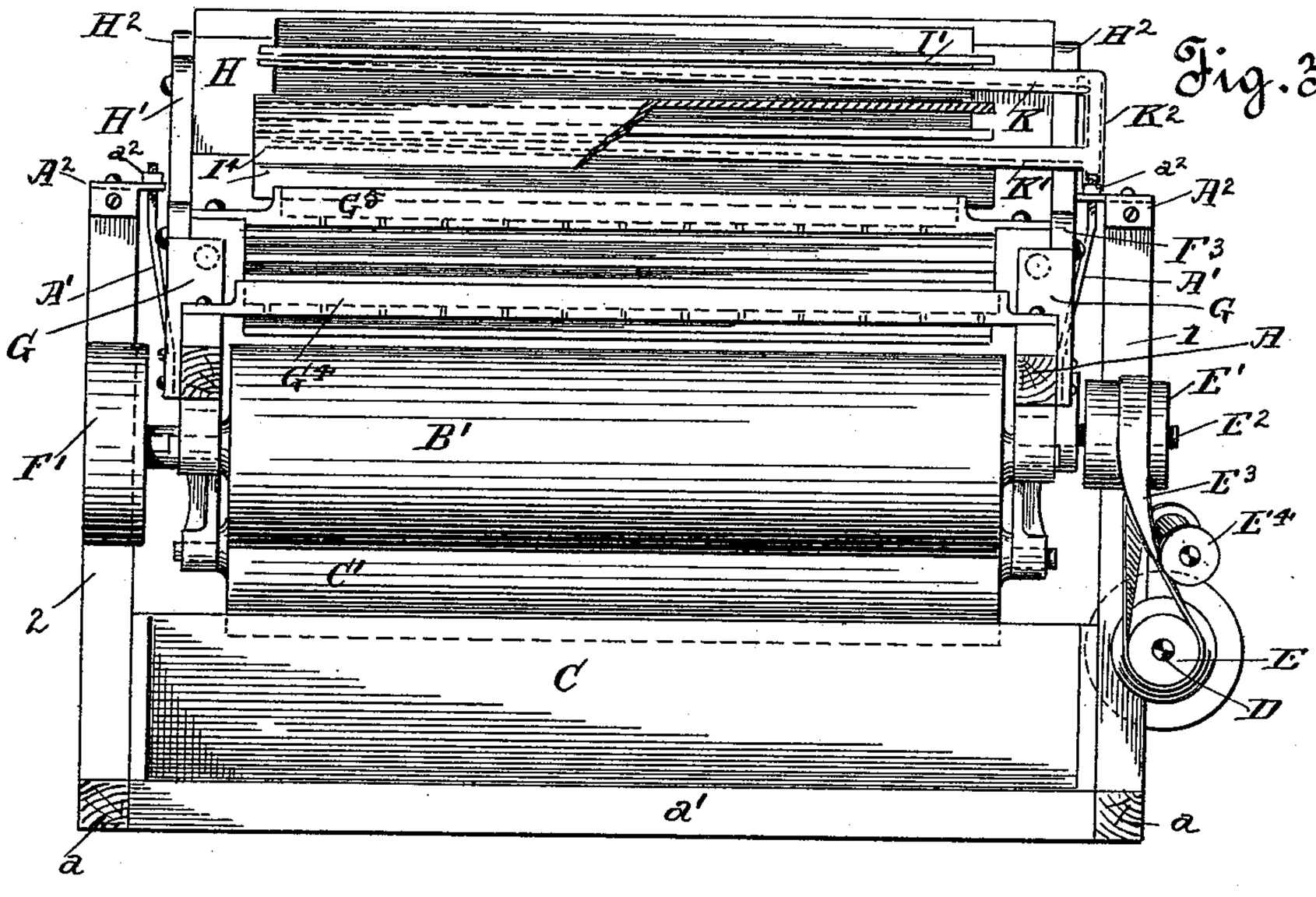
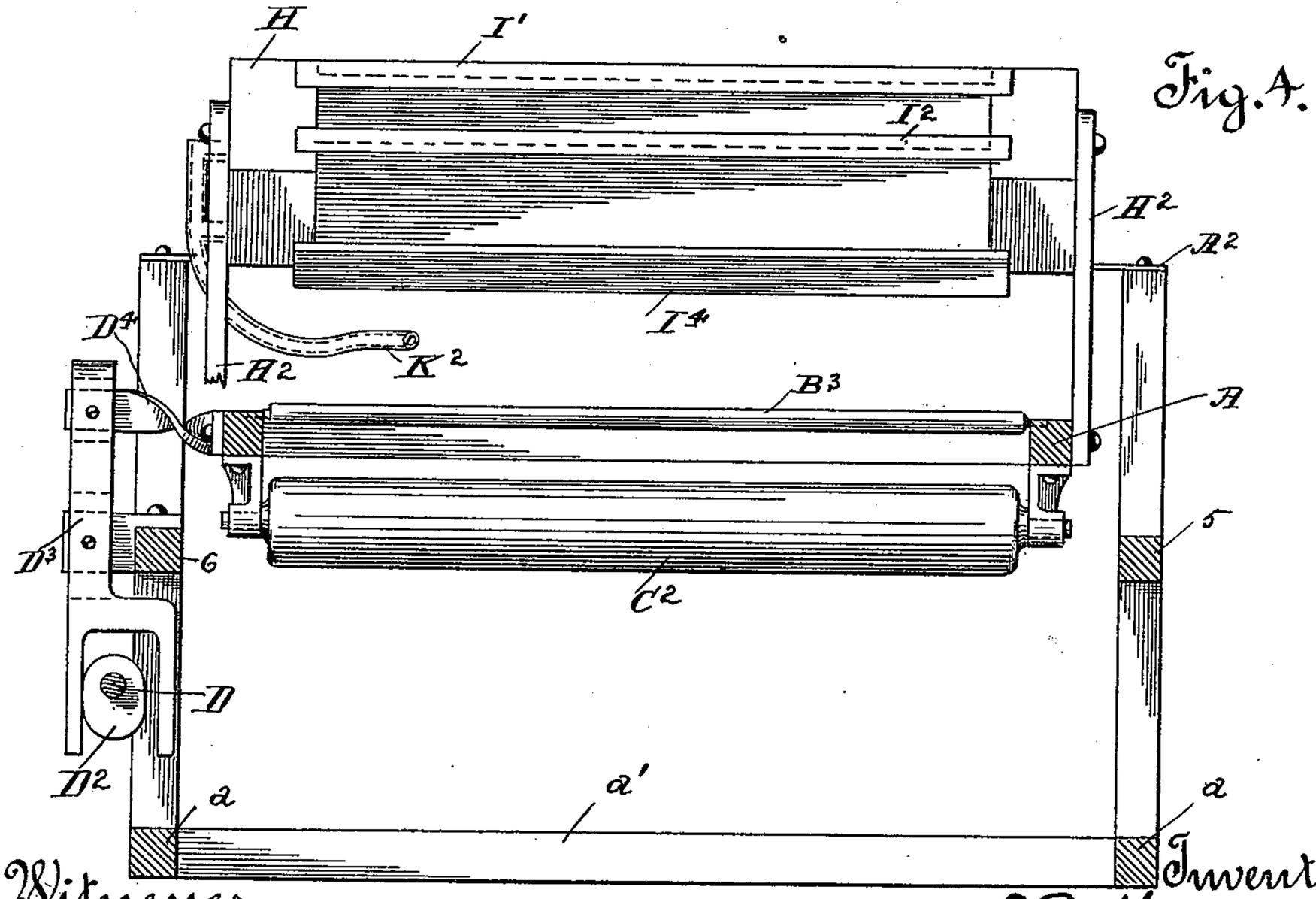


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

LOUIS R. TULLOCH, OF ANGEL'S CAMP, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 583,519, dated June 1, 1897.

Application filed June 16, 1896. Serial No. 595,802. (No model.)

To all whom it may concern:

Be it known that I, LOUIS R. TULLOCH, a citizen of the United States, residing at Angel's Camp, in the county of Calaveras and State of California, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby declare that the following is a full, clear, and exact description thereof.

The present invention relates to a certain new and useful ore-concentrator of that class wherein the ore or pulp is received and concentrated upon an endless traveling belt; and it consists in the arrangement of parts and details of construction as will be hereinafter fully set forth in the drawings and described and pointed out in the specification.

In order to fully comprehend the invention, reference must be had to the accompanying sheets of drawings, forming a part of this application, wherein—

Figure 1 is a side view in elevation, partly broken away, of the concentrator. Fig. 2 is a top plan view of the same. Fig. 3 is a front view in elevation; and Fig. 4 is a cross-sectional view in elevation, taken on line $x\,x$, Fig. 1, and viewed in the direction of the arrow.

In the drawings the fixed or supporting frame of the machine is shown as consisting of the longitudinal sills a, cross or end pieces a', and the uprights 1, 2, 3, and 4. The uprights 1 and 4 are connected by the longitudinal piece 5 and the uprights 2 and 4 by the longitudinal piece 6, Fig. 2. In the present machine I have shown the swinging frame A as being suspended between the uprights 1, 2, 3, and 4 at its corners by means of the elastic links or straps A'. These links or straps are connected at their lower ends to the bottom or side of the swinging frame, one at each end thereof. The upper end of the links or straps is made round and screw-threaded and passes through an opening in the brackets A^2, secured to and projecting from each upright, Figs. 1 and 3, and said links or straps are held in place by the nut a^2. By tightening or loosening these nuts the swinging frame of the concentrator is raised or lowered.

The endless concentrating-belt B travels over end rollers B' B^2, which rollers work in bearing-boxes secured at each end of the movable or swinging frame A. This movable or swinging frame is so hung that the endless concentrating-belt travels at a gradual incline from the rear end roller B^2 to the forward end roller B'. In order to prevent the sagging of the concentrating-belt between the end rollers, a series of small rollers B^3 are journaled in the movable or swinging frame.

Near the forward end of the concentrator, below the frame A, is located the usual receiving-tank C, within which is suspended the roll C', over which the endless belt travels as carried to the rear roller B^2. The belt also travels over the idler C^2, secured to the bottom of the swinging or movable frame A, between the roller C' and the roller B^2, Fig. 1.

To one side of the fixed or supporting frame is placed the drive-shaft D, which shaft is run parallel to the movable or swinging frame and works in bearing-boxes b b', secured to the outer face of the uprights 1 and 4 of the fixed frame. Upon the rear end of the shaft D is secured the belt-wheel D', over which works the drive-belt, (not shown,) which belt is operated by any suitable mechanism. Upon the shaft D, near its center, is fastened the eccentric cam D^2. This eccentric cam is straddled by the bifurcated lower end portion of the arm D^3, which arm is fulcrumed to the longitudinal piece 5. The upper end of the fulcrumed arm D^3 is connected to the swinging or movable frame A by the rod or strap D^4. Consequently it is obvious that as the arm is thrown in and out during the rotary movement of the eccentric cam D^2 the swinging or movable frame will have a lateral or side shake or movement given thereto. To the forward end of the drive-shaft D is secured the belt-wheel E, which is connected with the belt-wheel E', secured to one end of the cross-shaft E^2 by the belt E^3. By means of this belt the motion of the drive-shaft D is transmitted to the cross-shaft E^2, said belt being prevented from lateral displacement by means of the keeper-roll E^4, secured to the bracket b^2, projecting from the upright 1, Fig. 1. The cross-shaft E^2 works in bearing-

boxes secured to the bottom of the swinging or movable frame near its forward end. To the projecting end of the cross-shaft E^2 opposite to that carrying the belt-wheel E' is secured the belt-wheel F, which is connected by means of a suitable belt to the belt-wheel F', secured to the projecting end of the shaft of the roll B'. The motion of the cross-shaft E^2 is thus transmitted to the roll B' in order to drive or impart movement to the endless concentrating-belt B.

Above the swinging or movable frame A is located the bumping table or frame F^2, which is connected to the swinging frame and supported by means of the straps F^3 F^4. These supporting-straps are so connected to the swinging table and bumping-frame as to permit of the said bumping table or frame being freely moved back and forth. The forward end of the bumping table or frame is secured to the straps F^3 by means of the set-screws *d*, which pass through elongated slots *d'*, cut in the upper end of the said straps. By loosening the set-screws the forward end of the bumping table or frame may be raised or lowered in order to adjust the inclination thereof. To the forward cross-piece of the bumping frame or table are secured the buffers d^2, which strike against or contact with the buffers d^3, secured to the standards G, upwardly projecting from the swinging or movable frame A, Fig. 1. This bumping table or frame is thrown backward by means of the cams G', secured to the cross-shaft E^2 between the belt-wheels E and F and the frame of the swinging or movable frame. As these cams are carried around by the rotary movement of the cross-shaft E^2 they engage the arms G^2, downwardly projecting from the bumper frame or table, and force the said frame or table backward. The moment the cams move beyond the depending arms G^2 the bumping frame or table is thrown forward with considerable force by means of the curved springs G^3, which form connection between the rear end of the bumping frame or table and the swinging frame A. Within the bumping frame or table is secured the plate *f* and above this plate the smaller plate *f'*. The ore or pulp is fed upon the upper plate *f'*, and by the jolt given to the said frame or table it is scattered thereover and gradually works from said plate onto the plate *f*, from which it makes its escape at each end onto the traveling concentrating-belt. The object of the bumping-table is to separate the ore or pulp and free the same of as much foreign matter as possible before permitting the same to be delivered upon the concentrating-belt. By means of this bumping frame or table considerable work is saved the concentrating-belt.

At the front end of the swinging or movable frame above the endless traveling belt is located the water-distributer G^4, which distributes water upon the concentrating-belt, and above the bumping frame or table is located the water-distributer G^5, which distributes its water upon the plates of the bumping-table. Water is supplied to these distributers in the usual manner.

Above the bumping frame or table and the swinging or movable frame A is located the ore feed-box H. This box is supported by means of the straps, links, or standards H' H^2, fulcrumed to the swinging or movable frame A. The ore feed-box is arranged at a downward incline and its forward end comes directly over the upper plate of the bumping table or frame. The lower end of the supporting straps, links, or standards H' projects below the swinging or movable frame, and said standards are connected by means of the cross-piece H^3. This cross-piece is connected by the rod H^4 to an eccentric cam I, secured upon the cross-shaft E^2 below the swinging frame or table A, Fig. 1. Consequently as the said cross-shaft is rotated the eccentric cam throws the connecting-rod H^4 forward and backward, which through its connections imparts a longitudinal reciprocating motion to the ore feed-box.

The ore feed-box is provided with an upper and a lower ore-receiving plate I' I^2, upon which plates the ore or pulp from the stamp-battery is received. As the ore or pulp is conveyed downward over these plates toward the discharge end of the ore-box the reciprocating movement imparted to the said box by the hereinbefore-described mechanism causes a separation of the ore or pulp. In each plate I' I^2, near its lower end, is cut a cross-slot I^3, through which slots the heavier or more precious particles of the ore or pulp will flow as the separated pulp reaches this portion of the plates. The ore or pulp flowing through these slots falls upon the platforms I^4, located beneath the plates I' I^2, and flows from said platforms onto the bumping table or frame. The lighter or waste portion of the ore or pulp carried past the slotted portion of the plates I' I^2 flows into the troughs K K', secured to the ore feed-box below the discharge end of the plates I' I^2 for the purpose of receiving this waste. This portion of the pulp is conveyed by the water carried therewith through the pipe K^2 to what I term a "settling vessel, box, or receptacle," secured to the swinging or movable frame A near the lower end thereof. This settling vessel, box, or receptacle consists of the frame K^3, within which are secured two plates L L'. These plates are double-**V** shaped and are located one above the other, so as to leave a zigzag passage-way therebetween. The pipe or hose carrying the waste pulp from the receiving-troughs of the ore feed-box communicates with the forward end of the zigzag passage-way and the waste pulp is discharged therein. As the waste pulp is conveyed through the irregular passage-way just described by the water carried therewith the sand and the heavier material will settle in the lower bends of the bottom plate L, while the water will flow through the said passage-way and be discharged upon

the concentrating-belt near its lower end. In the lower bends of the bottom plate is cut a series of discharge-openings *l*, through which openings the sand and the heavier material settled in the lower bends of said plate L escape upon the bottom L^2 of the frame K^3, from which bottom the said material flows onto the concentrator-belt in advance of the settling-box. By means of this settling-box any of the precious metal carried by the waste from the ore feed-box is recovered. The plates forming the irregular passage-way for the waste pulp may be corrugated or of any other shape desired; but I prefer the shape shown.

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

1. In an ore-concentrator, the combination with the movable frame and the endless traveling concentrating-belt, of the bumping table or frame mounted thereabove and carried by the frame, and of mechanism for imparting a longitudinal reciprocating movement to the bumping table or frame.

2. In an ore-concentrator, the combination with the swinging frame, of mechanism for imparting motion thereto, the endless concentrating-belt traveling over the swinging frame, the bumping table or frame mounted on and located above the swinging frame, and of mechanism for imparting a longitudinal reciprocating movement to the bumping table or frame.

3. In an ore-concentrator, the combination with an endless traveling ore-concentrating belt, of mechanism for driving the same, of a bumping table or frame mounted above the traveling belt, an ore feed-box which supplies pulp or ore to the bumping table or frame, and of mechanism for imparting a longitudinal reciprocating motion both to the bumping table or frame and the ore feed-box.

4. In an ore-concentrator, the combination with an endless traveling ore-concentrating belt, of a swinging frame over which said belt travels, mechanism for imparting motion to said frame, the bumping table or frame mounted upon said swinging frame above the endless traveling belt, the ore feed-box mounted upon said swinging frame so as to discharge its pulp onto the bumping table or frame, and of mechanism for imparting a horizontal longitudinal movement both to the bumping table or frame and the ore feed-box.

5. In an ore-concentrator, the combination with the endless traveling belt, the bumping frame or table, the shaking ore feed-box, means for conducting the ore from the box to the table, the settling vessel for receiving the waste pulp from the ore feed-box, and of mechanism for imparting a longitudinal reciprocating movement to the bumping table or frame and the ore feed-box.

6. In an ore-concentrator, the combination with an endless traveling belt, of a shaking ore feed-box, a settling vessel, box or receptacle for receiving the waste from the ore feed-box located near the lower end of the belt-carrying frame, a connection between said settling device and the ore feed-box, a pair of plates secured in said settling device so as to form an irregular passage-way therebetween, discharge-openings in the lower plate through which the sand and the heavier material escape, and means for conducting the discharge from the openings forward.

7. In an ore-concentrator, the combination with an endless concentrating-belt, of a shaking ore feed-box mounted thereabove, discharge-openings in said ore feed-box through which the pulp flows, a settling device mounted above the concentrating-belt, and of connection between the ore feed-box and the settling device by means of which the waste pulp is conveyed to the settling device.

8. In an ore-concentrator, the combination with an endless traveling concentrating-belt, of a settling device, mounted above the concentrating-belt, which receives the waste pulp and settles the same in order to recover any precious metal contained therein and discharge-openings in the settling device through which the separated pulp escapes upon the endless traveling concentrating-belt.

9. In an ore-concentrator, the combination with a movable frame, and a concentrating-belt, an ore feed-box loosely supported on the frame, a bumping-box loosely supported on the frame, means for moving the frame, and means actuated by same moving means for moving the boxes longitudinally.

In testimony whereof I affix my signature, in presence of two witnesses, this 26th day of May, 1896.

LOUIS R. TULLOCH.

Witnesses:
R. RASMUSSEN,
C. H. WOOD.