W. G. HALL.

HOUSING FOR SUGAR MILLS.

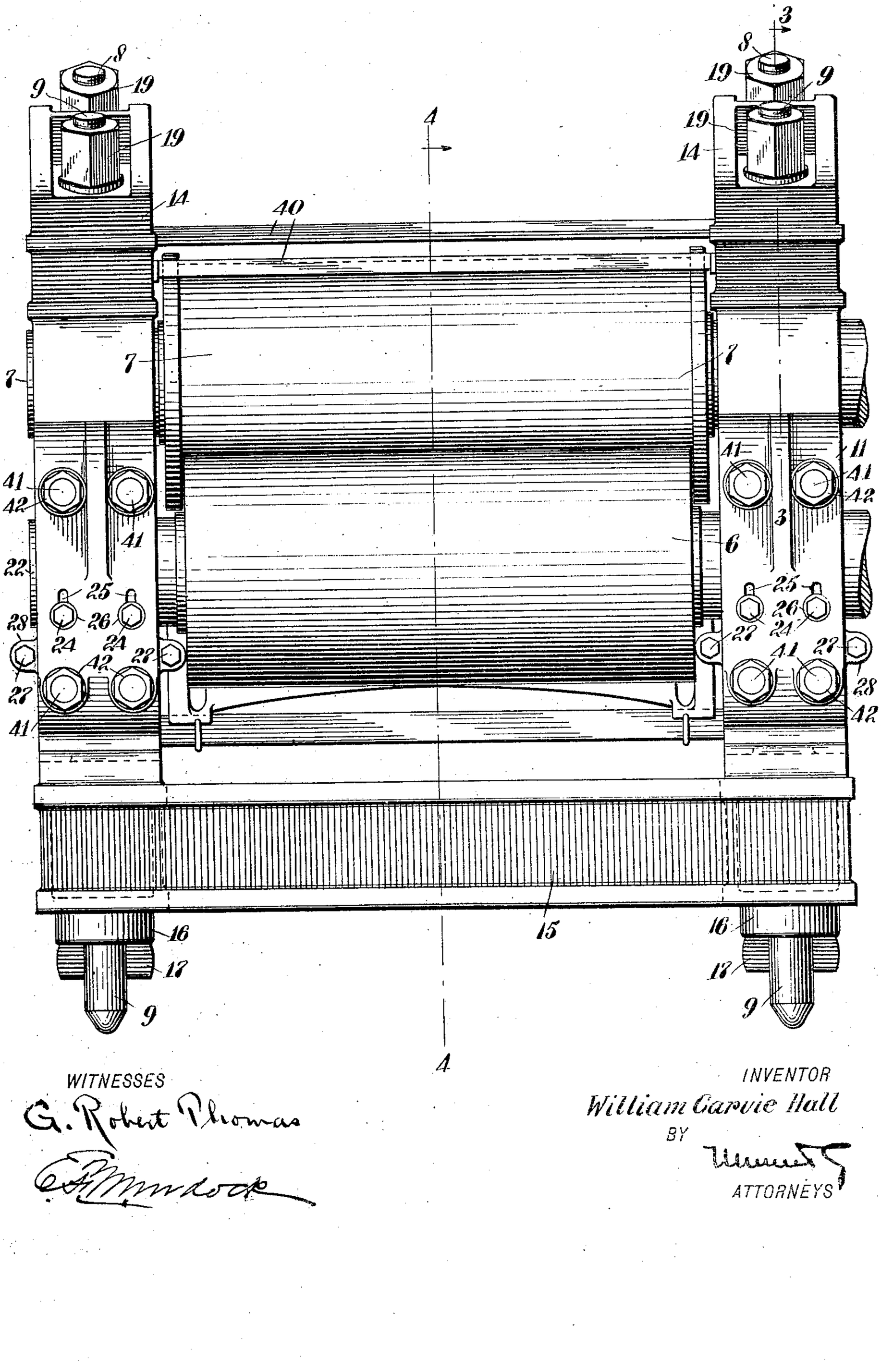
APPLICATION FILED AUG. 20, 1909.

966,199.

Patented Aug. 2, 1910.

4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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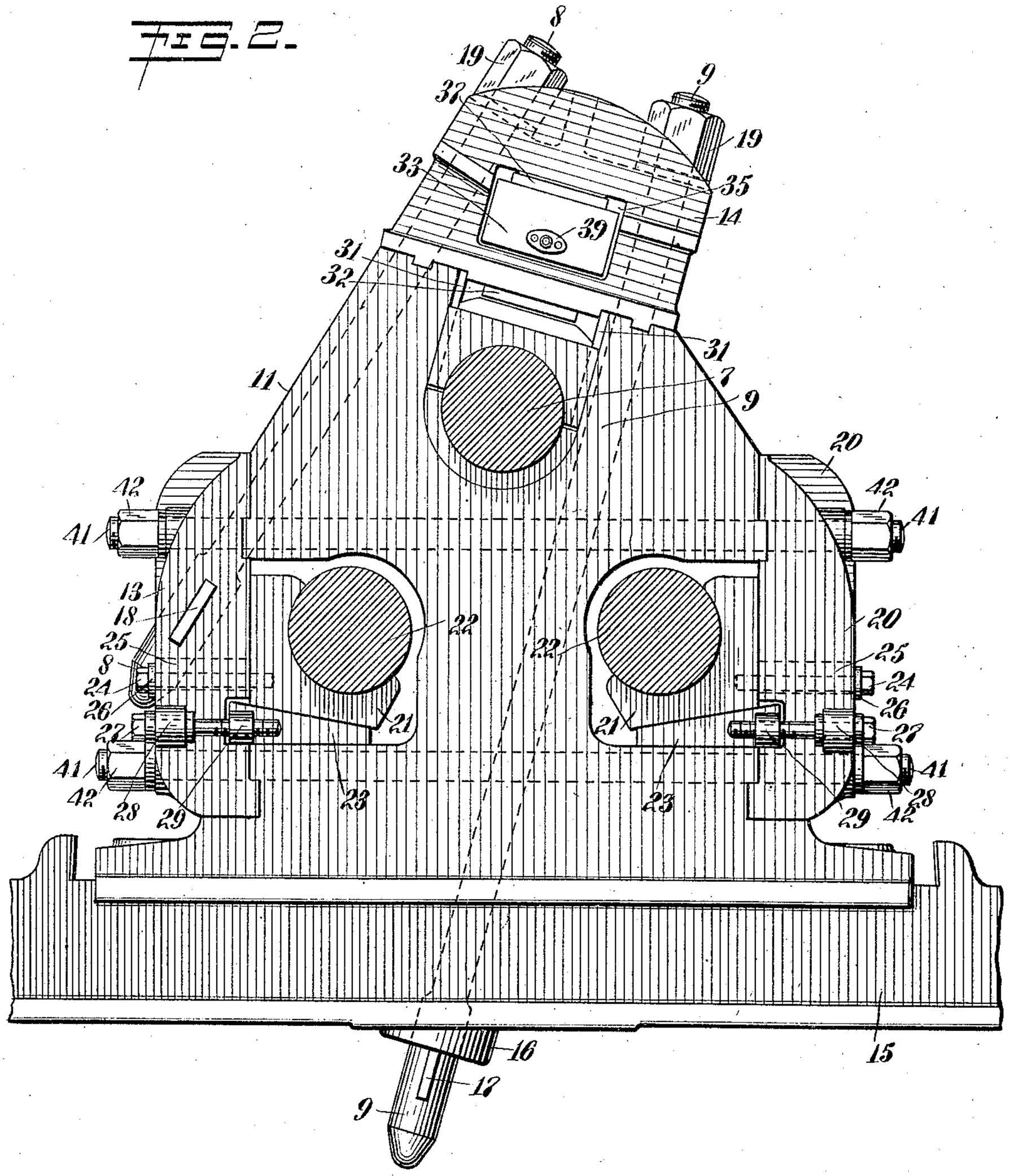
4 SHEETS—SHEET 2.

FIG. 2.



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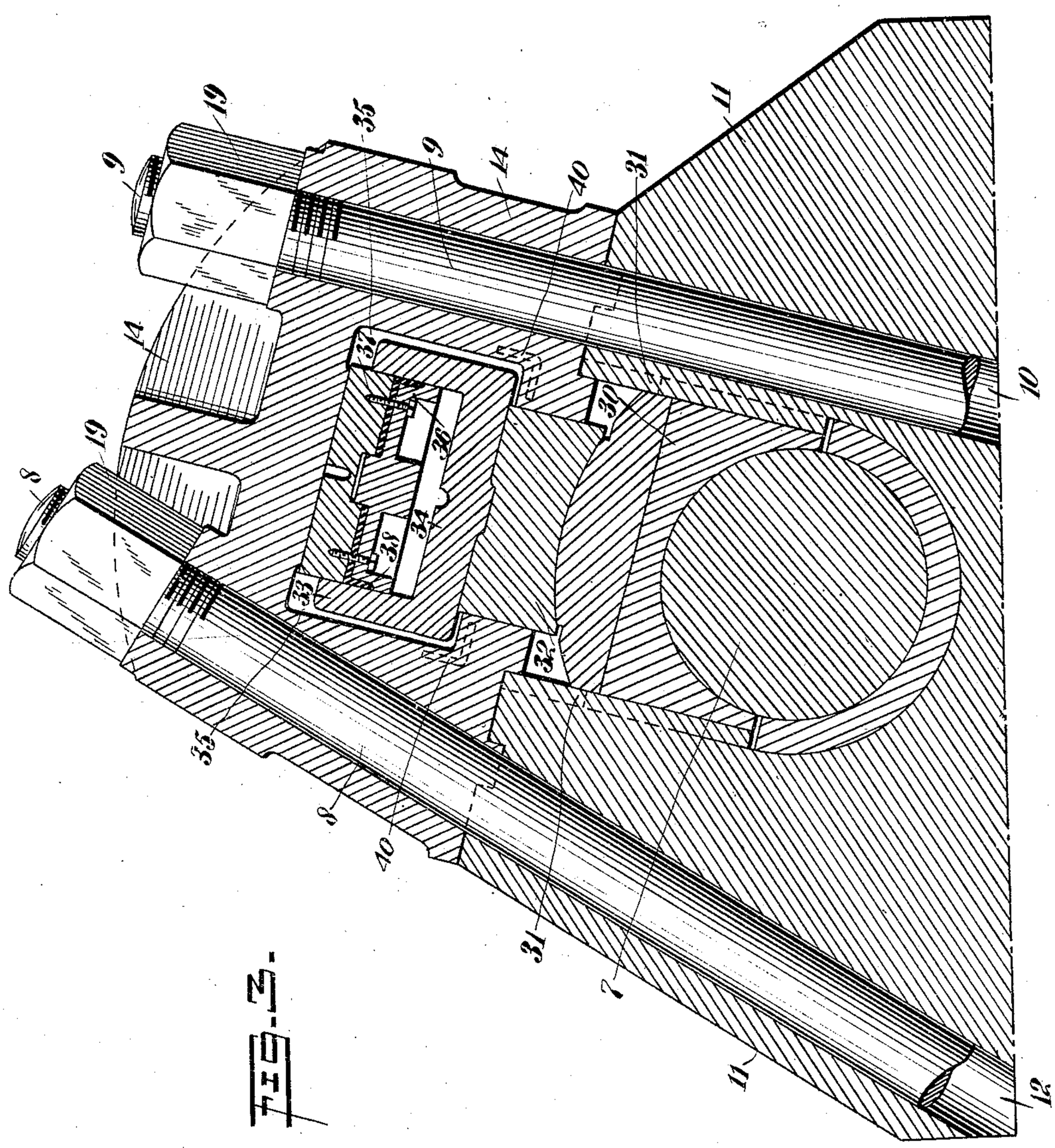

FIG. 2.

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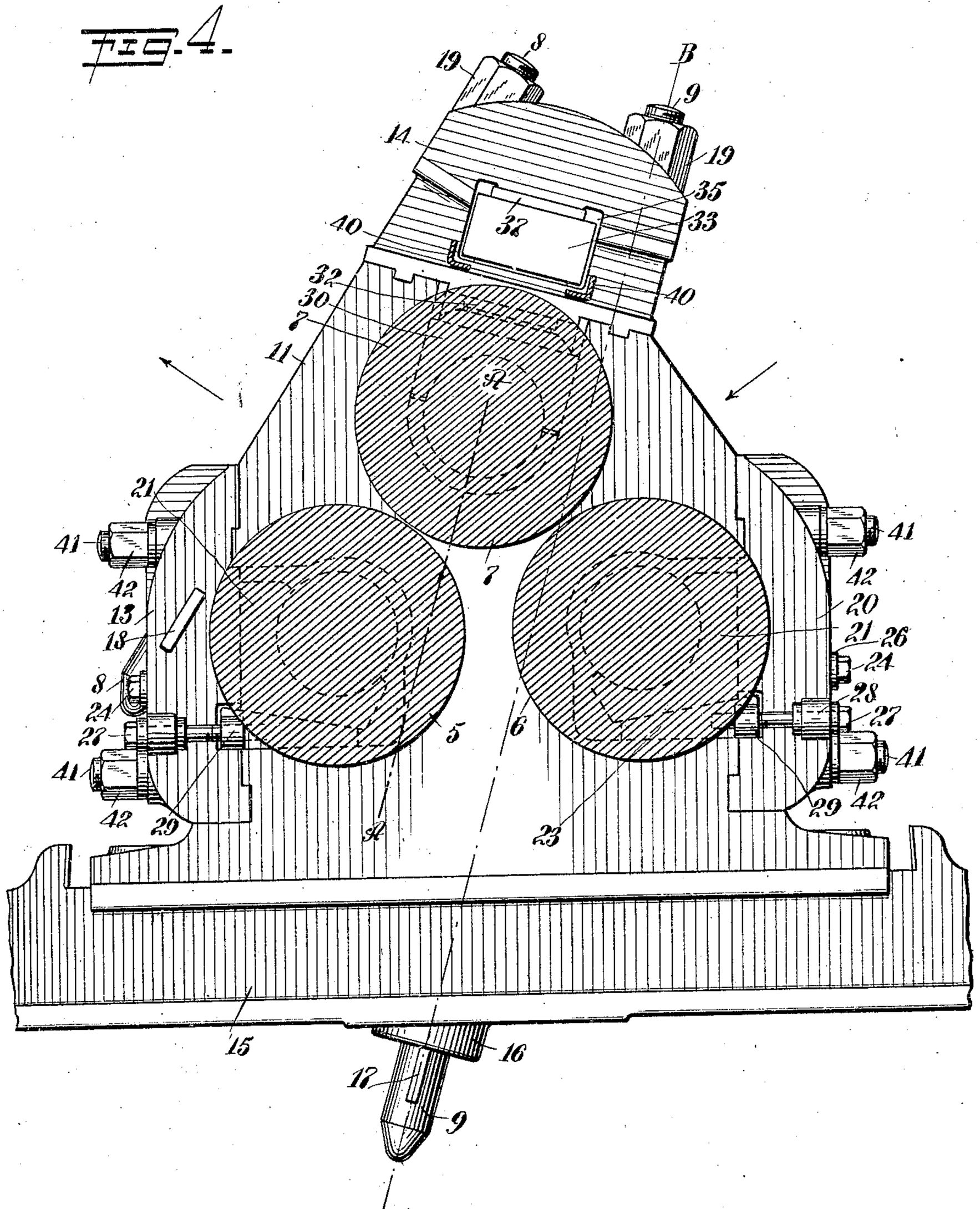
4 SHEETS—SHEET 4.

FIG. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM GARVIE HALL, OF HONOLULU, TERRITORY OF HAWAII.

HOUSING FOR SUGAR-MILLS.

966,199. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed August 20, 1909. Serial No. 513,834.

To all whom it may concern:

Be it known that I, WILLIAM GARVIE HALL, a subject of the King of Great Britain, and a resident of the city and county of Honolulu and Territory of Hawaii, have invented a new and Improved Housing for Sugar-Mills, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide hydraulic jacks for imposing and equalizing the pressure on the master roll of the sugar-cane crushing rolls: to provide a mounting for the said jacks whereby the inequalities of wear of the bearing brasses are accommodated: to provide devices whereby the said jacks may be withdrawn from operative position for repair or replacement rapidly and readily: to provide a bracing structure for maintaining the said master roll in position, the brasses being disposed with reference to receiving the maximum strain in a line coincident with the line of the resultant expansive forces developed between the three rolls, and to provide means for adjusting the bearing saddles of the lower rolls.

One embodiment of the present invention is disclosed in the accompanying drawings, which form part of this specification, in which like characters of reference indicate like parts throughout the views, and in which—

Figure 1 is a front elevation of rolls constructed and arranged in accordance with the present invention; Fig. 2 is a side elevation of one of the bearing standards showing the roller shafts in section; Fig. 3 is a vertical section taken on the line 3—3 in Fig. 1 of the upper portion of one of said standards; and Fig. 4 is a cross section of the rolls taken on the line 4—4 in Fig. 1.

The arrangement and operation of the rolls 5, 6 and 7 do not differ very materially from most of the rolls now in use on mills for similar purposes. The sugar-cane is introduced between the rolls 6 and 7, which, as will be noticed in Fig. 4 of the drawing, are somewhat separated, so as not to produce at the initial point in the process the maximum crushing strain upon the cane. The sugar-cane is then passed between the rolls 5 and 7, which rolls, as seen in the said figure of the drawings, are closely approximated. In the operation, the strains separating the rolls 6 and 7 on the one side, and rolls 5 and 7 on the other, differ in proportion to their juxtaposition. The separating force exerted between the rolls 5 and 7 largely exceeds that exerted between the rolls 6 and 7. Heretofore, in some mountings of these rolls the supporting structure has been designed to maintain the triangular arrangement of the rolls by braces disposed equally to each side of the line central between the axis of the lower rolls 5 and 6. In this invention, I have braced these rolls so that I place the thrust rods 8, 9 with reference to a line coincident with the resultant of the forces, tending to lift the roll 7. The thrust rod 9 I extend through a hole 10 provided in standards 11 in a position parallel with the line which would represent the resultant of the dual thrusts of the said rolls 5 and 6. In Fig. 4 I have added in diagram the line showing the center of the thrust rod 9, and the line showing the line of the resultant force or exertion received by the roll 7 to lift it from the rolls 5 and 6. The line of force I have designated by the letters A, A, while the central line of the thrust rod 9 I have designated by the letters B, B.

The thrust rod 8 is passed through a hole 12 formed in the standard 11, as shown in Fig. 3 of the drawing. The extent of the thrust rod 8 is governed by the convenience of the structure, it being arranged so that it is passed through a side cap 13 which holds in position the roll 5, and a top cap 14 which receives the thrust of the roll 7. The thrust rod 9 passes through the cap 14 and is extended through the standard 11 and bed plate 15, or side rails thereof, bosses 16—16 being provided therefor. Both rods in each of the standards are held in place by tapered pins 17—17 and 18—18, the same being driven through suitable perforations in the ends of the said rods. By means of these tapered pins the rods may be given a final tightening at any moment by the pins 17 being tapped to drive them into the perforations provided in the said rods, the top ends of the said pins being larger in dimension than will pass through the perforations when the rods have been properly adjusted to their initial position. The rods are primarily tightened by means of screw-nuts 19—19. The thrust rods 8, 9 are placed in position after the side caps 13, 20 and the cap 14 have been placed in position.

The bearings for the rolls 5 and 6 are shown in Fig. 2 of the drawings. They consist primarily of a saddle bearing 21, which may be constructed from brass, bronze or other suitable material. They are shaped to provide a seat for the bearings 22—22 of the rolls, and to have a vertical wall properly milled to form a sliding seat on the inner face of the caps 13, 20. The lower surface of the saddles 21 are slightly beveled to receive sliding wedge blocks 23. The saddles are held against the vertical surface of the caps 13, 20 by means of screw bolts 24—24, which are suitably threaded to engage the said saddles. The bolts 24—24 are extended through vertically elongated slots 25, 25 formed in the caps 13, 20. Placed under the heads of the bolts 24—24 and to straddle the slots 25—25 are suitable washers 26—26. The impinging strain exerted upon the bolts 24—24 seats the saddles 21—21 hard against the caps 13—20, and prevents any chattering on the part of the said saddles.

When it is desired to adjust the position of the rolls 5, 6 with reference to the roll 7, this is accomplished by means of the blocks 23, 23, these being either withdrawn or extended under the said saddles. This adjustment of the blocks 23 is produced by means of screw bolts 27, 27. The screw bolts 27, 27 are rotatably mounted in perforated lugs 28—28 extended from the sides of the caps 13, 20. The bolts 27 are held in a rotative position with reference to the lugs 28—28 by any well known and suitable construction. The bolts are suitably screw-threaded at the end opposite the head to engage a suitably threaded perforation formed in the lugs 29—29 extended from the sides of the blocks 23—23. By manipulating the bolts 27—27, they being rotatably held in the lugs 28—28, the blocks 23—23 are projected or retracted with reference to the said lugs 28—28 or the caps 13, 20. When, now, it is desired to raise or lower the rolls 5 or 6, the bolts 24, 24 are slackened, permitting the saddles 21—21 to rise and fall. The bolts 27 are rotated to project the blocks 23 if the desire be to raise the saddles, until the desired position of the rolls is attained. These positions having been attained, the operation upon the bolts 27 is suspended and the bolts 24—24 are set up to draw the saddles 21, 21 hard against the caps 13, 20.

The upper or master roll 7 is mounted in journals, the boxing of which is split and the upper portion formed by the moving brasses 30, 30. These brasses rise and lower on the guides 31—31. The tops of the brasses are provided with a spherical head to form a ball and socket joint in conjunction with the trimming blocks 32—32 which extend through the lower wall of the caps 14—14, to form the seats for the hydraulic jacks used in connection with these rolls. It is by means of these hydraulic jacks that the desired pressure is placed upon the roll 7 and by means of which the pressure at the opposite ends of the said roll is equalized to accommodate the inequality of the strain during the progress of the operation. The jacks consist of cup-like casings 33 of square or circular inner dimension. The bottoms 34 of these casings rest upon the trimming blocks 32. The casings 33 are adapted to extend through perforations 35 provided in the caps 14—14, said perforations being open-ended, so that the said casings or jacks may be slid into position within the caps 14 from either end of the said perforations.

Fitted snugly within the chamber of the casing 33 is a plunger 36, slidably fitted in the said chamber and adapted to be secured to a shoe 37 which bears against the pads provided in the tops of the perforations 35 in the casings of the caps 14. Between the plunger 36 and shoe 37 is inserted a leather or other suitable packing 38 which is adapted to form between the side walls of the plunger and the casing a water-tight joint. Extended from the side wall of the casing through a fitting 39 fixedly attached to the said casing is a water inlet connected with a suitable accumulator or other water pressure regulating mechanism.

Water pressure is admitted within the chamber of the casing 33 under the plunger 36, and the pressure exerted is proportionate to the square area of the plunger 36. The water is admitted within the chamber of the jack by means of the fitting 39. The fitting 39 is provided to receive the pipe delivering the water from the accumulator.

When in operation and the feed of the rollers having been started, the water pressure is turned on from the accumulator, and the plunger 36 resting against the solid head of the caps 14—14, it presses the casing 33 upon the terminating block 32 and by means of the same upon the brasses 30, and by means thereof upon the roller 7. When now, in the course of the operation the accumulation of cane passes under the one end of the roller 7 the excess strain thereof is accommodated by the water in the jack at that end of the roller 7 receding from the said jack and thus permitting the rise of the roller 7 at that end of the same, while preserving the equalized pressure at both ends of the roller. These jacks are more or less subject to breakage or disrepair and it is to withdraw the same repeatedly and rapidly from the operative position between the cap 14 and the terminating block 32, that I have provided the open-ended recess 35 in the said cap 14 and extend between the two standards in line with the said recesses, the angular rails 40. The rails 40—40 form the supports for the jacks when the same are

drawn from out of the recesses 35—35. The pipes which connect the said jacks and the accumulator or water pressure may be in this position easily removed from the fitting 39. A new jack may be substituted or the old repaired and replaced in the recesses 35, and this with the minimum loss of time. The strain exerted upon the saddles 21—21 and transferred thereby to the caps 13 and 20, is received upon the thrust rods 41—41 which are extended through holes provided in the standards 11 and provided with suitable, threaded end extensions adapted to receive the nuts 42—42.

It will be observed by reference to the drawings, particularly at Fig. 2 thereof, that the thrust rods 41—41 are extended parallel each to the other and to the line drawn between the axes of the rollers 5 and 6, thus receiving in direct line the thrusting strain tending to separate the same. All vertical strains on these rollers are received directly upon the blocks 23—23 and transferred by them to the standards 11—11. The thrust rods 8 and 9 which receive the thrust of the cap 14 are arranged with direct reference to the lifting strain exerted upon the roller 7 by both of the rollers 5 and 6. It will be noticed particularly that the rod 9 is carried through the standards 11 as close as convenient to the bearing for the roller 7 and is extended in a line parallel to the line of the resultant of the forces tending to separate the said roller 7 from the rollers 5 and 6. The thrust rod 8 is extended designedly as shown, so as to pass through the cap 13, aiding thereby to support and maintain the same in position. The operating strains received by the rollers 5, 6 and 7 are by the construction of the present housing each provided for in such manner as to support the said strains upon the thrust rods 8, 9 and 41—41, taking advantage of the tensile strength of the materials from which these rods are constructed, and serving to relieve the castings of the body of the standards and the caps.

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

1. A sugar mill, comprising three crushing rollers mounted in triangular arrangement, and thrust rods arranged to receive the spreading strain of said rollers, one of said rods being placed in position substantially parallel to the line of the resultant strain of the pressures of the said two rollers upon the said third roller.

2. A sugar mill, comprising a pressure roller, yielding bearings for said roller, expansible pressure members embodying a body portion having formed therein a chamber, a plunger slidably mounted in said chamber, suitable ducts connecting said chamber with a fluid pressure system adapted to extend the said plunger from said chamber, standards for said rollers having recesses to receive said bearings, caps to fit said standards above said pressure roller and having laterally extended chambers to receive said pressure members, and supports extended laterally from said standards to receive said pressure members when the same are withdrawn from said laterally extended chambers.

3. A sugar mill, comprising a pressure roller, yielding bearings for said roller, expansible pressure members embodying a body portion having formed therein a suitable chamber, a plunger slidably mounted within said chamber, suitable ducts for connecting the said chamber with the fluid pressure system adapted to extend said plunger from said chamber, standards for said rollers having recesses to receive the said bearings, caps to fit said standards above said pressure roller and having laterally extended chambers to receive said pressure members, trimming blocks to form rocking joints between said bearings and said expansible members, and supports extended laterally from said standards to receive said pressure members when the same are withdrawn from said laterally extended chambers.

4. A sugar mill, comprising a pressure roller, yielding bearings for said roller, expansible pressure members embodying a body portion having formed therein a suitable pressure chamber, a plunger slidably mounted in said chamber adapted to be extended in the line of movement of said roller, suitable ducts for connecting the said chamber with a fluid pressure system adapted to extend the said plunger from said chamber, standards for said rollers having recesses to receive the said bearings, caps to fit said standards above said pressure roller and having a laterally extended chamber to receive said expansible members, and rails extended between said standards in line with the said chambers and said caps to receive and support the said expansible members when they are withdrawn from said laterally extended chambers.

5. A sugar mill, comprising expansible pressure members adapted to rest between the standards of said housing and the pressure roller to exert a designed pressure on said roller, and rails extended between the standards of said housing in line with said members to support and guide the same when withdrawn from or being introduced into operative position.

6. A sugar mill, comprising side standards for said housing adapted to receive the pressure rollers in triangular arrangement, caps adapted to rest upon said rollers to maintain them in proper bearing relation, expansible pressure members mounted be-

tween said rollers and said caps and adapted to exert independent pressure on the end bearings of said rollers, and supporting rails extended between the said standards adapted to support and guide said expansible pressure members when being introduced into or withdrawn from operative position.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM GARVIE HALL.

Witnesses:

HARVEY R. GRANT,

ROB. ANDERSON.