

(No Model.)

2 Sheets—Sheet 1.

F. C. BILLINGS & W. J. BELCHER.
DROP HAMMER.

No. 547,197.

Patented Oct. 1, 1895.

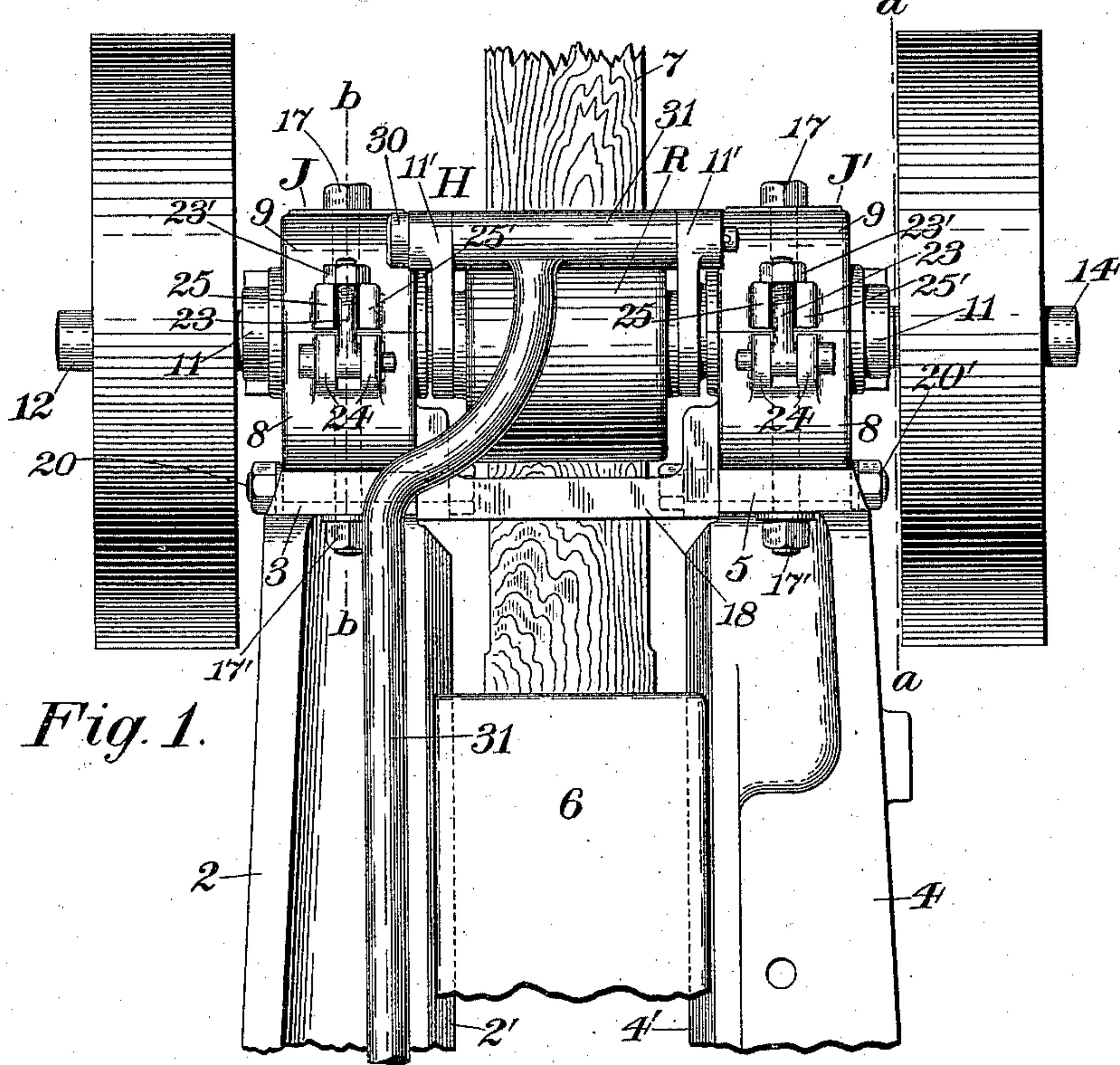
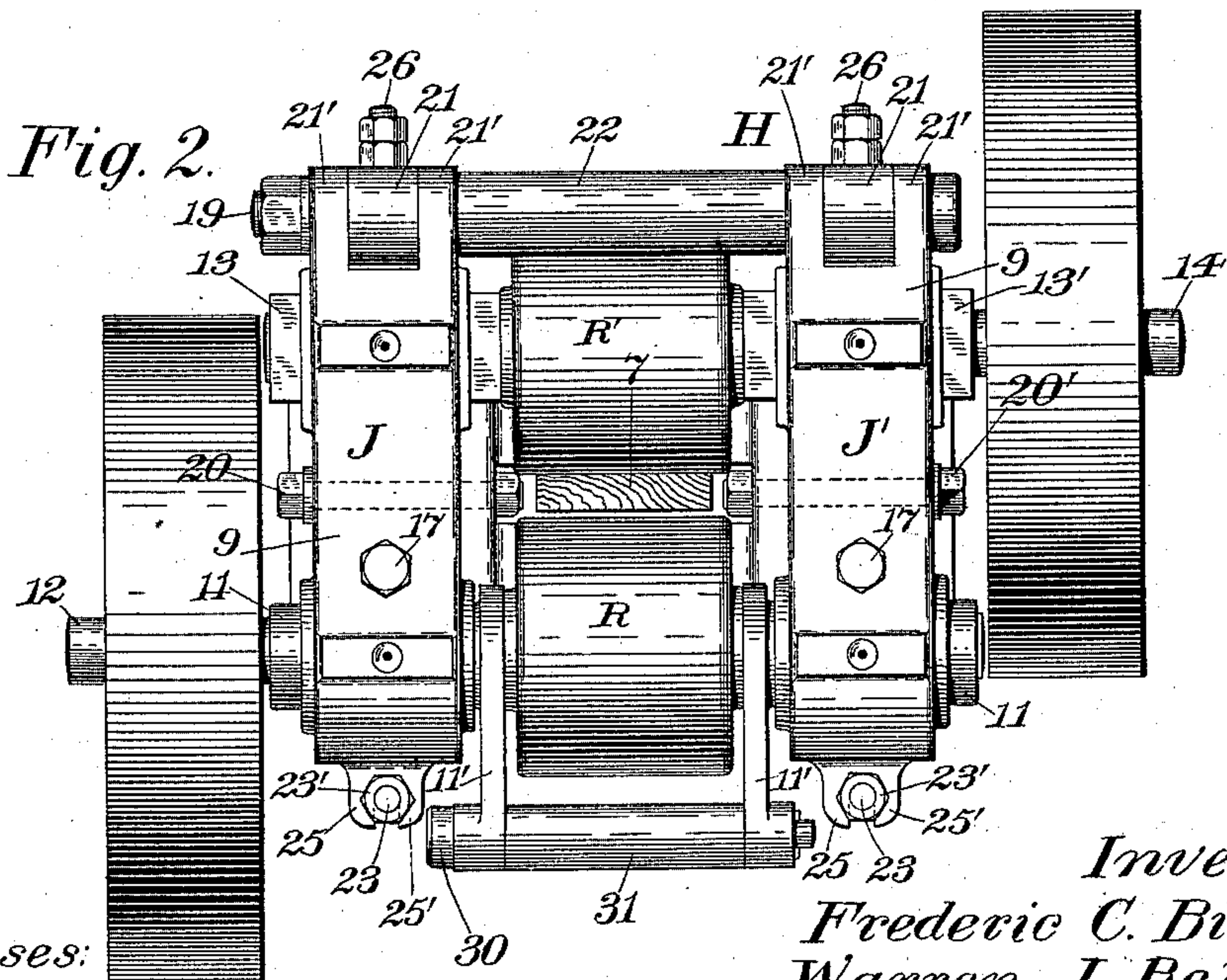


Fig. 1.



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By their Attorney

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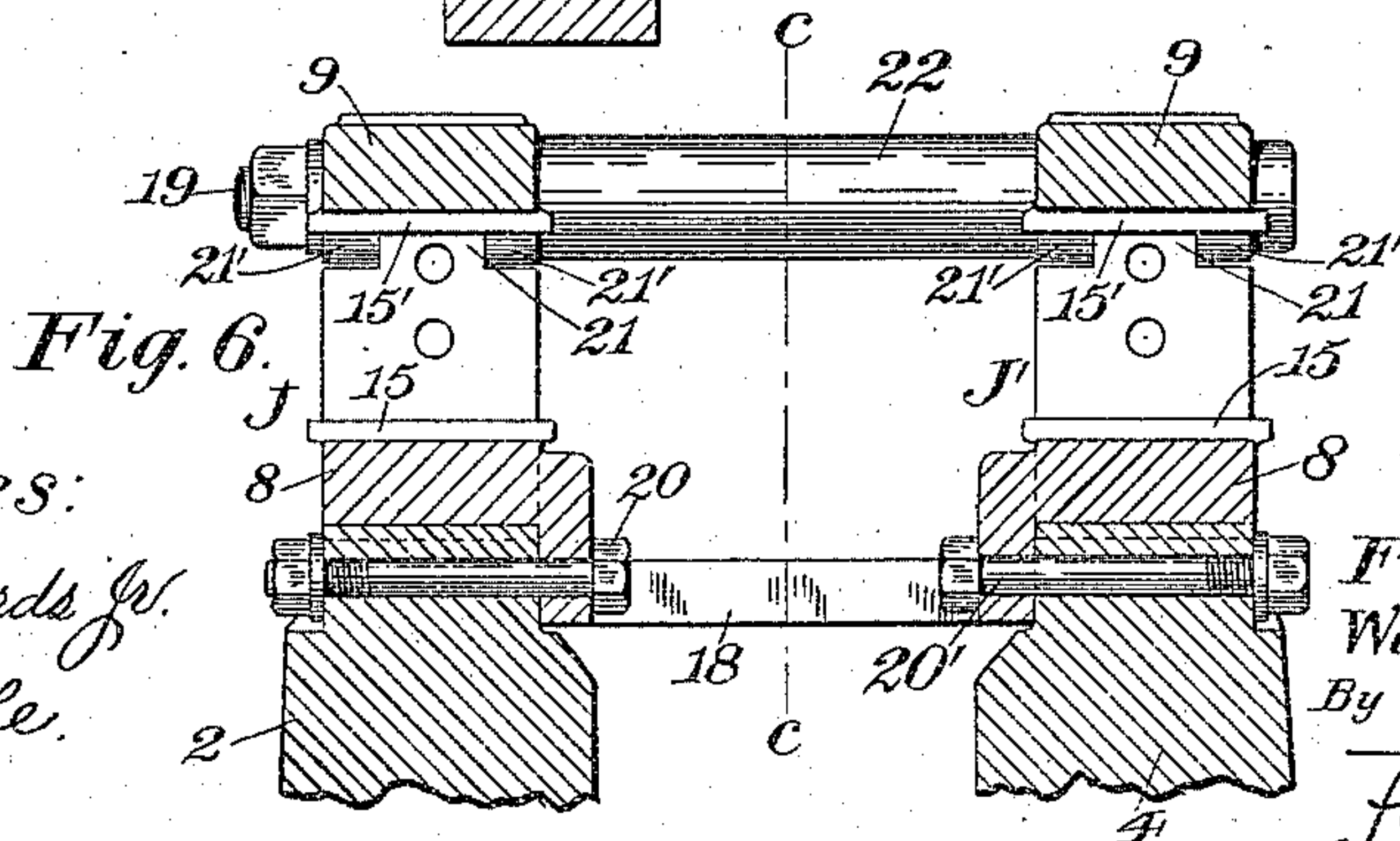
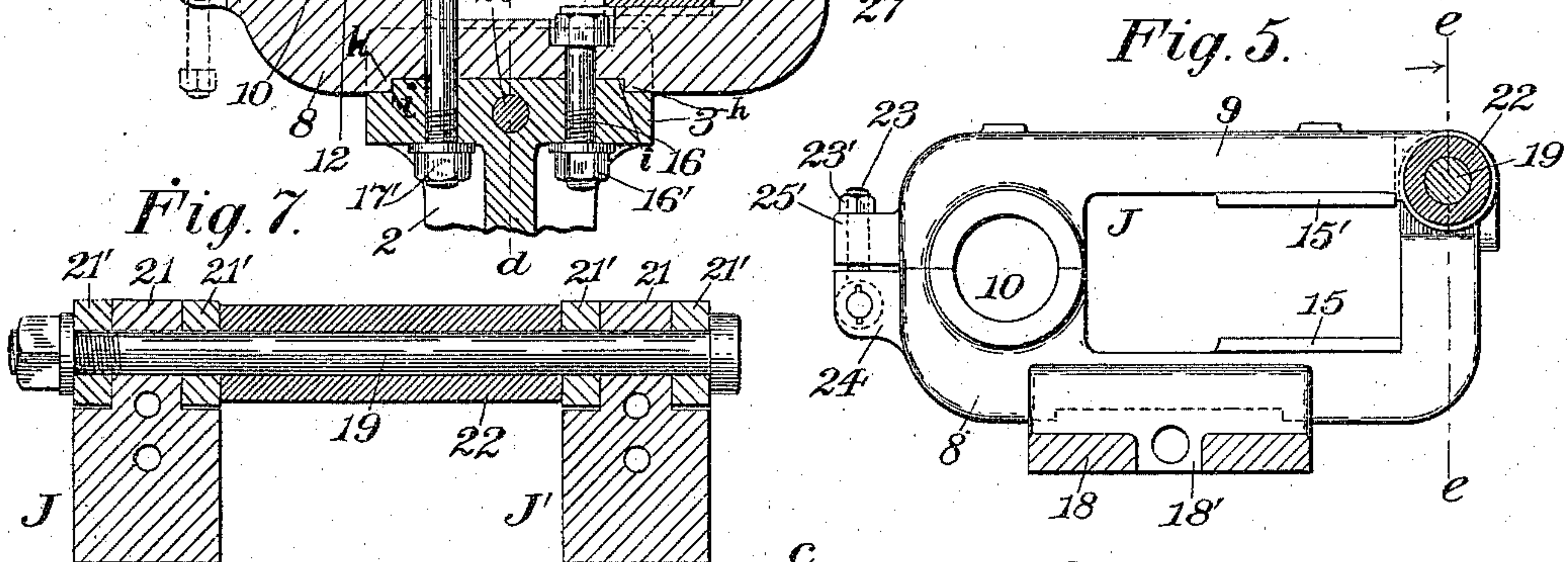
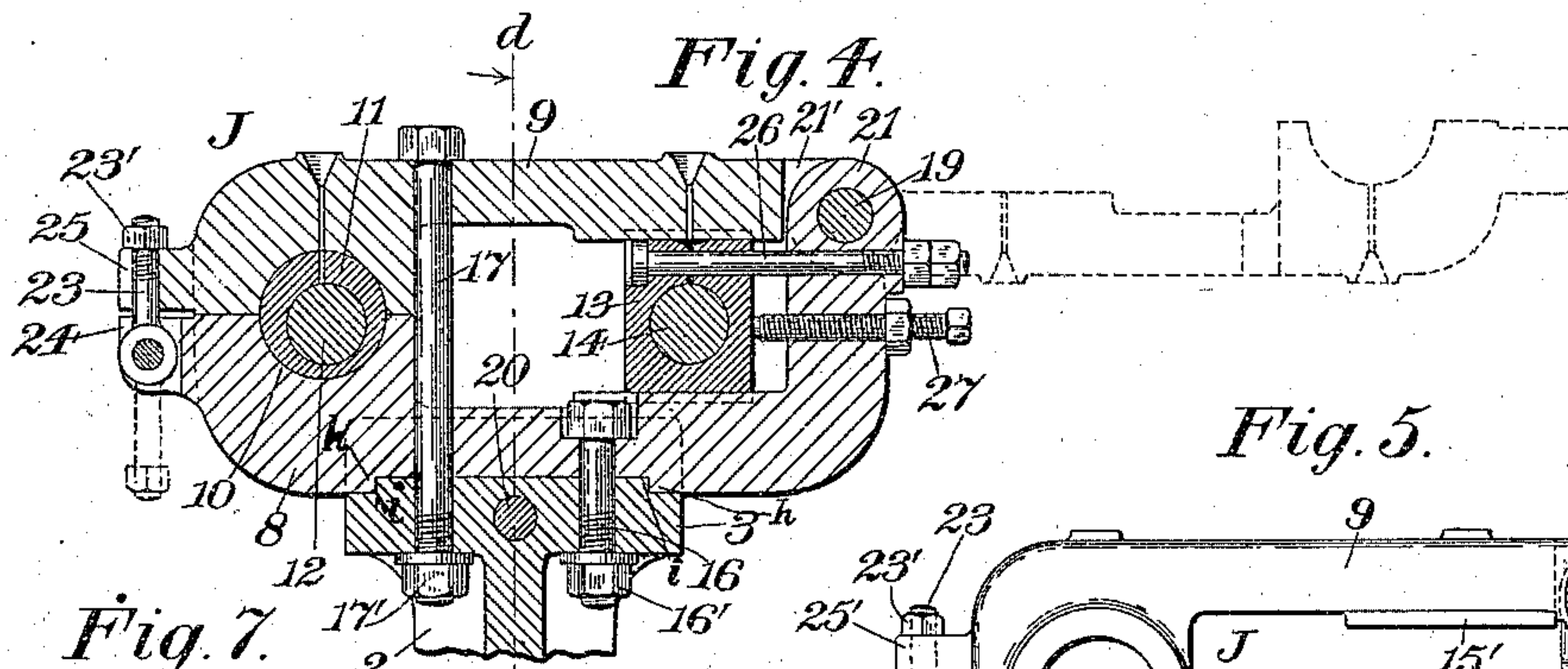
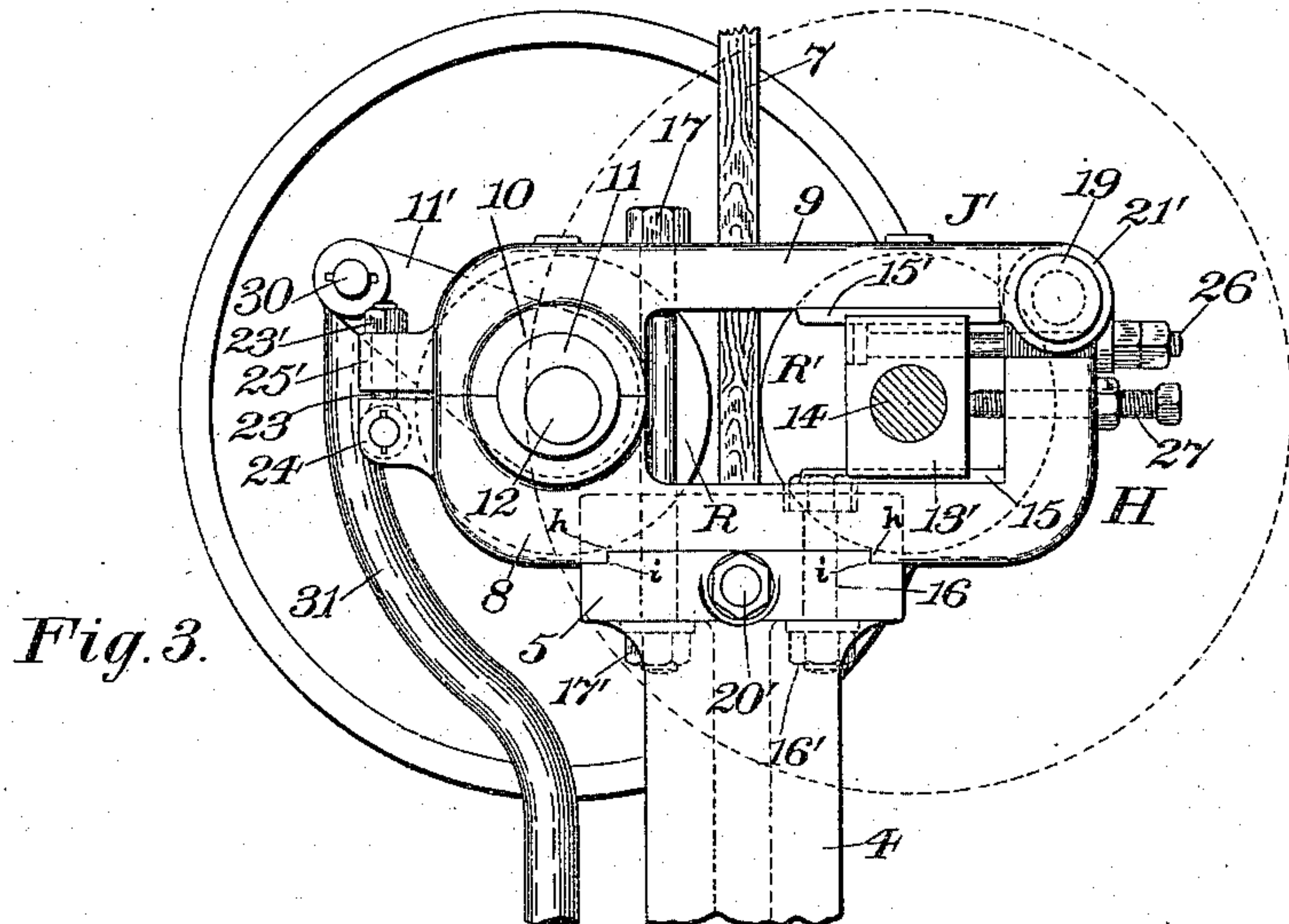
(No Model.)

2 Sheets—Sheet 2.

F. C. BILLINGS & W. J. BELCHER.
DROP HAMMER.

No. 547,197.

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UNITED STATES PATENT OFFICE.

FREDERIC C. BILLINGS AND WARREN J. BELCHER, OF HARTFORD, CONNECTICUT, ASSIGNORS TO THE BILLINGS & SPENCER COMPANY, OF SAME PLACE.

DROP-HAMMER.

SPECIFICATION forming part of Letters Patent No. 547,197, dated October 1, 1895.

Application filed February 15, 1895. Serial No. 538,548. (No model.)

To all whom it may concern:

Be it known that we, FREDERIC C. BILLINGS and WARREN J. BELCHER, citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Drop-Hammers, of which the following is a specification.

This invention relates to drop-hammers of that class in which the drop-hammer has a reciprocatory hammer or ram which is provided with a lifting-board and in which a pair of lifting-rolls is employed for engaging the lifting-board for lifting the hammer and in which shifting mechanism is employed for shifting one of said rolls relatively to the other to release the rolls from engagement with the lifting-board to allow the hammer to drop.

Our present invention has particular reference to the hammer-lifting mechanism, its carrying frame or head, and to adjusting devices for said mechanism.

The object of our present invention is, primarily, to furnish in connection with the framework of a machine of this class a lifting-roll carrying-head of improved construction and organization adapted for facilitating the assembling and disassembling of the parts and also for securing lightness and rigidity in construction and efficiency in operation.

Another object of the invention is to provide in connection with a machine of the class specified a pair of hammer-lifting rolls shiftable one roll toward the other and to provide adjusting means in connection with the shiftable roll, whereby said roll may be adjusted toward or from the other roll to take up wear, and also to secure the requisite adjustment for adapting the lifting-rolls for engagement with lifting-boards of different thickness and whereby said roll may be positively fixed in adjusted position relatively to the other roll and against accidental movement.

In the drawings accompanying and forming a part of this specification, Figure 1 is a front elevation of a portion of the upper part of the drop-hammer embodying our present improvement. Fig. 2 is a plan view of said drop-hammer as seen from above in Fig. 1. Fig. 3 is a sectional side elevation of a por-

tion of the drop-hammer, looking toward the left hand in Fig. 1, said section being taken in dotted line *a a* in said Fig. 1, the driving-pulley of the shiftable lifting-roll herein shown in dotted lines. Fig. 4 is a vertical cross-sectional view of a portion of the head of the machine, taken in dotted line *b b*, Fig. 1, looking toward the left hand, in said figure, the driving-pulley for the non-shiftable roll being removed. Fig. 5 is a vertical cross-section taken in dotted line *c c*, Fig. 6, looking toward the left hand in said figure, and showing that portion of the head at the left hand of said dotted line removed from the side frame of the machine. Fig. 6 is a cross-sectional view of the head of the machine, taken in dotted line *d d*, Fig. 4, looking toward the right hand in said figure, and showing said head with the lifting-rolls and their accessories removed. Fig. 7 is a cross-sectional view of the head of the machine, taken in dotted line *e e*, Fig. 5, and showing those parts of the entire head at the right hand of said dotted lines.

Like characters represent like parts in all the figures of the drawings.

In the drawings only so much of the drop-hammer is shown as is deemed necessary for clearly illustrating the construction, organization, mode of operation, and application of our certain improvements.

The framework of the machine may, in a general way, be of any suitable or usual construction adapted for carrying the working parts, it being herein shown as having the usual side frames 2 and 4, having suitable hammer-guides 2' and 4', respectively, at adjacent sides thereof. These side frames 2 and 4 are usually bolted at their lower end to a suitable base, (not shown,) and in the present instance have laterally-projecting flanges 3 and 5, respectively, at the upper ends thereof, to which the head, designated in a general way by H, is bolted. The hammer or ram 6 may be of any suitable construction and will be provided with the usual lifting-board 7, which is secured to the upper end thereof in any suitable manner, said hammer being supported for vertical reciprocation between the guides 2' and 4', as clearly shown in Fig. 1.

In the preferred form thereof herein shown the head H, which constitutes the carrier for the lifting-rolls, (which lifting-rolls are designated in a general way by R and R', respectively,) comprises, in part, two connected journal boxes or carriers, designated in a general way by J and J', respectively, having on their under sides rabbets *h*, adapted to engage similar rabbets *i* on the laterally-projecting flanges 3 and 5. One of the journal-boxes, as J, is bolted to the side frame 2, at the upper end thereof, and the other of the journal-boxes is bolted to the side-frame 4, at the upper end thereof, said journal-boxes being connected at their lower ends by a "strut" formed, preferably, integral therewith, as will be seen by reference to Figs. 1, 2, 3, 4, and 6 of the drawings, whereby, by means of this peculiar construction of strut, hereinafter described, and the engaging rabbets *h* and *i*, the head is prevented from movement in all directions and the device thereby strengthened. Each journal-box in the preferred form thereof herein shown and described comprises two members—*i. e.*, a fixed member or body portion 8 and a removable member or cap 9, which is preferably hinged, as will be hereinafter more fully described, to the fixed member or base 8.

As illustrated most clearly in Figs. 4 and 5 of the drawings, each journal-box has at the forward end thereof or at the left-hand end, as shown in said figures, a journal-bearing 10, adapted for supporting one end of the eccentric 11, in which the shaft 12 of the automatically-shiftable lifting-roll R is journaled, and by means of which eccentric said lifting-roll is shifted laterally of the lifting-roll R' and thrown into and out from engagement with the lifting-board 7 of the hammer 6, and both journal-boxes have a transverse recess or opening in the rear of the bearing 10, which recess forms a guideway for one or the other of the two journal-bearings 13, in which one or the other ends of the shaft 14 of the lifting-roll R' is journaled. These journal-bearings 13 (there being one at each end of the shaft 14) are preferably rectangular in cross-section and are supported for horizontal adjustment toward and from the journal-bearings 10 of the roll R between guides 15 and 15' upon the adjacent faces of the two members 8 and 9, respectively, of both journal-boxes, respectively, as will be understood by reference to said Figs. 4 and 5.

The lower half of the journal-bearing 10 is formed in the upper face of the fixed member of body portion 8 of the journal-box, and the upper half of said bearing is formed in the lower face of the cap 9, in the usual manner of forming bearings in divided members, and the guideway for the journal-bearing 13 is formed by grooving or slotting the inner or adjacent faces of the upper and lower members 8 and 9 of said journal-box, as shown in Figs. 5 and 6 of the drawings.

As a convenient means for securing each

journal-box to the side frame which supports the same, and also as a means for rigidly holding the cap 9 against movement relatively to the body portion 8 of said journal-box, said journal-box is bolted to the flange at the upper end of the side frame by means of two bolts 16 and 17, one of which bolts, as 16, is relatively short and extends only through the lower member 8 and the flange of the side frame, where it is provided with a nut 16' for binding said parts together, the head of said bolt being countersunk, so that its outer face lies below the inner face of the lower member 8, as shown in Fig. 4, to prevent interference with the adjustment of bearing 13, whereas the other of said bolts, as 17, is relatively long and extends through the cap 9 and body portion 8 of the journal-box and through the flange of the side frame, it being provided with a nut 17' at one end thereof for binding said parts together, as shown in Fig. 4. This relatively long bolt not only constitutes one means for securing the journal-box to the side frame, but also constitutes a tie-bolt between the two members of the journal-box and prevents accidental movement of one member relatively to the other.

The two journal-boxes J and J' are herein shown rigidly secured together, so as to prevent lateral movement of said boxes relatively to each other, by means of two bracing or connecting members 18 and 19, the one 18 of which is in the nature of a channeled strut or tie-plate, it being formed integral with said boxes J and J', as shown most clearly in Fig. 6 of the drawings, said strut or tie-plate being projected preferably below the lower faces of the journal-boxes and being bolted by means of the bolts 20 and 20' to said side frames 2 and 4, respectively, as most clearly illustrated in Figs. 4 and 6 of the drawings, said bolts 20 and 20' being provided with nuts at the ends thereof, by means of which said strut is tightly clamped to the side frames, as shown in Fig. 6, so that said frames will be prevented from separating or being wrenched apart by the hammer should the same sway when being forced upon an inclined surface, and the projected portions of the strut, through which the bolts 20 and 20' are passed, form a support for the side frames and thereby prevent said frames from being compressed toward each other by any means. The connecting member or clamping device 19 is in the nature of a tie-rod, which extends through the parallel knuckles 21', formed by the bifurcated end of the member 9 and through the knuckle 21 of the member 8 of both journal-boxes J and J' at the upper rear ends thereof, as shown most clearly in Figs. 2 and 7, and constitutes the pintle which hinges the two members 8 and 9 of each journal-box together, said tie-rod carrying at the middle portion thereof a sleeve abutment 22, the opposite ends of which bear against the inner faces of the two journal-boxes J and J', as shown in said Fig. 7, and also being pro-

vided at the outer ends thereof with a nut, by means of which said parts are held assembled and substantially clamped against vibration. The tie-plate 18 is longitudinally slotted, as shown at 18', to form a guideway for the hammer-lifting board during the reciprocations thereof.

As a convenient means for securing the cap 9 of the journal-box in its closed position relatively to the base portion 8 of said journal-box, as shown in Fig. 4, and to facilitate the opening of said cap, I have provided in connection with the forward end of the journal-box a shiftable fastening device, which, in the form thereof herein shown, consists of an eyebolt 23, pivotally secured between ears 24 upon the lower member of the journal-box, and having the shank thereof in position to be swung into the position shown in Fig. 1 of the drawings between ears 25 and 25' upon the upper member or cap 9, said bolt having a nut 23' at the outer free end thereof, by means of which the cap is tightly clamped in its closed position or in the position shown in full lines in Fig. 4.

By the construction and organization of lifting-mechanism carrying-head herein shown and described it will be readily seen that the caps 9 of the two journal-boxes J and J' may be quickly opened into the position shown in dotted lines in Fig. 4 to render the journal-bearings of the two lifting-rolls accessible from above by simply loosening the nut upon the eyebolt 23, swinging said eyebolts into the position shown in dotted lines in said Fig. 4, and unscrewing the nut 17' upon and withdrawing the bolts 17, which leaves the cap 9 free to be opened.

As a convenient means for adjusting the roll R' toward and from the roll R, as may be required to take up wear or for adapting said rolls for engagement with the lifting-boards of different thicknesses, I have provided in connection with each bearing 13 and 13', respectively, adjusting means, which, in the preferred form thereof herein shown, consists of two oppositely-operable adjusting members 26 and 27, the one 26 of which is shown in the nature of a bolt extended through a smooth bore in the rear wall of the lower member 8 of the journal-box and having a head at the inner end thereof in engagement with the forward face of the journal-bearing 13, said bolt being provided with an adjusting-nut at the outer free end thereof, which bears against the rear face of the rear wall of the journal-box and is adapted to be adjusted for moving the journal-bearing rearwardly. Said bolt also has a jam-nut for maintaining a fixed adjustment of said bolt, whereas the other adjusting member 27 is in the nature of a screw, which extends through a screw-threaded opening in the rear wall of the lower member of the journal-bearings and bears at its inner end against the rear face of the journal-bearing 13 and is adapted for moving said journal-bearing forwardly, said adjusting-screw 27 also having a

jam-nut for preventing accidental turning of said screw. The construction, organization, and operation of the adjusting devices for the two journal-bearings 13 will be readily understood by reference to Figs. 2, 3, and 4 of the drawings.

When it is desired to remove or replace the lifting-rolls R and R' in the head 8, it is simply necessary to throw the caps 9 of the two journal-boxes J and J' into the open position shown in dotted lines in Fig. 4 and remove the nuts upon the adjusting-bolts 26, which leaves the rolls, with their journal-bearings, free to be separately removed, which will be readily understood by reference to Fig. 4 of the drawings.

The eccentric 11 for the shiftable roll R will, in practice, usually be a two-part eccentric, the inner ends of the two parts usually abutting against the opposite ends, respectively, of the hub of said roll and as herein shown. Each part is provided at the inner end thereof with an outwardly-projecting locker-arm 11', and these two arms of said eccentric are fixedly connected at their free ends by a tie-bolt 30, to which is pivoted the eccentric-actuating rod or roll-actuating rod 31, as clearly shown in Figs. 1, 2, and 3 of the drawings.

Having thus described our invention, we claim—

1. In a drop-hammer, the combination with the two side-frames; of a roll-carrying head consisting of two connected journal-boxes secured one to each side-frame, and each consisting of a fixed lower member having upwardly-extended front and rear portions, the front portion thereof having an approximately semi-circular recess in its upper face, and an upper member hinged to said lower member adjacent to the upper end of the rear portion thereof; and having a downwardly-extending front portion having an approximately semi-circular recess therein adapted to form, with the recess in the lower portion, a substantially-circular journal-bearing adapted to rotatably support a roll-actuating eccentric; a horizontally-shiftable journal-bearing supported between said upper and lower members in the rear of the approximately-circular journal-bearing; means in connection with and adapted for clamping said members together; and a slotted right-angled strut integral with and connecting said journal-boxes and depending below said boxes, and having a bearing engagement with and clamped to said side-frames, whereby the boxes will be prevented from lateral movement relatively to the side-frames, substantially as described.

2. In a drop-hammer, the combination with the two side-frames; of a roll-carrying head comprising two connected journal-boxes secured one to each side-frame, and each consisting of a fixed lower member and an upper member hinged to said lower member; and each journal-box having a bearing intermediate to said two members adapted for rotatably supporting a roll-actuating eccentric, and each

having a slideway adapted for shiftably supporting a horizontally-shiftable journal-bearing; and a slotted right-angled strut integral with and connecting said journal-boxes and depending below said journal-boxes, and having a bearing engagement with and clamped to said side-frames, whereby the boxes will be prevented from lateral movement relative to the side-frames, substantially as described.

3. In a drop-hammer, the combination with the two side-frames having laterally-projecting flanges at their upper ends, having rabbets on their upper faces; of a roll-carrying head comprising two connected journal-boxes secured one to each side-frame, and each consisting of a fixed lower member having rabbets on its under surface adapted to engage the rabbets on the laterally-projecting flanges of the side-frames, whereby the journal-boxes are rigidly held from movement relative to the side-frames, and an upper member hinged to said lower member; each journal-box having a bearing intermediate to said two members adapted for rotatably supporting a roll-actuating eccentric; and each having a slideway provided with a guide; a horizontally-shiftable journal-bearing adapted to engage said guide in the slideway; and a slotted right-angled strut integral with and connecting said journal-boxes and depending below said boxes, and having a bearing engagement with and clamped to said side-frames, whereby the boxes will be prevented from lateral movement relative to the side-frames, substantially as described.

4. In a drop-hammer, the combination with a roll-carrying head comprising two connected, relatively-remote journal-boxes adapted to support journal bearings, each journal-box comprising an upper and a lower member, and one of said members having a bifurcated end forming parallel knuckles adapted to overlap the knuckle of the other member; a clamping device consisting of a tie-rod extending through the hinge-knuckles and clamping said journal-boxes together, and constituting a pintle on which the upper members of said boxes swing; a sleeve on said pintle between, and abutting against, the inner faces of the journal-boxes, and constituting an abutment for said journal-boxes; and means for tightly clamping said tie-rod in the journal-boxes and the journal-boxes against the sleeve, whereby said boxes are prevented from being strained out of position or separated, and whereby also vibration of the boxes relative to each other is substantially prevented, substantially as described.

5. In a drop-hammer, the combination with

the two side-frames; of a roll-carrying head comprising two connected relatively-remote journal-boxes, adapted to support journal-bearings, each journal-box comprising an upper and a lower member having parallel extending hinge-knuckles; a clamping device consisting of a tie-rod adapted to connect and clamp said journal-boxes together, and constituting a pintle on which the upper members of said boxes swing; a sleeve on said pintle between and abutting against the inner faces of the journal-boxes to keep the same from being drawn out of position; means for tightly clamping said tie-rod in the journal-boxes, whereby said journal-boxes are prevented from being strained out of position or separated; and a slotted right-angled strut integral with and connecting said journal-boxes and depending below said boxes, and having a bearing engagement with and clamped to said side-frames, whereby the boxes will be prevented from lateral movement relative to the side-frames, substantially as described.

6. In a drop-hammer, the combination with the two side-frames; of a roll-carrying head consisting of two connected journal-boxes, secured, one to each side-frame, and each consisting of a lower member and an upper member hinged to said lower member, and having a substantially-circular journal bearing adapted to rotatably support a roll-actuating eccentric; a horizontally-shiftable journal-bearing supported between said upper and lower members in the rear of the approximately-circular journal-bearing; a relatively-long clamping-bolt extending through both members of each journal-box, and adapted to clamp said members together and to the frame; and a relatively-short clamping-bolt extending through the lower member of each journal-box, and adapted to clamp the journal-boxes to the side-frames, whereby by means of the clamping-bolts, the two members of each journal-box are held clamped together, and the journal-boxes fixed to the frames; and a slotted right-angled strut integral with, and connecting, said journal-boxes and depending below said boxes, and having a bearing engagement with, and clamped to, said side-frames, whereby the boxes will be prevented from lateral movement relative to the side-frames, substantially as described.

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