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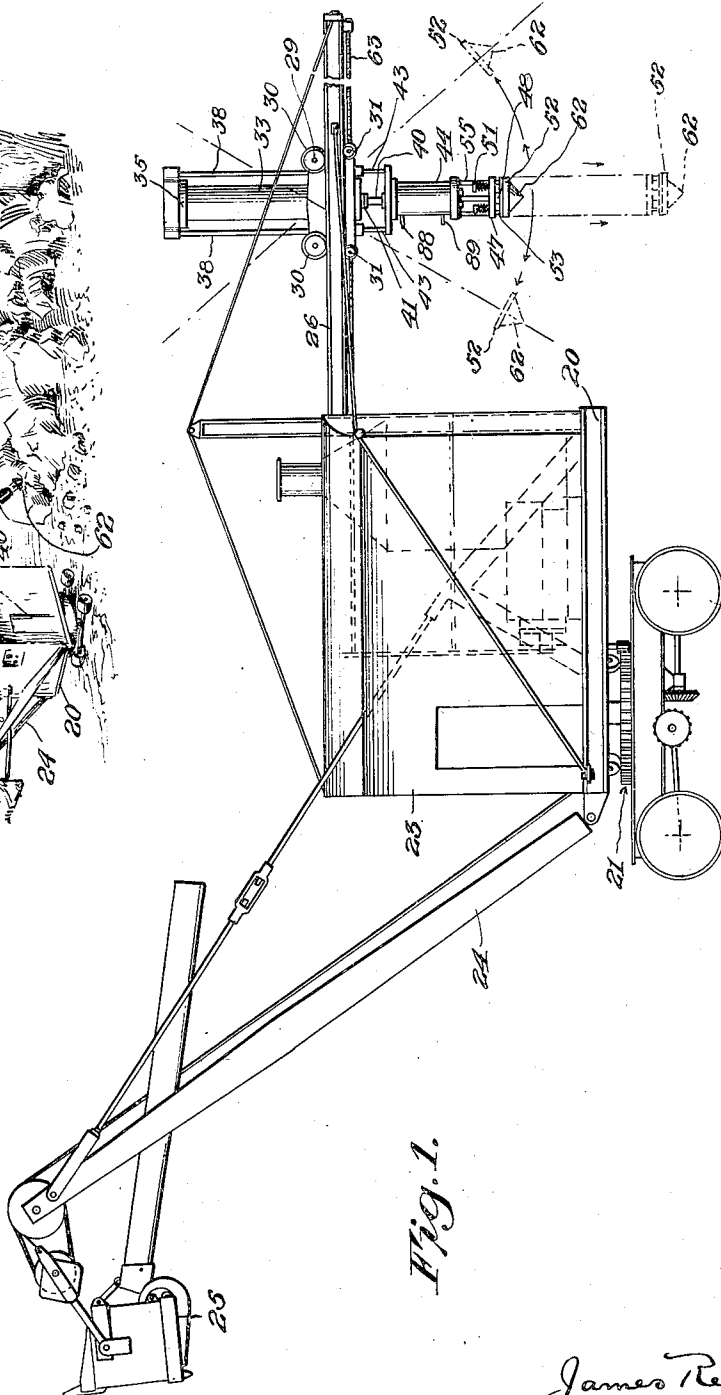
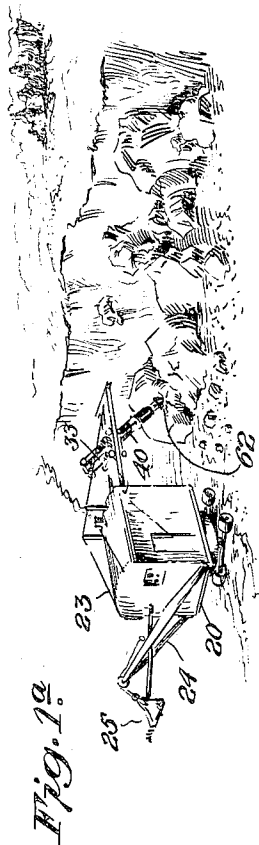
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J. REANEY

MECHANISM FOR BREAKING AND HANDLING STONES

Filed June 22, 1921

6 Sheets-Sheet 1



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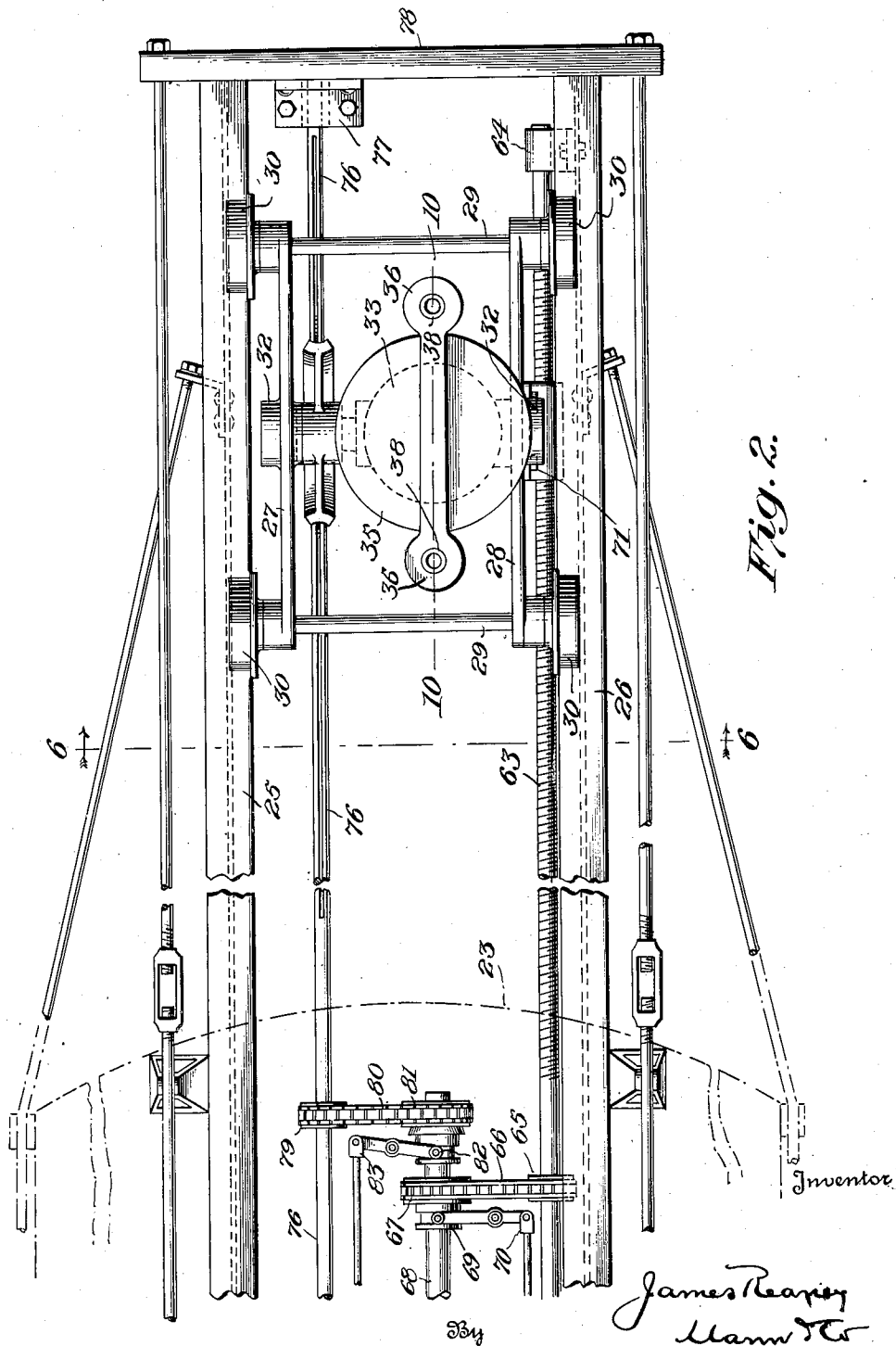
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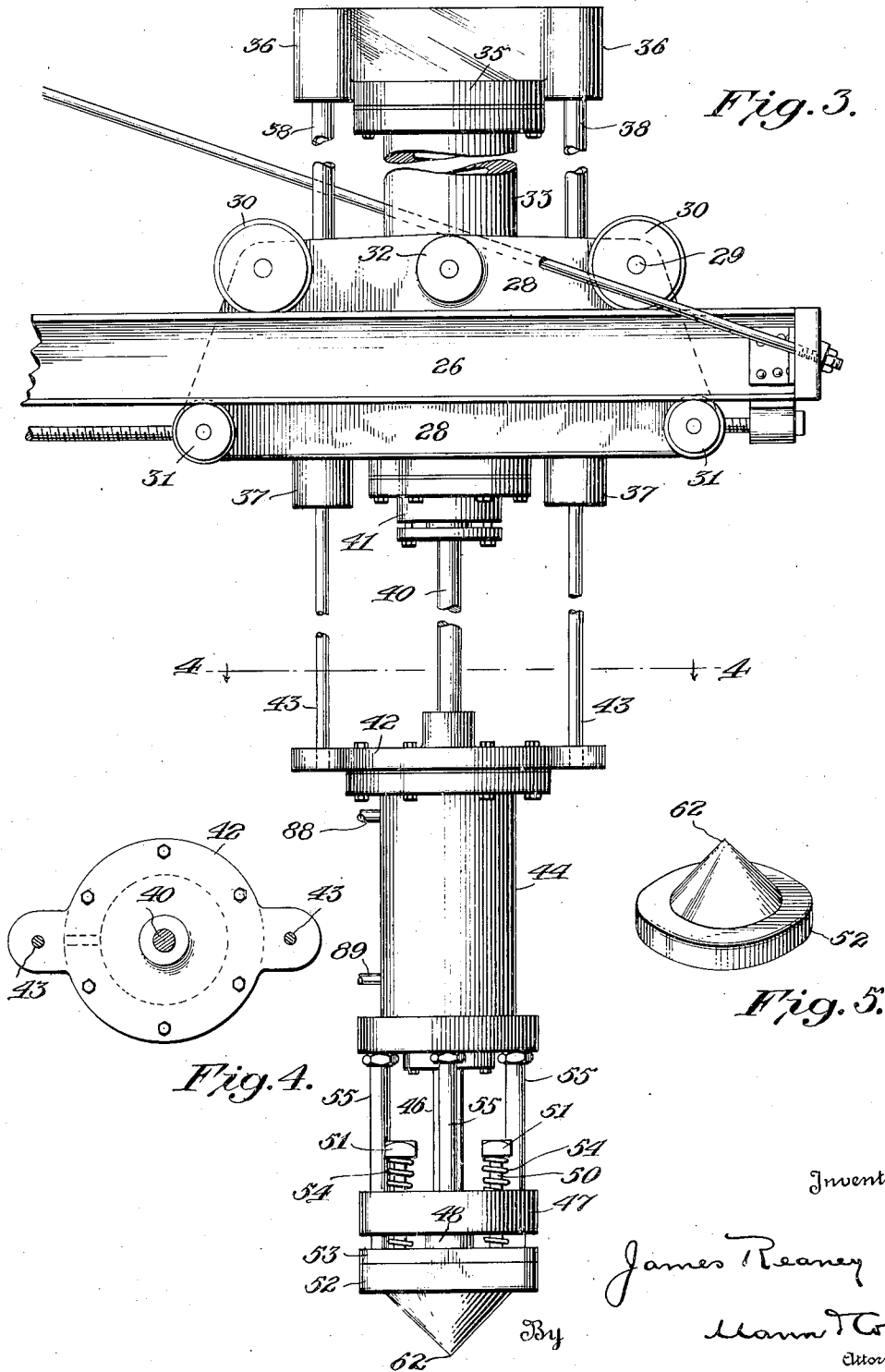
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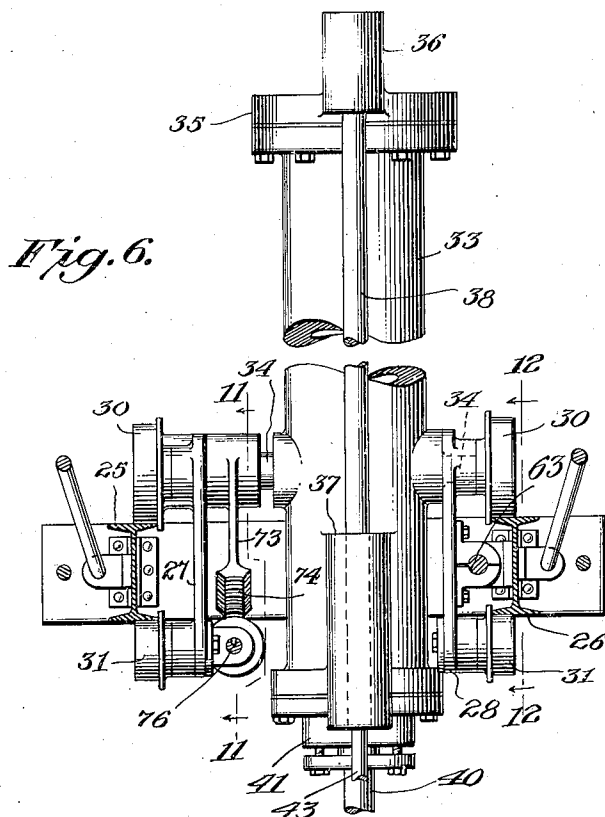


Fig. 6.

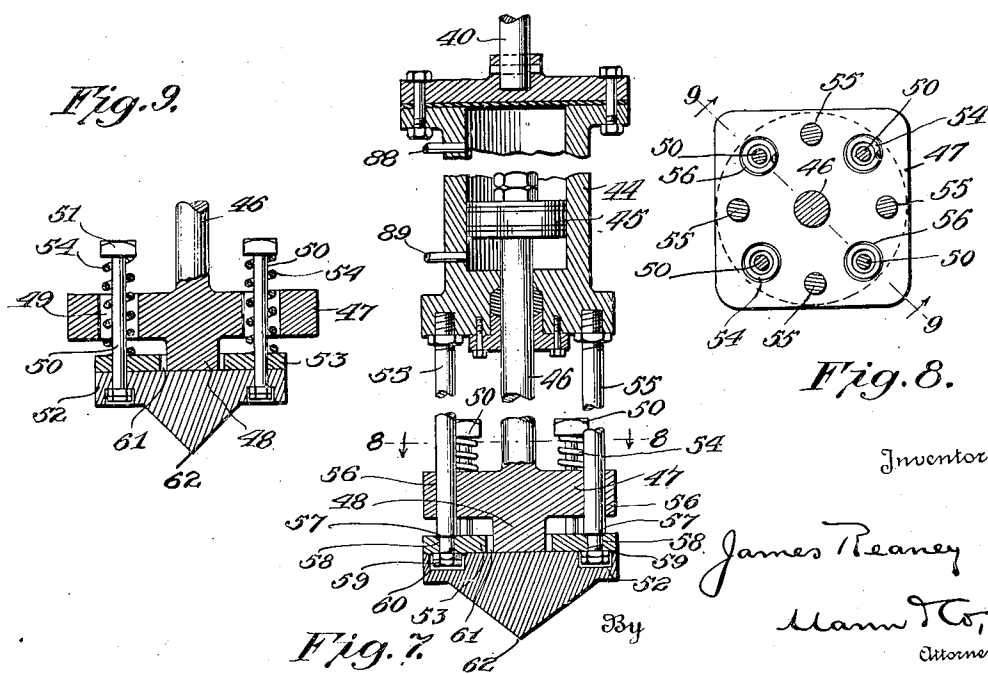


Fig. 9.

Fig. 8.

Fig. 7.

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MECHANISM FOR BREAKING AND HANDLING STONES

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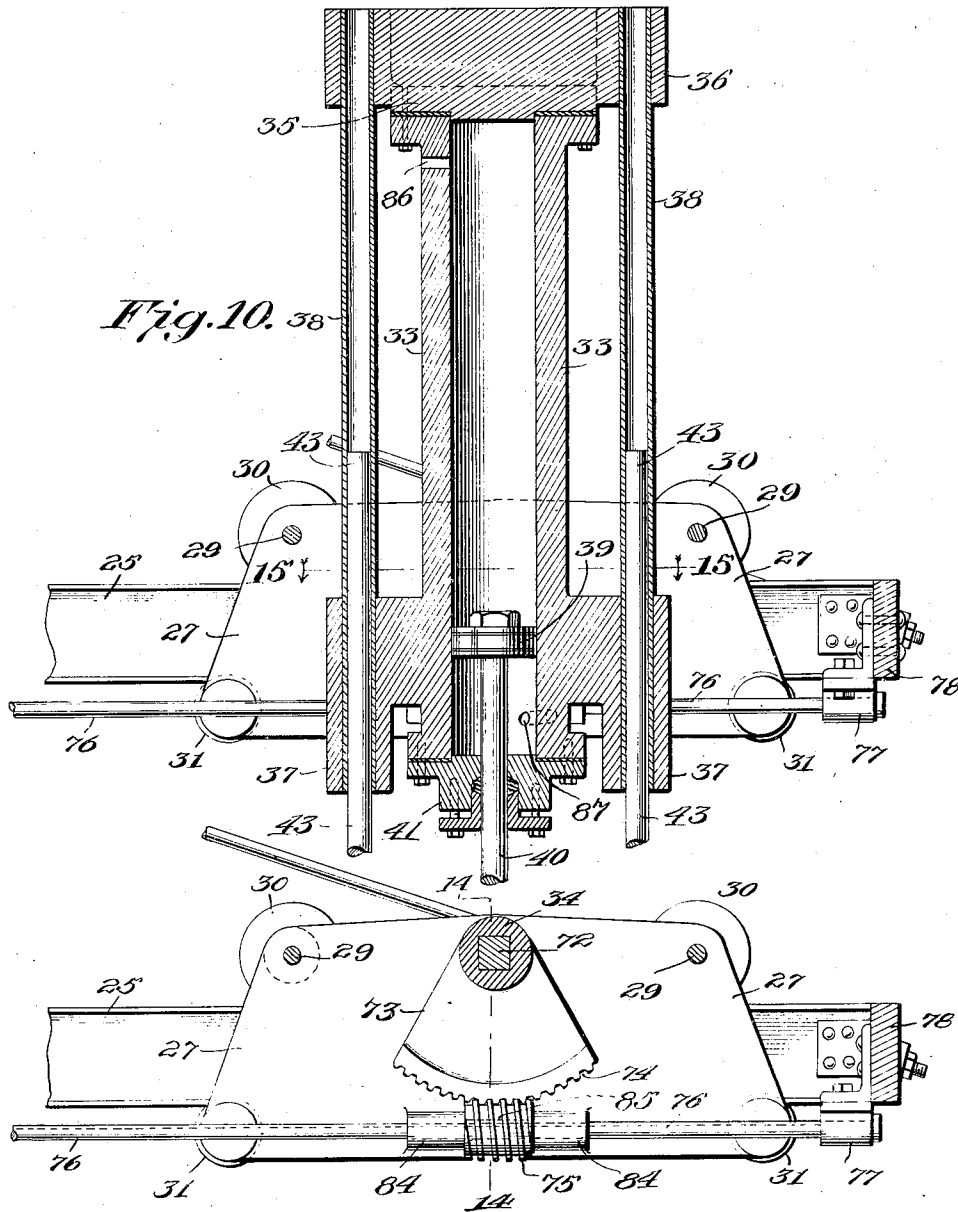


Fig. 11.

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Fig. 12.

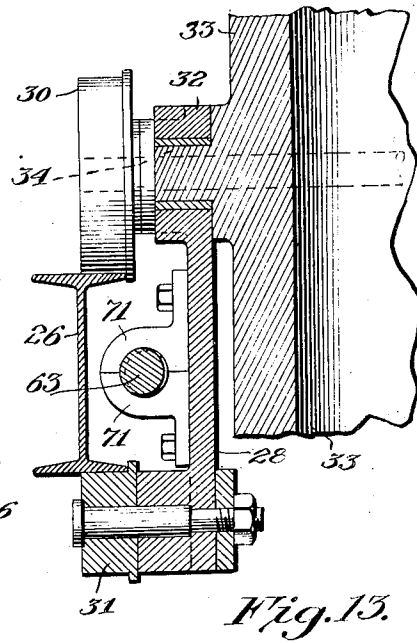
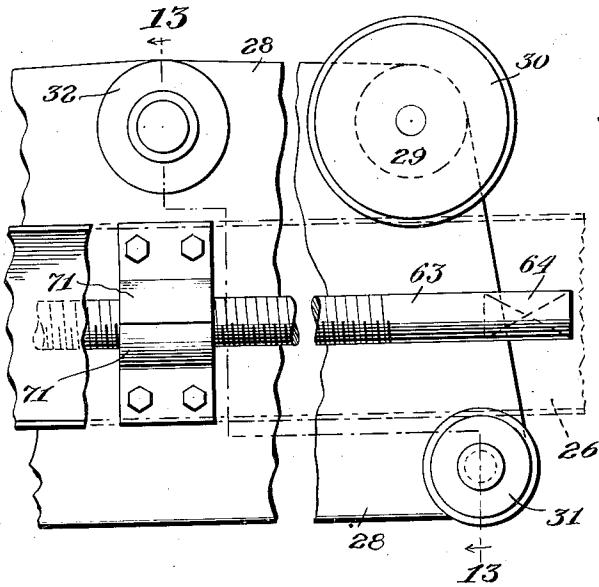


Fig. 13.

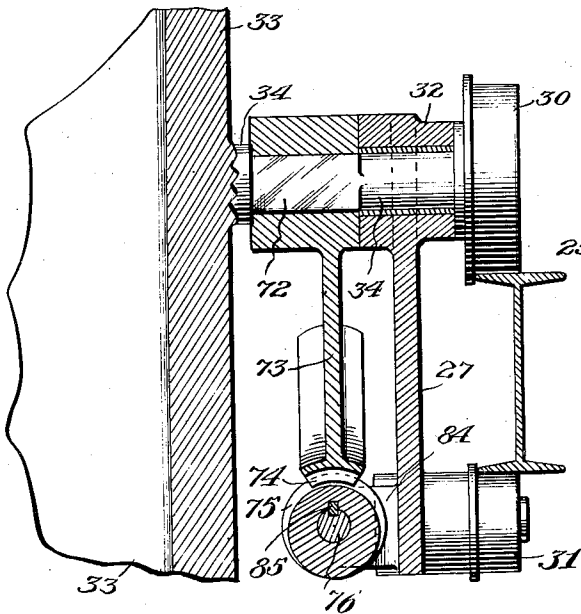


Fig. 14.

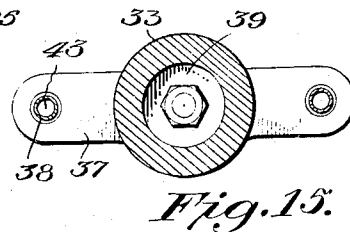


Fig. 15.

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UNITED STATES PATENT OFFICE.

JAMES REANEY, OF RUXTON, MARYLAND.

MECHANISM FOR BREAKING AND HANDLING STONES.

Application filed June 22, 1921. Serial No. 479,443.

To all whom it may concern:

Be it known that JAMES REANEY, a citizen of the United States, residing at Ruxton, in the county of Baltimore and State of Maryland, has invented certain new and useful Improvements in Mechanism for Breaking and Handling Stones, of which the following is a specification.

This invention relates to an improved machine for breaking and handling rock and other materials and has for its main object to provide a machine that combines a power hammer and a shovel device arranged on a self-propelled vehicle structure whereby it may be portable and wherein the shovel or hammer may be swung from one side to the other to bring either of them into position for operation.

Another object of the invention is to provide an improved means for portably sustaining a power hammer whereby the latter may be capable of movement forward or backward with respect to the sustaining means; may be raised or lowered or be swung laterally to present the hammer at substantially a right angle to the surface against which the blow is to be directed, and

A further object of the invention is to provide an improved construction of power hammer.

With these, and other objects in view, the invention is illustrated in the accompanying drawings, wherein,—

Fig. 1 shows a machine in side elevation, wherein the invention is embodied.

Fig. 1^a illustrates on a smaller scale the machine in conjunction with a wall of rock, or rock quarry, to indicate the operation of the machine.

Fig. 2 shows, on an enlarged scale and in top or plan view, the hammer-supporting and positioning mechanism and a portion of the cab from which the same is controlled.

Fig. 3 illustrates the outer end of the hammer-supporting devices and shows the hammer in side elevation.

Fig. 4 shows a cross-sectional detail through the hammer-suspension device,—the section being taken on the line 4—4 of Fig. 3.

Fig. 5 illustrates in perspective the detached anvil-plate which receives the blow of the hammer proper.

Fig. 6 shows a vertical cross-sectional detail through the track-supports and looking

toward the carriage and hammer-support on the line 6—6 of Fig. 2.

Fig. 7 illustrates a vertical cross-sectional detail through the hammer actuating-mechanism, the anvil-plate and the yielding suspension means for the latter.

Fig. 8 shows a cross-sectional detail through the latter,—the section being taken on the line 8—8 of Fig. 7.

Fig. 9 illustrates a cross-sectional detail through the hammer-head,—the anvil-plate and the suspension means for the latter as the same would appear if cut on the line 9—9 of Fig. 8.

Fig. 10 shows an enlarged vertical section through the upper pressure cylinder which sustains the lower hammer-actuating cylinder and devices,—the section being taken on the line 10—10 of Fig. 2.

Fig. 11 illustrates a vertical sectional detail through the hammer swinging devices,—the section being taken on the line 11—11 of Fig. 6.

Fig. 12 shows a detail in side elevation of the hammer-supporting carriage and the means for moving the same on the track beams all as they would appear if viewed on the line 12—12 of Fig. 6, with the track-beam removed.

Fig. 13 illustrates a vertical-sectional detail through the same,—the section being taken on the line 13—13 of Fig. 12.

Fig. 14 shows an enlarged vertical section through the devices for swinging the hammer devices,—the section being taken on the line 14—14 of Fig. 11, and

Fig. 15 illustrates a cross-sectional detail through the upper pressure cylinder and its guide devices which sustain the lower hammer-cylinder,—this section being taken on the line 15—15 of Fig. 10.

In carrying the invention into practical effect there is provided in the present instance a vehicle 20, mounted on a portable truck 21, as indicated in Fig. 1^a of the drawing. In practice, this vehicle has a cab 23, in which mechanisms are installed for propelling the vehicle and operating suitable windlass mechanism and pumps for the compression of air, in case compressed air is utilized as the motive fluid for actuating the hammer devices, or a boiler in case steam is utilized as such motive fluid.

The present machine is especially designed for use in stone quarries where after

blasting rock from its bed it is necessary to further break the stone into desirable sizes or sizes that can be handled by a power-actuated shovel or bucket,—so it can be loaded onto cars or trucks and conveyed to the mill where any further reduction in size that may be necessary can be effected by crushers or other means.

With these objects therefore in view, I mount the vehicle 20 on the truck 21, so the same can be revolved or swung from one side to the other of the portable truck, and from one side of the vehicle there is pivotally sustained a beam 24, which sustains a suitable shovel or bucket device 25, that may be elevated or lowered under the control of mechanism in the cab.

At the opposite side, the vehicle is provided with two spaced apart track-beams 25 and 26 respectively, which latter extend horizontally from but are rigidly held with respect to the cab.

On these track-beams there is mounted a carriage or truck which has two side plates 27 and 28, that are connected by upper horizontal cross-shafts 29 on the ends of which there are flanged wheels or rollers 30. These wheels or rollers 30 are sustained by and are designed to roll upon the top faces of the track-beams so that the weight of the carriage or truck is sustained by said beams.

At the lower edge each of the side plates 27 and 28 of the carriage or truck is provided with flanged rollers 31, which latter engage the under sides of the track-beams whereby upward displacement of the carriage from the beams will be prevented.

Each side plate 27 and 28 of the carriage or truck is provided with a circular boss 32, near its upper edge which forms a trunnion bearing and these bearings are centrally located with respect to the front and rear ends of the side-plates, as clearly shown in Figs. 2 and 3 of the drawings.

The purpose of the carriage or truck is to sustain the entire hammer devices, but of these devices an upper fluid motor only 33 is directly attached to the carriage by means of trunnions 34, which project horizontally and enter the bearings of the side plates.

This upper fluid motor 33 has a cylinder whose head 35 is provided with side lugs 36 at diametrically opposite sides thereof and near the bottom, said cylinder has other side lugs 37 so that guide tubes 38, may extend vertically from the upper to the lower side lugs, as shown best in Figs. 6 and 10 of the drawings, and for a purpose that will presently be explained.

In the cylinder of the upper fluid motor 33, there is a piston 39, having a stem 40 which passes through a stuffing-box 41, and depends below said motor. The lower end of this stem 40 is rigidly connected to a horizontal plate 42, and at opposite sides of the

stem this plate has an upwardly-extending guide-rod 43, which rods pass up through the lower lugs 37 on the lower end of the motor above and enter the guide tubes 38.

It is therefore to be understood that when the piston 39 is operated to move the stem 40 in a vertical direction the horizontal plate 42 will be given a like movement and the guide rods 43, will prevent the plate from turning during such movement.

The upper motor 33, its piston 39 and stem 40, are not utilized, in this instance, to give a hammer-blow, but are merely used to raise or lower the hammer devices to properly position said latter devices with respect to the work, before those devices are set into hammering operation by other means, as will present be more fully disclosed.

The actual hammer devices are pendantly sustained below the horizontal plate 42.

By reference to Figs. 3 and 7 of the drawings it will be noted that a lower cylinder 44 has its upper head-end bolted to the under side of the horizontal plate 42 which latter serves as a cover for the cylinder, and that said cylinder has a piston 45, and a rod 46, that depends from the lower end of the cylinder. This rod 46 carries a head 47 at its lower end which in reality is the hammer-head and has a central depending hammer-lug 48.

The hammer-head 47, is provided with a plurality of vertical holes or passages 49, as best illustrated in Figs. 8 and 9 of the drawings wherein it will be seen that four of such passages are provided. Through each of these vertical passages there extends a bolt 50, whose upper end is provided with a head 51 and whose lower end is bolted to an anvil-plate 52,—a washer 53, preferably being interposed between the anvil-plate and the hammer-head and the bolts 50 extending freely therethrough.

A coiled spring 54 encircles each vertical bolt 50 and has its lower end seated on top of the washer 53 and its upper end seated against the under side of the bolt-head 51, so that the washer and plate 52 are yieldingly held together by the four springs 54.

While the springs 54 yieldingly hold the anvil-plate 52 and washer 53 together, they play no part in sustaining the anvil-plate in position to receive the blow of the hammer-lug 48. The means for thus holding the anvil-plate will therefore now be explained, reference being made to Figs. 3, 7 and 9 of the drawings.

The lower cylinder 44, carries a plurality of depending rods 55, whose upper ends are rigidly secured in the lower end of such cylinder and extend downwardly therefrom. These rods are therefor rigid with the cylinder and, while movable therewith, have no movement independently thereof.

These rods 55, extend freely through vertical passages 56 in the hammer-head 47, and their lower ends are reduced in diameter whereby to form shoulders 57 thereon. 5 These reduced ends of the rods extend through perforations 58, in the washer 53 while the shoulders 57, seat on top of said washer so that the washer can have no vertical movement independently of the rods. 10 Nuts 59, are screwed onto the lower reduced ends of the rods 55, and seat against the under side of the washer so as to rigidly engage the washer with said rods.

In order to permit the anvil-plate 52, to 15 seat close against the under side of the washer 53, the same is provided with suitable sockets or recesses 60, which receive the nuts 59 on the lower ends of the rods, as clearly shown in Figs. 7 of the drawing.

20 The washer 53, is provided with a central hole 61, through which the hammer-lug 43, may project to stroke the upper side of the anvil-plate.

The anvil-plate 52, has a pointed projection or other shaped working-edge 62, which 25 directly engages or contacts with the rock to be broken.

From the foregoing explanation it will be understood that the upper cylinder 33 is 30 pivotally sustained from the carriage or truck by the trunnions 34 and that its lower end, and also the cylinder 44 and the hammering mechanism carried by the latter, hang pendantly from said carriage.

35 The carriage, because of its rollers 30—31 and the track-beams 25 and 26, may be moved on the track-beams in a direction toward or from the cab 23 so that the hammer mechanism may be moved more or 40 less laterally or to one side of the track-rails 22. To effect this, mechanism is provided whereby the movement may be accomplished with ease and expedition, as will now be explained, reference being made particularly to Figs. 2, 6, 12, and 13 of the 45 drawings.

By reference to Fig. 2, it will be noted that a horizontal shaft 63 extends along the inner side of track-beam 26 and has its outer 50 end supported in a bearing 64, and is carried on said beam. This shaft 63, extends into the cab 23 and on the interior of the latter said shaft carries a driving element such as a sprocket wheel 65, over which a 55 chain 66, passes. This chain 66, also travels over a sprocket 67, which is carried on a main driving-shaft 68, and a clutch 69, having a lever 70, is so connected with the sprocket 67, that the latter may be connected with or 60 disconnected from the said driving-shaft 68 at will.

The shaft 63, is circumferentially screw-threaded along its stretch between the cab 65 and the outer bearing 64, and this screw-threaded portion extends along and close to

the vertical side plate 28 of the carriage or truck, as clearly shown in Figs. 2 and 13 of the drawings. This side plate 28 of the carriage or truck sustains a split or two-part bearing-bracket 71, which is internally 70 screw-threaded so as to engage the threads on the exterior of the shaft.

Obviously, as shaft 63 has no longitudinal movement while the threaded bearing 71 is 75 movable with the carriage or truck, when said shaft is revolved the bearing 71 will be made to travel thereon, thereby moving the carriage in the direction in which said bearing is caused to travel. Obviously if shaft 68, be capable of reversal in its direction of 80 rotation it may drive the sprockets and chain in either direction and thus enable the shaft 63 to be rotated in either direction so that the carriage and the suspended hammering mechanism may be moved either forward or backward on the track-beams. 85

In addition to the back or forward adjustment of the carriage and hammer-mechanism with respect to the cab, it is also 90 desirable that said hammer-mechanism be capable of being swung with respect to the carriage from which it is suspended in order that the blow may be delivered at a right angle with respect to the surface 95 against which it is to be directed.

To provide for this swinging adjustment of the hammer-mechanism I pendantly sustain the latter by the trunnions 34 but the means employed to effect this swinging adjustment will now be explained, particular 100 reference being made to Figs. 2, 6, 11 and 14 of the drawings.

By referring particularly to Figs. 11 and 12 it will be noted that the trunnion 34, 105 on the side of cylinder 33, next to the track-beam 25, has a squared or angular portion 72 and that a segment-plate 73 is rigidly secured on said angular portion and depends therefrom in a vertical plane between the 110 wall of the cylinder 33 and the vertical side-plate 27 of the carriage or truck. The lower edge of this plate 73, is provided with a segment-rack 74, which latter meshes with a worm 75, that is carried on a long horizontal shaft 76. 115

This horizontal shaft 76, as can be seen in Fig. 2 of the drawing, extends horizontally at the inner side of the side-plate 27 120 of the carriage or truck with its forward end seated in a bearing 77 on a cross-bar 78 at the outer ends of and connecting the two track-beams.

This shaft 76 extends toward and enters the cab 23 and carries a sprocket 79 over 125 which a chain 80 passes. This chain also extends around a sprocket 81 on the main driving shaft 68, and a clutch device 82, controlled by a lever 83, serves to connect or disconnect the shafts 68 and 76.

The shaft 76, passes through suitable 130

guide bearings 84, which are carried at the inner side of the vertical truck or carriage plate 27, which bearings are located at opposite ends of the worm 75, and said shaft is provided with a groove 85 which extends longitudinally thereof and a key in the worm 75, engages the groove of said shaft and coacts therewith whereby to form a spline and feather connection which will permit the shaft 76 to be revolved so as to revolve the worm and swing the segment-plate 73, which latter will rock the trunnion 72—34, and thereby swing the cylinder 33 in a direction corresponding to the direction in which the segment-plate is swung by the shaft. Obviously, when the cylinder 33 is swung the lower cylinder 44 and hammering mechanism will be correspondingly moved.

To raise or lower the hammering mechanism it is only necessary to actuate the piston 39 in the cylinder 33 in the desired direction,—connections 86 and 87 for the inlet or exhaust of the actuating medium, such as a fluid under pressure being provided in the cylinder.

To actuate the hammering mechanism, fluid pressure connections 88 and 89 are provided in the lower cylinder 44.

From the foregoing explanation it is to be understood that the vehicle carrying the shovel and hammer structures may be moved along the track-rails to any precise point desired; that the vehicle may be revolved on its truck so that either the hammer mechanism or the shovel may be swung to either side of the truck; that the hammer mechanism may be moved along the track-beams in a direction toward or from the cab of the vehicle, or raised or lowered to present it to the substance against which the force of the blows are to be directed, and that the anvil-plate 52 may be seated on the material to be broken and the hammer-head reciprocated to deliver blows against the anvil-plate.

Having described my invention, I claim:—

1. In a device of the character described the combination with a trackway, a carriage on the trackway, a cylinder pivotally carried by the carriage and depending from the latter, power means for inclining the cylinder with respect to the carriage, a piston in said cylinder, a power hammer sustained by said piston and means independent of said piston for actuating said hammer.

2. In a device of the character described the combination with a trackway, a carriage on the trackway, a cylinder pivotally carried by the carriage, a segment-rack movable with the cylinder, a worm engaging the segment-rack, a piston in the cylinder, a power hammer sustained by the piston and means independent of the said piston for operating the power hammer.

3. In a device of the character described the combination with a portable truck, of a trackway extending laterally from the truck, a carriage on said trackway, a cylinder carried by the carriage, a piston in said cylinder, a second cylinder sustained by said piston said latter also having a piston with a stem, a hammer device yieldingly carried by the stem of the latter piston and means for operating said latter piston to actuate the hammer.

4. In a mechanism for handling rock with a portable truck having a shovel structure at one side in combination with a trackway extending laterally from the truck, a carriage on the trackway, a power hammer pivotally carried by the carriage and depending below the trackway, means on the truck for moving the carriage toward and from the same, means for vertically adjusting the power hammer and power means for swinging the hammer with respect to the carriage and trackway.

In testimony whereof I affix my signature.
JAMES REANEY.