

Oct. 15, 1929.

J. REANEY

1,731,985

COMBINED POWER HAMMER AND SHOVEL MECHANISM

Filed Oct. 8, 1927

4 Sheets-Sheet 1

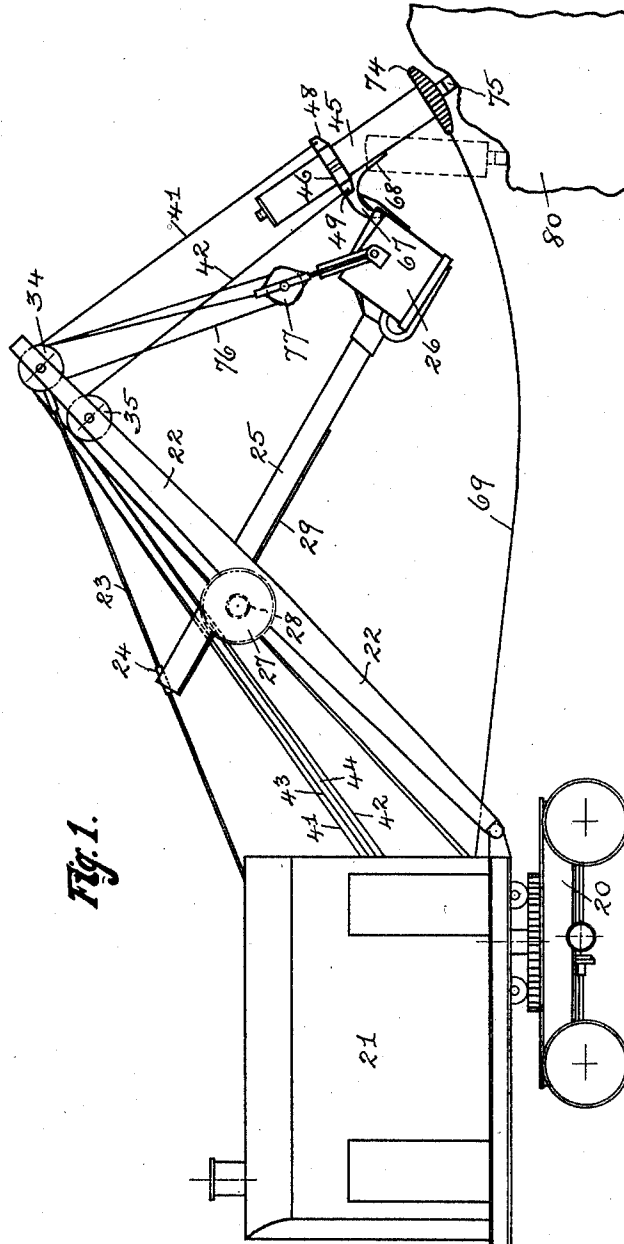


Fig. 1.

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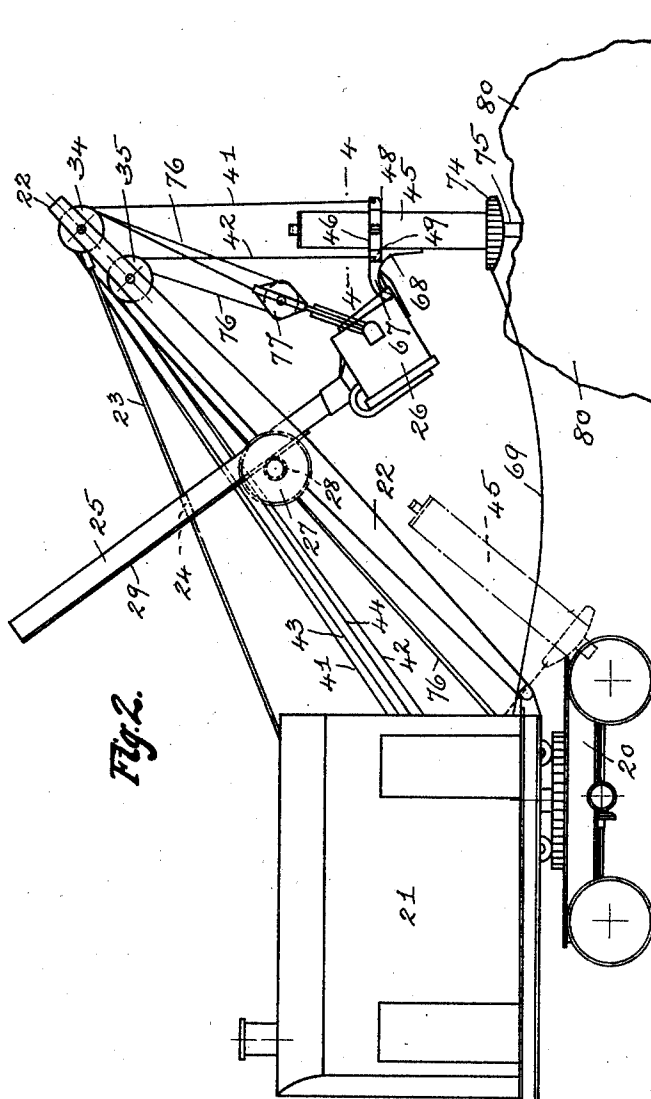


Fig. 2.

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Fig. 3

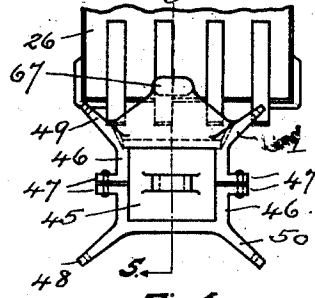
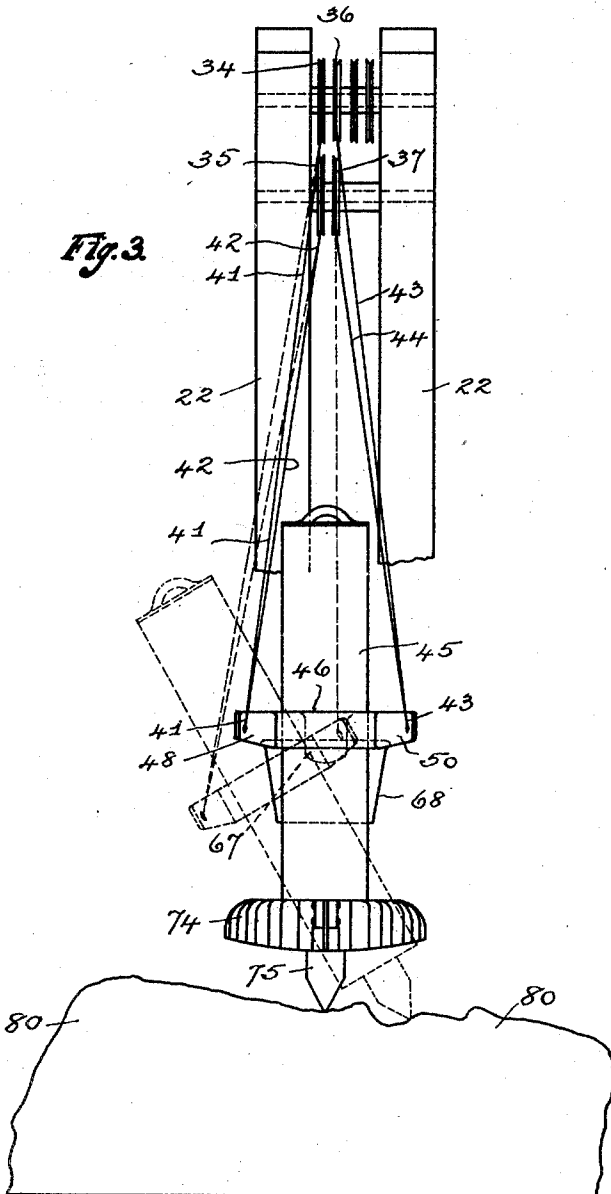


Fig. 4

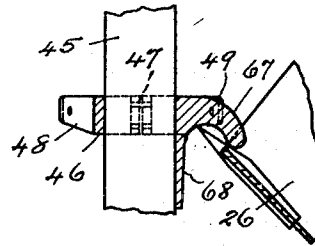


Fig. 5



Fig. 6

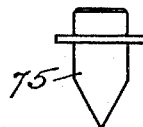


Fig. 7

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4 Sheets-Sheet 4

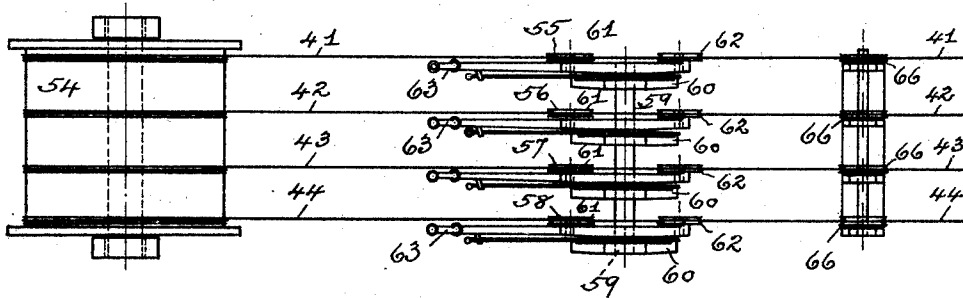


Fig. 8

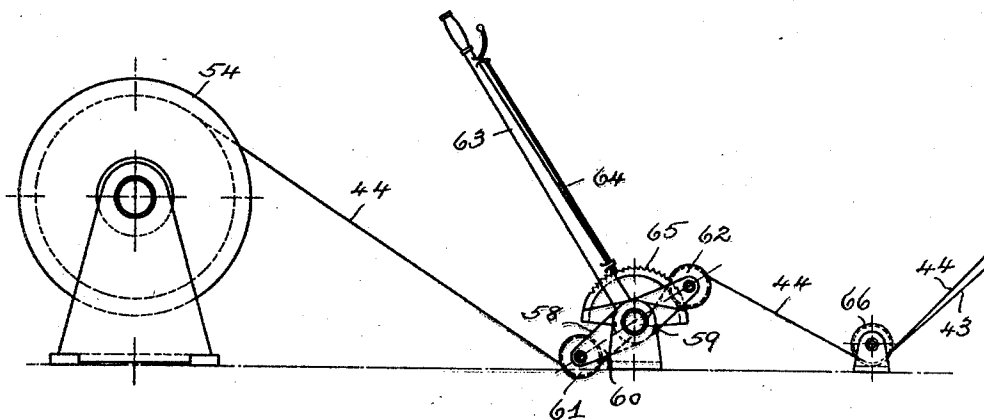


Fig. 9.

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UNITED STATES PATENT OFFICE

JAMES REANEY, OF BALTIMORE, MARYLAND

COMBINED POWER HAMMER AND SHOVEL MECHANISM

Application filed October 8, 1927. Serial No. 224,853.

This invention relates to a combined power hammer and shovel mechanism and is particularly directed to a portable mechanism whereby the two structures may cooperate in breaking up and removing material.

The present invention is a modification of and an improvement upon my pending application for patent, Serial Number 160,168, filed January 10th, 1927, and differs from the latter mainly in that in the present structure, the shovel or dipper structure may be made to cooperate with the hammer and its suspension means whereby to properly position the hammer with respect to the object or material upon which it is to operate.

The invention is especially useful in the operation of quarrying stone where the stone is to be broken up sufficiently to enable it to be handled with a power shovel or dipper.

I have found in the operation of a stone quarry that many large boulders may be readily broken up by power hammers, if the hammer is properly presented to the face of the boulder, and that an enormous saving in both time and expense over drilling and blasting will result.

I have also found that I can combine a hammer with a shovel structure in such manner that the hammer may be raised or lowered, swung or tilted, and that I can utilize the dipper attachment of the shovel structure so it may engage the hammer and materially assist in placing the latter against a rock or boulder so the latter can be broken to advantage.

With these objects in view, the invention is illustrated in the accompanying drawing, wherein,—

Fig. 1 shows in side elevation a portable vehicle carrying a power-operated dipper and also carrying a power hammer which latter is being held in an inclined position against a rock by the dipper.

Fig. 2 illustrates a similar view but with the dipper and hammer in a different relative position.

Fig. 3 shows the boom and hammer in front elevation together with the suspension cables for adjustably sustaining the hammer.

Fig. 4 illustrates the hammer in top or plan

view and shows the front edge of the dipper engaging the latter as though the parts were viewed on the line 4—4 of Fig. 2.

Fig. 5 shows a vertical sectional detail through the hammer suspension frame and arms and a portion of the dipper as the same would appear if viewed on the line 5—5 of Fig. 4.

Figs. 6 and 7 illustrate top and side views respectively of the detached breaking-tool.

Fig. 8 shows the cable winding and tension varying means in top view, and

Fig. 9 illustrates the same in side elevation.

Referring to the drawings and particularly Figs. 1 and 2 thereof, the numeral 20 designates a truck on which there is a cab 21 in which the power plant is located.

The particular construction of the truck, the cab thereon, or the power-plant is not material to this invention but the cab and power plant, as is usual in similar structures, are mounted so as to be turned on the truck or to be advanced with the truck.

In this instance, the cab carries a boom 22 whose lower end is attached to the base of the cab and whose upper end is sustained by rods 23 and turn-buckles 24 whereby to support the boom in an inclined position from the base of the cab.

In the present disclosure, the boom 22 sustains dipper stick 25 with the dipper 26 at the end thereof.

On the boom 22, I locate a power device 27, which has a pinion 28 that engages a rack 29 on the dipper stick 25 whereby in conjunction with certain cables, hereinafter to be explained, to move the latter.

At the upper end of the boom 22, there are four grooved pulleys 34, 35, 36 and 37 respectively over which cables 41, 42, 43 and 44 pass and the forward ends of the cables are designed to be attached to the hammer 45 which latter is to be raised, lowered or tilted.

In making this attachment to the hammer 45, it is important that the cables, at the point of attachment, be sufficiently spread to prevent them fouling and also to enable the hammer to be shifted by either increasing or

lessening the tension on one or more of the cables which suspend the hammer.

In the present instance, I provide a spreader frame 46 which is clamped about the hammer structure and this frame has, in this instance, four arms 48, 49, 50 and 51 and the lower ends of the hoisting and suspension cables 41, 42, 43 and 44 are connected respectively to the said arms.

The cables 41, 42, 43 and 44 all extend from the grooved pulleys 34, 35, 36 and 37 back toward the cab 21 and are wound about a power-driven drum 54, which latter is designed to operate like any hoisting drum to wind or unwind the cables at will.

I preferably, however, wind all of the hoisting and suspension cables about the same drum so that when the drum is turned, all of the cables will be wound or unwound. This simplifies the structure over one wherein each cable is wound about a separate drum.

Between the drum 54 and the boom, I interpose a means for varying the tension on any one of the cables independently of the others by making a cable take more or less of the load of the hammer.

I have adopted the expression "varying the tension" with reference to the cable after due consideration, for if any one of the cables is operated so its suspension end of the load is lowered, then the tension on that one or more of the cables is lessened and the load itself will shift correspondingly, and if one or more of those cables is or are operated so its or their suspending end or ends is or are elevated, then such cable or cables will carry more of the load or have their tensions increased, and the load will shift or turn at an angle corresponding to the variations in such cable-tension.

The variation in cable-tension is effected, in this instance, by normally providing a bend or loop in the stretch of each cable so that to decrease the tension, the bend will be straightened out or to increase the tension, the bend or loop will be increased.

By reference to Figs. 8 and 9 of the drawings, it will be noted that each cable passes around a tension-varying device, the same being designated 55, 56, 57 and 58 respectively in the drawings.

These devices are all mounted on a horizontal shaft 59 and each has a rocking-beam 60 with idler rollers 61 and 62 at opposite ends thereof.

Each beam is provided with an actuating lever 63 with a locking-pawl 64 associated therewith, and a segment rack 65, is provided for engagement by the pawl in order that the beams may be held in any desired rocked position.

The cables pass from the drum 54, to and around the under side of rollers 61 on one end of the rocking-beams; then over the

upper side of the rollers 62, at the opposite end of the beams, and then, in this instance, beneath a series of idler pulleys 66, on their way to the pulleys 34, 35, 36 and 37 at the end of the boom.

The tension-varying devices, preferably, are normally set in an inclined position, as shown in Fig. 9 of the drawings so that a bend will be formed in each cable between the drum 54 and the idler pulleys 66, instead of allowing those cables to run in a direct straight line from the drum to said pulleys.

Obviously, if the lever 63, shown in Fig. 9 is swung to the right, the bend in cable 44, shown in that view, will be let out, consequently the load-end of that cable will be lowered and the hammer at the lower end of that cable will shift its position and tilt as it takes up the slack thus provided.

Thus by varying the tension of the cables, the hammer may be tilted by making the suspension cables of unequal tension so that the hammer may be made to take any one of a wide range of tilted or inclined positions.

The spreader frame 46 about the hammer 45, in this instance, is formed in two parts and has vertical side flanges 47 by which said parts are bolted together.

This frame also has at its rear side a laterally-projecting and downwardly-curved hook-lug 67 which extends laterally from between the spreader-arms 49 and 51, as shown in Figs. 4 and 5 of the drawing which lug is provided for a purpose that will presently be explained.

The spreader frame 46 also has a depending shield or apron 68 which extends downwardly therefrom and preferably lies close against the rear side of the hammer casing 45, as can be seen in Figs. 1, 2 and 5 of the drawings.

No attempt has been made herein to illustrate the hammer structure, which in practice may be operated by fluid pressure as set forth in my said pending application for patent, or by any power means, to direct a blow on the tool 75 at the lower end of the hammer and below the guard plate 74.

I provide a cable 69 which extends from the cab 21 to and is attached to a part of the hammer by which the hammer may be drawn toward the cab and held out of the way of the shovel 26, as indicated in broken lines in Fig. 2 of the drawing, when it is desired to use the shovel alone.

In the operation of the device, the cab 21 may be turned on the truck 20 so the boom 22 may project as near as practicable over the rock or material 80 to be broken.

If the boulder is located in a vertical plane of the boom beyond the upper suspension end, the dipper 26 may be readily manipulated to engage under the hook-lug 67 of the spreader-frame and swing the hammer into an inclined position as shown in Fig. 1, and

thus present the hammer-tool 75 to the rock in a way to produce the best splitting results.

If it is then desired to move the hammer back to present the tool 75 to another face of the rock, a slight rearward movement to the dipper and a further adjustment of the suspension cables 41, 42, 43 or 44 if necessary will again enable the hammer to be properly positioned with respect to the face of the rock or material to be broken.

If a rock should be under the boom, the shovel may engage the hook-lug 67 and draw the hammer backward over such rock.

The shovel therefore acts as a support at one side of the hammer while the suspension cables may be manipulated to tilt the hammer above that support.

Obviously the dipper is operated through its dipper-stick and the cables 76 and pulleys 77 in the usual manner.

When the rock has been broken sufficiently for the shovel to scoop it up and load it upon cars, the hammer will be drawn to one side by cable 69 and the shovel then proceed with its work independently of the hammer.

Having described my invention, I claim,—

1. The combination of a power hammer, of a plurality of separate suspension devices to engage the hammer at spaced points with respect to the axis of the hammer, means for operating the suspension devices to effect a tilting of the hammer and a power operated dipper to engage the hammer and shift the latter laterally.

2. The combination with a power hammer, of means for moving the hammer up and down and to tilt the latter to an inclined position and a power operated dipper movable to engage the hammer to shift the same laterally.

3. The combination with a portable vehicle, of a boom extending from the vehicle and mounted so it may be swung, a power hammer sustained from the boom, means for raising, lowering and tilting the hammer and a power dipper also operated from the boom and movable to engage the hammer to shift the latter laterally with respect to the suspension point of the boom.

4. The combination with a vehicle having a boom, of a power hammer, a plurality of cables directed by the boom to and suspending the hammer, means for manipulating the cables to effect a tilting of the hammer, a power dipper directed by the boom said dipper being movable to engage the hammer to shift the latter out of plumb with respect to the suspension point of the boom.

5. The combination with a power hammer, of a plurality of arms radiating from the hammer, a separate cable attached to each of said arms whereby to suspend the hammer, means for operating the cables to effect a tilting of the hammer, a power dipper and means for operating the dipper to engage it

with the hammer to swing the suspended hammer laterally.

6. The combination with a power hammer of a spreader frame about the hammer and having a series of arms and a lateral lug, means for suspending the hammer from said arms, a power dipper and means for operating the dipper to engage it with the said lug to move the suspended hammer laterally.

In testimony whereof I affix my signature.
JAMES REANEY.

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