

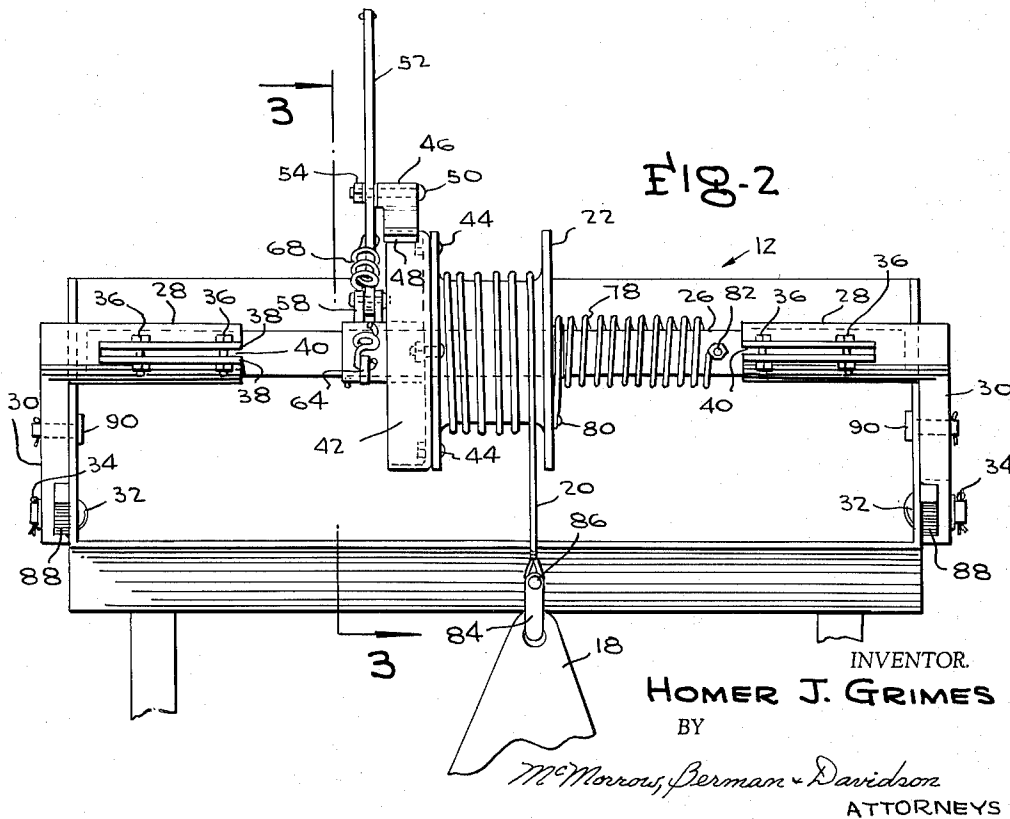
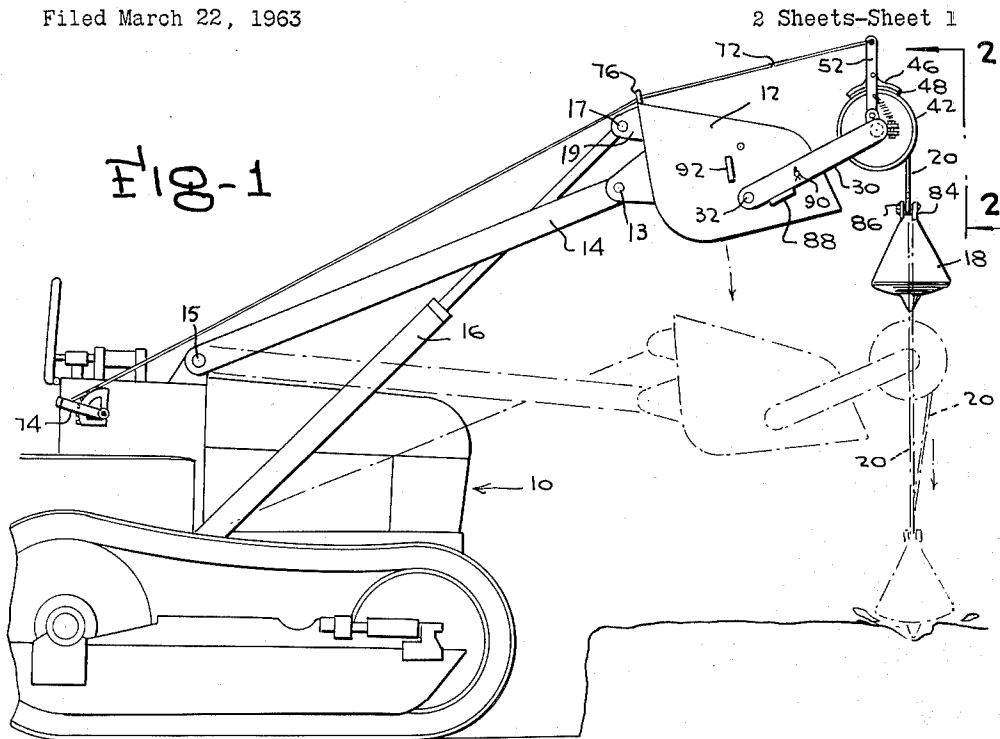
Feb. 8, 1966

H. J. GRIMES

3,233,687

DROP HAMMER

Filed March 22, 1963



INVENTOR.
HOMER J. GRIMES
BY
McMorrow, Berman & Davidson
ATTORNEYS

Feb. 8, 1966

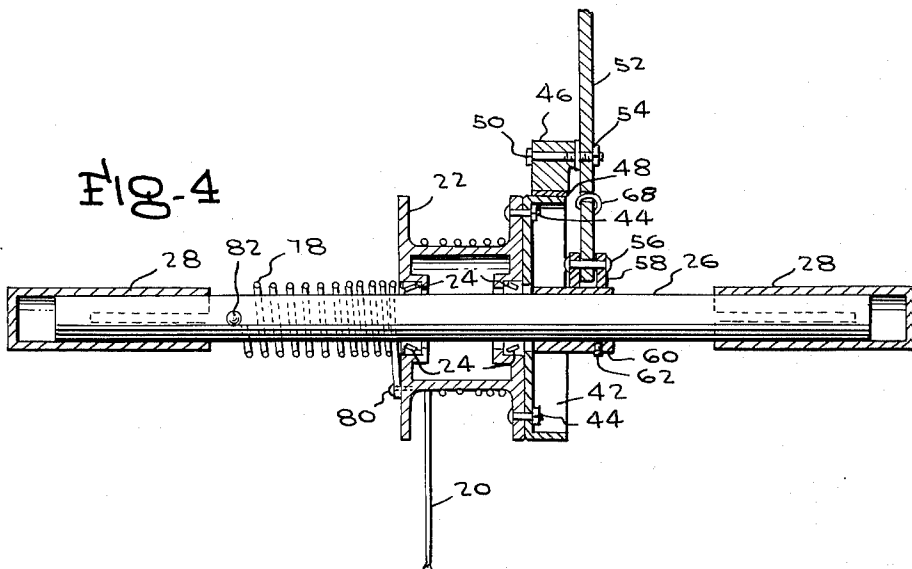
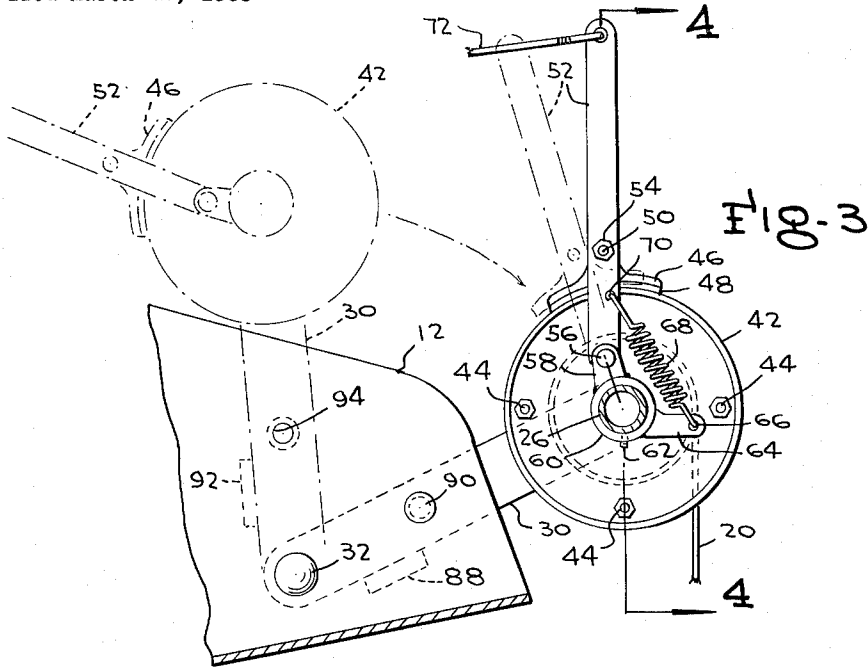
H. J. GRIMES

3,233,687

DROP HAMMER

Filed March 22, 1963

2 Sheets-Sheet 2



INVENTOR

HOMER J. GRIMES

BY

McMorrow, Berman & Davidson
ATTORNEYS

1

3,233,687

DROP HAMMER

Homer Jay Grimes, R.R. 2, Centralia, Ill.

Filed Mar. 22, 1963, Ser. No. 267,302

4 Claims. (Cl. 173-83)

This invention relates to drop hammers, in general, and in particular to a device for breaking up concrete slabs, demolishing small structures, driving piling, and other uses requiring heavy blows, and the primary object of the invention is to provide means whereby existing machines, such as back hoes, power shovels, loading scoops, high lifts, loaders, and the like, can be converted to perform such functions.

Another object is to provide a drop hammer attachment in association with a boom, adjustable in elevation, in which the hammer, while remaining captive with respect to the boom, is nevertheless permitted a degree of free fall sufficient for demolition or fragmentation work, with the slack being automatically taken up on descent of the boom, for subsequent raising of the hammer.

In still greater particular, it is an object to provide an arrangement of the kind indicated above wherein the substantially free fall of the hammer stores spring energy which serves, on subsequent descent of the boom, to rewind the cable to which the hammer is connected.

These and other objects, as will be apparent, are attained by the present invention, a preferred form of which is described in the following specification, and illustrated in the drawing, in which:

FIGURE 1 is a side elevational view of a shovel-bearing tractor, with a drop hammer attachment of the invention mounted on its bucket,

FIGURE 2 is a fragmentary view, in front elevation, on enlarged scale, of the winch assembly, taken on the line 2-2 of FIGURE 1,

FIGURE 3 is a vertical longitudinal, sectional view through the winch assembly, taken on the line 3-3 of FIGURE 2, and

FIGURE 4 is a transverse, sectional view through the winch assembly, taken on the plane of the line 4-4 of FIGURE 3.

Referring to the drawings by characters of reference, there is shown, generally, in FIGURE 1, a small-scale, earth-working machine, comprising a tractor 10, having bucket 12, which is pivoted, as indicated at 13, on the upper end of a boom, composed of a pair of arms 14. The arms 14 are pivoted, as indicated at 15, at their rear ends, on the tractor 10. A hydraulic cylinder 16 is pivoted, at its lower end, on the tractor, and is pivoted, at its upper end, as indicated at 17, to a bracket 19 which is located above the pivot 13, for tilting the bucket, in the usual manner.

As best seen in FIGURES 2-4, a drop hammer 18 is secured to one end of a cable 20, whose other end is anchored to, and is wound on, a winch drum 22, journaled on anti-friction bearings 24 on a shaft 26, extending cross-wise of shovel 12. Shaft 26 is mounted at its ends in split sleeves 28 on the forward ends of a pair of arms 30, which are pivoted, at their rear ends, on aligned pivot pins 32, in the side walls of the bucket 12, and secured by any suitable means, such as cotter pins 34. The shaft 26 is held against rotation due to the clamping action of the split sleeves 28, the clamping pressure being applied by bolts 36, traversing spaced flanges 38 of the sleeves.

Free-wheeling of the winch drum 22 is restricted by brake means, and to this end, a brake drum 42 is secured to one end of the drum, as by bolts 44. An arcuate brake shoe 46, with suitable lining 48, is pivotally mounted, medially of its length, on a pin 50, carried by a brake

2

lever 52, and secured in place, as by a nut 54. For its swinging movement, to apply or retract the brake shoe, lever 52 is pivoted, at its lower end, on a pin 56, carried by a bracket 58, secured as by welding to a sleeve 60, snugly received on shaft 26, and secured thereto against sliding or rotation, by any suitable means, such as a set screw 62. A further bracket 64, positioned at a forward and downward angle, relative to the bracket 58, is fixed on the sleeve 60 and has a transverse bore 66 providing anchorage for one end of a tension coil spring 68, the other end of which is anchored in a bore 70 in lever 52 located above the pivot 56. As seen in FIGURE 3, the tension spring 68 applies the braking force to the shoe 46, and it will be understood that the strength and general construction of the spring 68 and the brace assembly must be sufficient to sustain the weight of hammer 18 until deliberately released. Such release may be conveniently effected by pulling on a pull cable 72, secured to the upper end of lever 52, and leading to a hand-control lever 74, mounted on the tractor, adjacent the operator's position. Conveniently, the cable 72 will be guided around bucket 12 by means of an eye 76 on the top of the rear wall thereof.

An important feature of the invention is the automatic rewinding of the hammer cable 20 on the drum 22. This action, which takes place after fall of the hammer, and in response to the slack in the cable caused by lowering of the shovel is effected by a torsion, coil spring 78, circumposed on the shaft 26, one end of which is anchored to a pin 80, carried by drum 22, its end being secured to a bolt 82, extending transversely through shaft 26.

With reference to FIGURE 2, it will be seen that lowering of hammer 18, upon release of the brake assembly, will cause tension winding of spring 78, on the shaft 26, with resultant storage of energy, to be later expended in rewinding the cable 20. It will be obvious that the resulting tension of the spring 78 will not be sufficient to seriously impede the free fall of the falling hammer. After fall, the cable above the hammer will remain taut, as seen in phantom lines in FIGURE 1, due to the pull of spring 78, so that as the shovel is lowered, this back pull provides constant take-up of the cable 20 on the drum, so that the cable remains taut, as also shown in phantom lines in FIGURE 1. After the rewinding is accomplished to the fullest extent possible, or to any desired degree, depending upon the work demands, the brake is applied, and the shovel, is raised so as to elevate the hammer 18 to appropriate level for the next drop.

Although the exact form of the hammer is not critical in the practice of the invention, the pear-shaped weight shown is designed to remain upright, and any form of hammer which will so function is to be preferred, since the amount of cable to be rewound is minimized if the hammer does not roll over. Also, the hoisting eye 84 with cable-holding pin 86 on the hammer may be replaced by other suitable types of connections.

In order to avoid the necessity for removing the winding drop hammer assembly during other uses of the tractor 10 and its boom, as when the shovel 12 is employed in normal use, the attachment may be arranged to be swung out of the way. Thus, in the working position for the hammer, shown in FIGURE 1, the arms 30 rest upon stops 88 on the side walls of bucket 12. In this position, the arms 30 are locked against swing by detent pins 90, passing through suitable bores in the shovel side walls and the arms. In the out-of-the-way position of the bucket, shown in broken lines in FIGURE 3, the arms 30 abut, in normally tilted position, a second pair of stops 92 on the side walls of the shovel, in which position suitable bores 94 are also provided in the shovel side walls to receive detent pins 90.

3

While a certain, preferred embodiment has been shown and described, various modifications will be apparent, in the light of this disclosure, and the invention should not, therefore, be deemed as limited, except insofar as shall appear from the spirit and scope of the appended claims.

I claim:

1. In combination, a support, a boom pivoted at its rear end on the support, a bucket pivoted on the forward end of the boom, means for tilting the bucket extending between and pivoted to the support and the bucket, said means also serving to raise and lower the boom, arm means pivoted at the rear end of said bucket and normally extending forwardly thereof, a winch assembly mounted on said arm means at the forward end thereof, said assembly comprising a stationary transverse shaft, a drum rotatably circumposed on said shaft, a cable wound on and fixed at one end to said drum, a drop hammer secured on the other end of the cable, spring means acting between the shaft and the drum, spring-pressed brake means mounted on the shaft and normally having brake application to the drum, means for releasing the brake means so as to permit the hammer to fall and to rotate the drum on the shaft, said spring means being arranged to be tensioned by the fall of the hammer so as to keep the cable taut between the drum and the hammer as the boom is lowered and raised.

2. The combination of claim 1, wherein said arm means is pivoted at its rear end on the bucket and said bucket has first stop means upon which the arm means is adapted to rest in the working position of the arm means.

3. The combination of claim 1, wherein said arm means is pivoted at its rear end on the bucket and said bucket has first stop means upon which the arm means is adapted to rest in the working position of the arm means, said bucket having second stop means located

4

behind the first stop means against which said arm means is adapted to be rested with the winch assembly in an out-of-the-way position above the bucket.

4. In combination, a bucket, means supporting the bucket above the ground, arm means pivoted on the bucket to swing from a depressed working position to a tilted storage position, a stop means on the bucket against which the arm means is adapted to rest in said positions, a winch assembly comprising a stationary shaft carried by said arm means, a drum journaled on the shaft and having a concentric brake drum on one end thereof, a cable wound on and secured to the drum, a drop hammer connected to the cable, a brake shoe engaged with the brake drum, a lever pivotally mounted on the shaft and pivoted to the brake shoe, first spring means operatively connected between the bucket and the lever and maintaining braking contact of the shoe with the brake drum, and second spring means operatively connected to the drum and to the shaft, said second spring means being arranged to be tensioned as the brake is released from the brake shoe and the hammer drops for producing return rotation of the drum at the end of the hammer drop for rewinding the cable on the drum.

References Cited by the Examiner

UNITED STATES PATENTS

2,029,363	2/1936	Downie	262—8
2,412,412	12/1946	Meili	242—107.3
2,442,571	6/1948	Ruddock	242—107.3
2,517,980	8/1950	Cornett	173—29
2,637,510	5/1953	Gill	242—107.3
2,660,110	11/1953	Boutwell	262—8
2,969,966	1/1961	Matheis	173—29

BROUGHTON G. DURHAM, *Primary Examiner.*