Oct. 18, 1949. A. E. CORYER 2,485,362

ROCK CRUSHER

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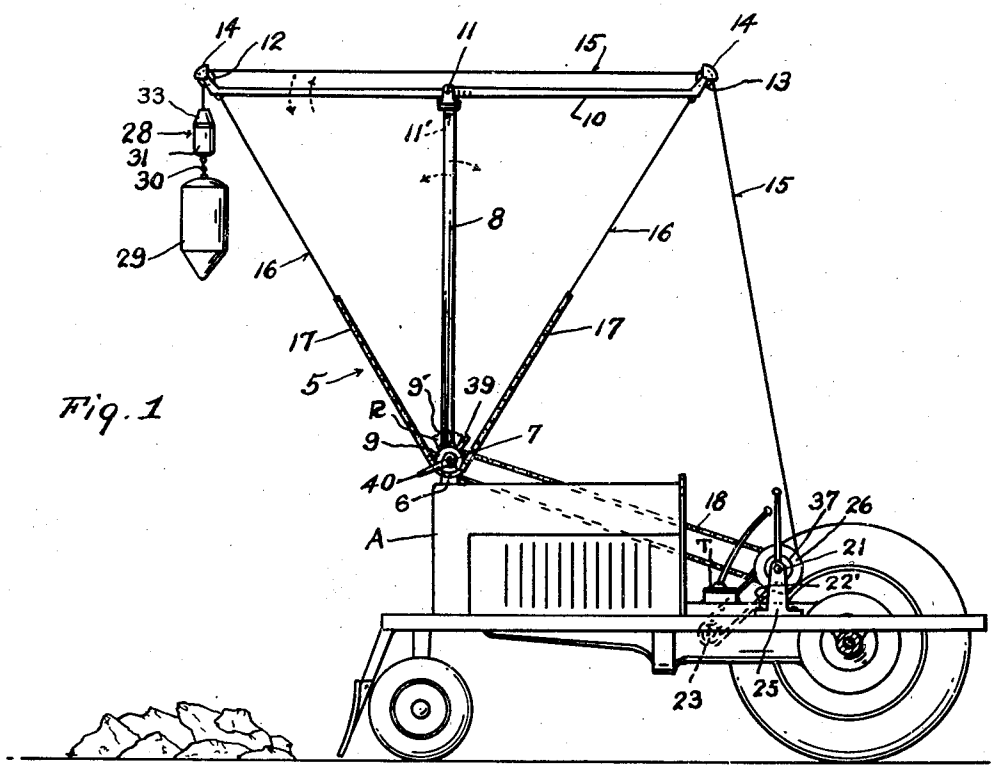


Fig. 1

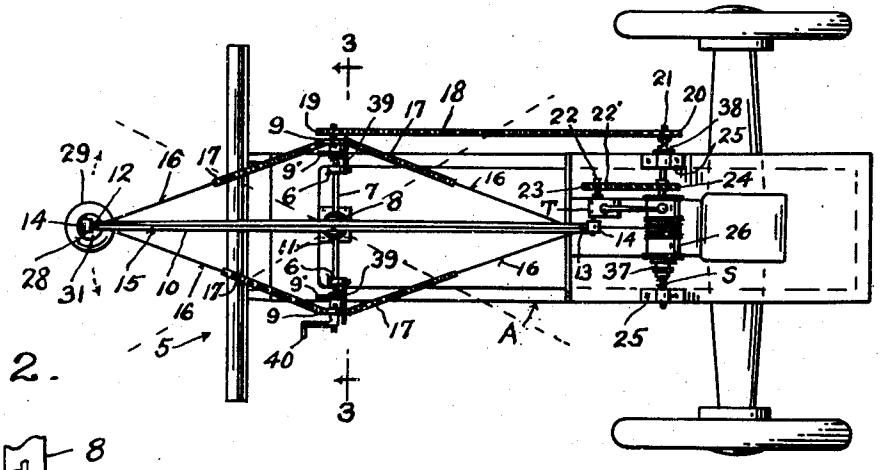


Fig. 2.

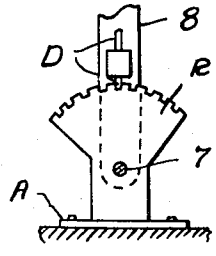


Fig. 4.

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Fig. 3.

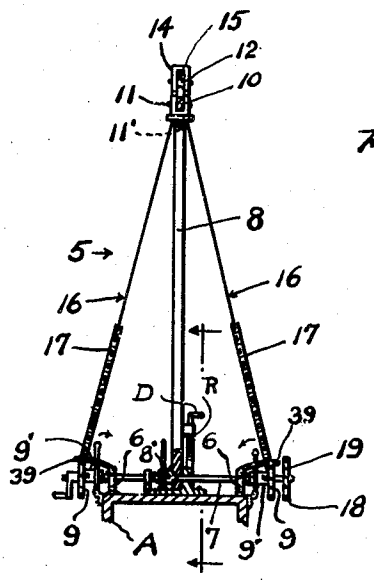


Fig. 5.

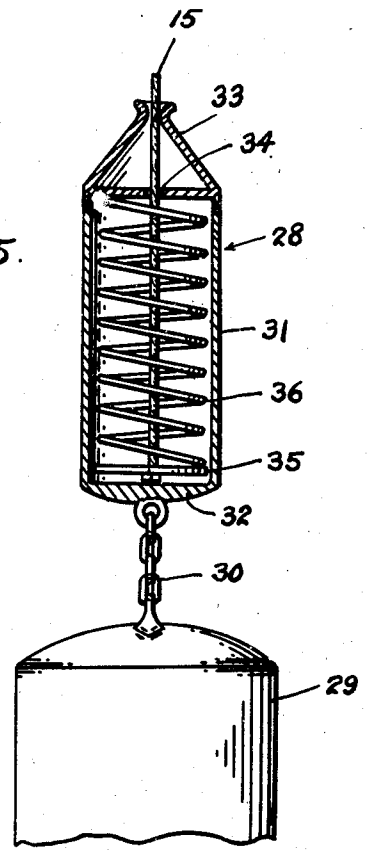


Fig. 6.

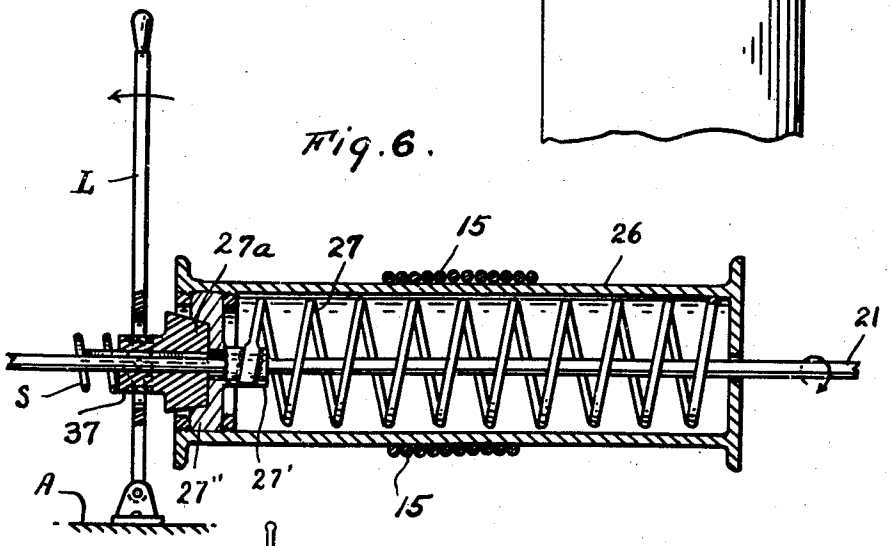
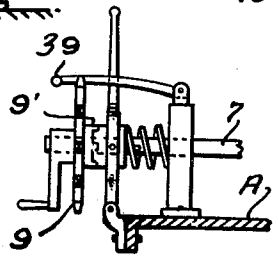


Fig. 7.



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Patented Oct. 18, 1949

2,485,362

UNITED STATES PATENT OFFICE

2,485,362

ROCK CRUSHER

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Application March 4, 1946, Serial No. 651,954

2 Claims. (Cl. 241—273)

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This relates to rock crushers and more particularly a mobile rock crusher.

The primary object of this invention resides in the provision of a mobile rock crusher adapted to promote the practice of crushing large rocks in quaries for transportation and thereby reduce labor and decrease the cost of blasting the same.

Another object of this invention resides in the provision of a mobile rock crusher adapted to crush rock along railroad beds and shoulders of highway roads.

A further object of this invention resides in the provision of a rock crusher adapted to be attached to and operated by a bulldozer or other self propelled vehicle such as tractors or the like.

A still further object of this invention resides in the particular assemblage of coacting elements forming the rock crusher.

Aside from the foregoing objects, this invention resides in the particular construction of the standard manipulating means.

In addition to the aforesaid objects, this invention resides in the particular manner of mounting of the elements comprising the rock crusher on the bulldozer.

Among the many objects of this invention is the provision of means whereby the elements of the rock crusher are disposed in compact relation for transportation.

One of the salient features of this invention resides in the particular construction of the power transmitting means employed to hoist the rock crushing hammer.

Included among the paramount features of this invention is the provision of means to relieve the hoisting cable and other operating elements from shock or strain.

With these and other objects in view, this invention resides in certain novel features of construction and arrangement of coacting elements to be hereinafter more particularly set forth in the specification, illustrated in the accompanying drawings and pointed out in the appended claims and, while this disclosure depicts my present conception of the invention, the right is reserved to resort to such changes in construction and arrangement of elements as come within the spirit of the invention.

In the accompanying drawings forming a part of this application:

Fig. 1 is a side view of a bulldozer showing the rock crusher assembled thereon in operative position relative thereto.

Fig. 2 is a plan view thereof.

Fig. 3 is a cross sectional view taken approximately on line 3—3 of Fig. 2.

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Fig. 4 is a detail sectional view taken approximately on line 4—4 of Fig. 3.

Fig. 5 is an enlarged vertical sectional view through the hammer.

Fig. 6 is an enlarged longitudinal sectional view through the cable windlass.

Fig. 7 is an enlarged side view of one of the clutches on the front shaft.

In the present illustration of this invention the letter A designates a conventional type of bulldozer used in pushing earth, rock and the like over the surface of ground and, although said type of power plant is herein employed to operate the elements of this invention herein designated, in general, by the numeral 5, any suitable type of tractor or motor vehicle may be utilized therewith which is capable of developing the necessary power to perform similar functions thereto.

Journalled on the bulldozer in suitable bearings 6 and extending laterally thereof adjacent its front end is a shaft 7 having a standard 8 releasably secured thereto by a clutch 8' and carrying loose sprocket wheels 9 at its opposite ends, which are connected thereto by clutches 9'. The standard 8 has a beam 10 swivelly pivoted to its upper end by a horizontal trunnion 11 and vertical trunnion 11', and supports sheaves 12 and 13 which are provided with cable guides 14 to prevent a cable 15 trained thereover from accidentally leaving the same.

Secured to opposite ends of the beam 10 are stabilizing slings 16 provided with sprocket chains 17 at their medial portions for engagement with the aforesaid sprocket wheels 9. Each of said slings diverges from the outer end of the beam 10 on opposite sides of the same to provide means whereby the beam is disposed in elevated operative position on the standard as it is rotated in substantially perpendicular position relative to the bulldozer by a chain 18 trained over a sprocket wheel 19 keyed to said shaft 7 and trained over a sprocket wheel 20 keyed to a counter-shaft 21 journalled on the bulldozer to the rear of said shaft 7 and operated from the take-off shaft 22 of the bulldozer by a chain 22' trained over sprocket wheels 23 and 24. Said beam 10 is also rotated on the trunnion 11' by releasing an elected clutch 9' to permit the adjacent sprocket 9 to freely rotate on the shaft 7 subsequent to disengaging dogs to be hereinafter set forth from the sprockets 9, whereupon that sprocket secured to the shaft 7 by the opposite clutch 9' will cause the chain 17 trained thereon to operate the beam 10 in accordance with the direction in which it is rotated by the chain 18 trained on sprockets 19 and 20, it being within the purview of this in-

vention to so dispose said chains 17 at such angles between the sprockets 9 and beam 10 that they will remain on the sprockets while rotating the beam 10.

The aforesaid counter-shaft 21 is journaled in suitable bearings 25 secured to the bulldozer and supports a cylindrical windlass 26 which is yieldingly connected thereto by an elongated coil spring 27 disposed within the windlass and surrounding the counter-shaft with one end thereof secured to a boss 27' formed on an annular bearing 27'' disposed at one end of the windlass and loosely mounted on the countershaft and its opposite end secured to the windlass, thus providing means whereby shock from the crusher mechanism will not be transmitted to the tractor mechanism and smooth operation of a coacting mechanism will prevail. Said bearing 27'' forms the female member of a clutch to be hereinafter set forth.

Connected to the windlass at its inner end is the cable 15 while secured to its outer end is a shock absorber 28 which in turn has a rock crushing hammer 29 suspended therefrom by a link chain 30 or other similar flexible element and, while a rock crushing hammer is herein secured to the free end of the cable, it is within the purview of this invention to substitute an earth packer or other pounding element therefor.

The shock absorber 28 consists of a cylinder 31 having its lower end 32 closed and supporting the aforesaid chain 30 and its upper end provided with a cap 33 having a hole 34 therein to shield the free end portion of the cable which has its free end secured to a slidable disk 35 disposed within the cylinder and normally retained adjacent the bottom thereof by an expansion coil spring 36 disposed around the cable and exerting pressure between the cap and disk.

Slidably splined on the aforesaid counter-shaft is the male member 27*a* of a trip clutch 37 adapted to normally engage and lock the aforesaid female member 27'' thereto through the instrumentality of an expansion coil spring S surrounding the counter-shaft with its outer end bearing against the adjacent bearing 6 of said shaft and control power from the take-off shaft of the bulldozer to said counter-shaft by a lever L connected thereto so as to operate the windlass in elevating the hammer and thereafter release the windlass to permit the hammer to gravitate for impact against rock therebeneath and, upon the rock being crushed to predetermined sizes, the hammer is elevated and the bulldozer advanced against the crushed rock to dispose it out of the way for further crushing of large sizes of rock in the region of that previously crushed.

Power from the take-off to the chain 18 is controlled by a clutch 38 on said counter-shaft and, in order to retain the standard and elements carried thereby in operative positions, dogs 39 or other similar elements are employed to engage and prevent rotation of the sprocket wheels 9 while a dog D on the standard 8 engages a rack R secured to the tractor to retain said standard at various angles relative to the shaft 7. In order to manually elevate and lower the standard and elements carried thereby a crank handle 40 is carried by said shaft 7.

In that the beam 10 has universal movement on its pivots 11 and 11' relative to the standard, the slings 16 through power transmitted thereto from the bulldozer take-off shaft are also utilized to shift the same in any direction over the rock pile to be crushed thereby obviating continuous movement of the bulldozer in disposing the hammer over the rock. Said beam 10 is moved sidewise by the slings through the instrumentality of the take-off chain 18 with the direction of movement thereof being controlled by releasing an elected clutch 9' to free the desired sprocket 9.

In order to reverse the movement of the slings, a conventional transmission mechanism connects the power transmitting means (not shown) of the tractor to the take-off in the usual manner.

With this invention fully set forth, it is manifest that a mobile rock crusher is provided which consists of a small number of parts and, through the instrumentality of the same, the practice of crushing rock in quarries and separated districts requires a small force of labor and thereby reduces the cost of operation.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In the combination with a bulldozer, a rotatable shaft mounted thereon adjacent its front end, a standard loosely supported by said shaft, a clutch connecting the standard to the shaft, a rack locking the standard in elected positions around the shaft, a beam, a universal joint securing the beam to the free end of the standard, sheaves secured to said beam, sprocket wheels loosely disposed on the opposite ends of the shaft, clutches connecting the sprockets to the shaft, a counter-shaft journalled on the bulldozer to the rear of the rotatable shaft, power transmitting means connecting said counter-shaft to the take-off of the bulldozer, a yieldable windlass mounted on said counter-shaft, a cable wound around said windlass with its outer portion trained over said sheaves, a shock absorber yieldingly secured to the free end of the cable, a flexible element secured to the lower end of the shock absorber, a hammer secured to the free end of the flexible element, a sprocket chain connecting the aforesaid rotatable and counter-shafts, stabilizing slings connected to the opposite ends of the beam and extending on opposite sides thereof, sprocket chains connected to the medial portions of said slings and engaging the sprockets on the rotatable shaft, a clutch on said counter-shaft connecting the aforesaid sprocket chain to the take-off shaft, a trip clutch connecting the counter-shaft and windlass to the take-off shaft, and dogs engaging the loose sprocket wheels of the rotatable shaft.

2. The combination with a mobile vehicle having a power take-off shaft, a rockable standard loosely mounted on the vehicle, a beam having universal movement mounted on the standard, a yielding windlass mounted on said vehicle, sheaves carried by said beam, a cable wound around the yielding windlass and trained over said sheaves, a shock absorber secured to the free end of the cable, a hammer, a chain connecting the hammer to the shock absorber, slings connecting the beam to said rotatable shaft, means locking said standard in predetermined positions relative to the axis of the rotatable shaft, means connecting the rotatable shaft to the take-off of the vehicle, means connecting the windlass to the take-off of the vehicle, a clutch connecting the rotatable shaft operating means to the take-off, a trip clutch connecting the windlass to the operating means thereof, and means on the vehicle locking the rotatable shaft in elected positions on the vehicle.

ALBERT E. CORYER.

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