

O. S. PROCTOR.
 ROCK BREAKING SHOVEL.
 APPLICATION FILED AUG. 18, 1908.

1,067,375.

Patented July 15, 1913.

3 SHEETS—SHEET 1.

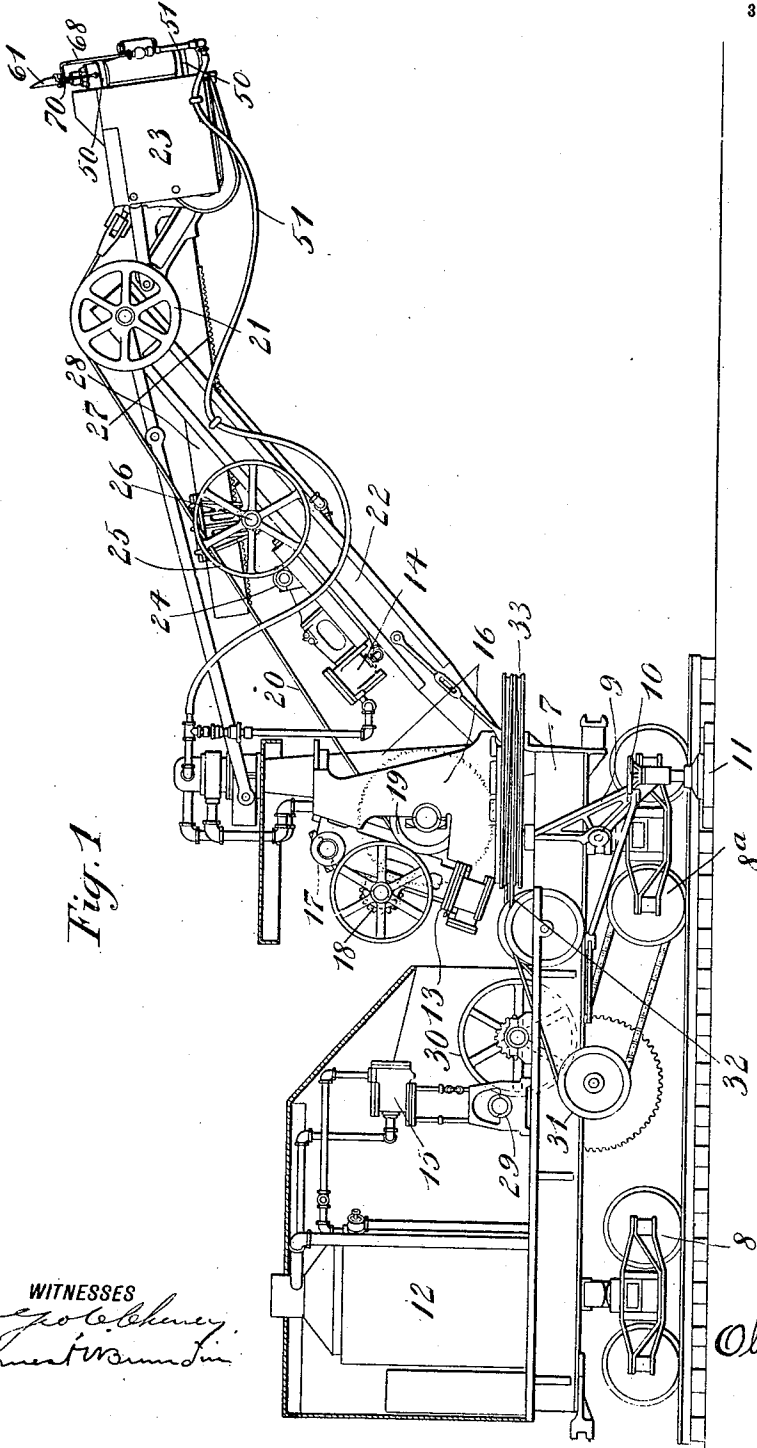


Fig. 1

WITNESSES
Geo. C. Cheney
Ernest W. Smith

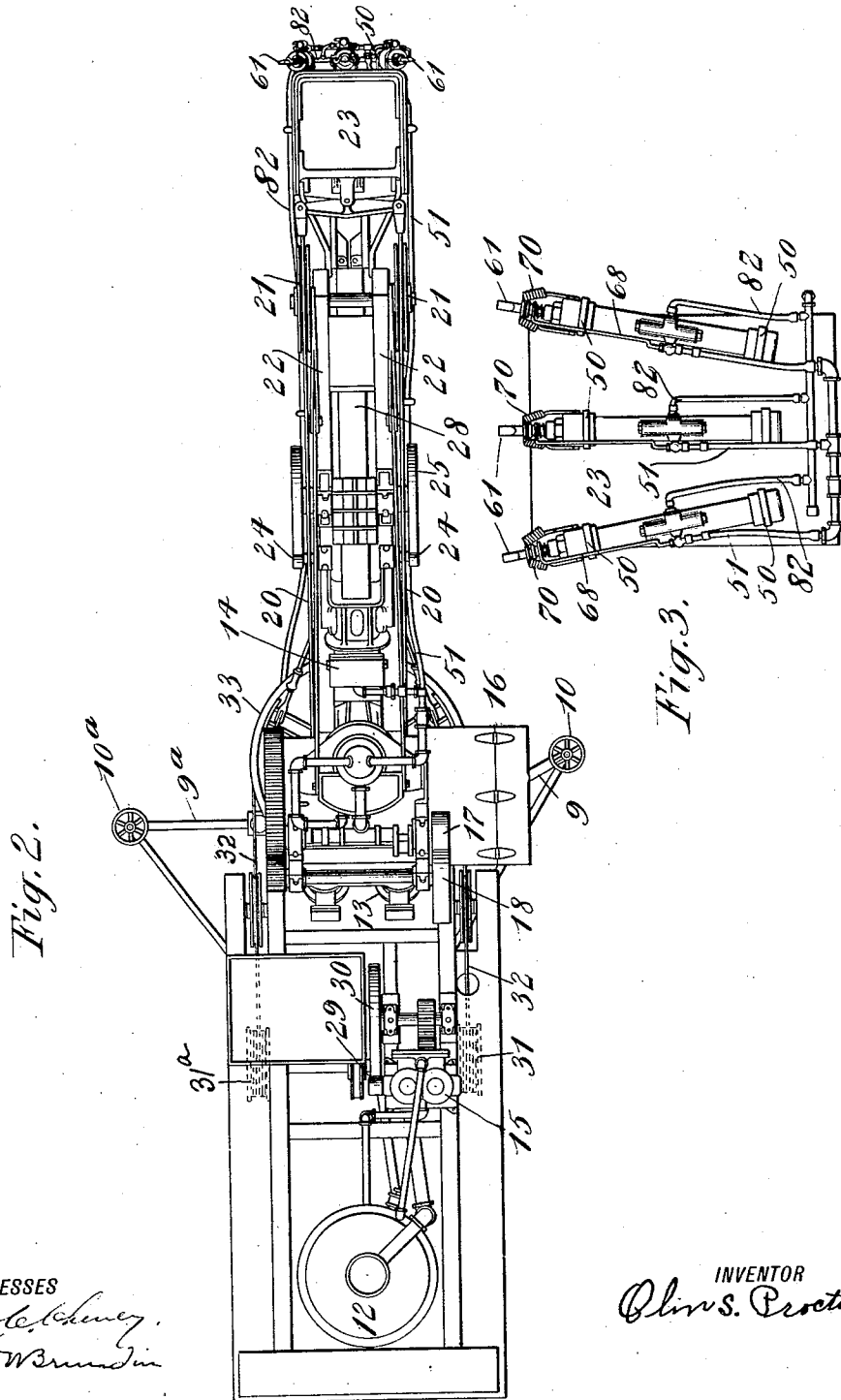
INVENTOR
Olin S. Proctor

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WITNESSES
E. J. Cheney
Ernest W. Brundin

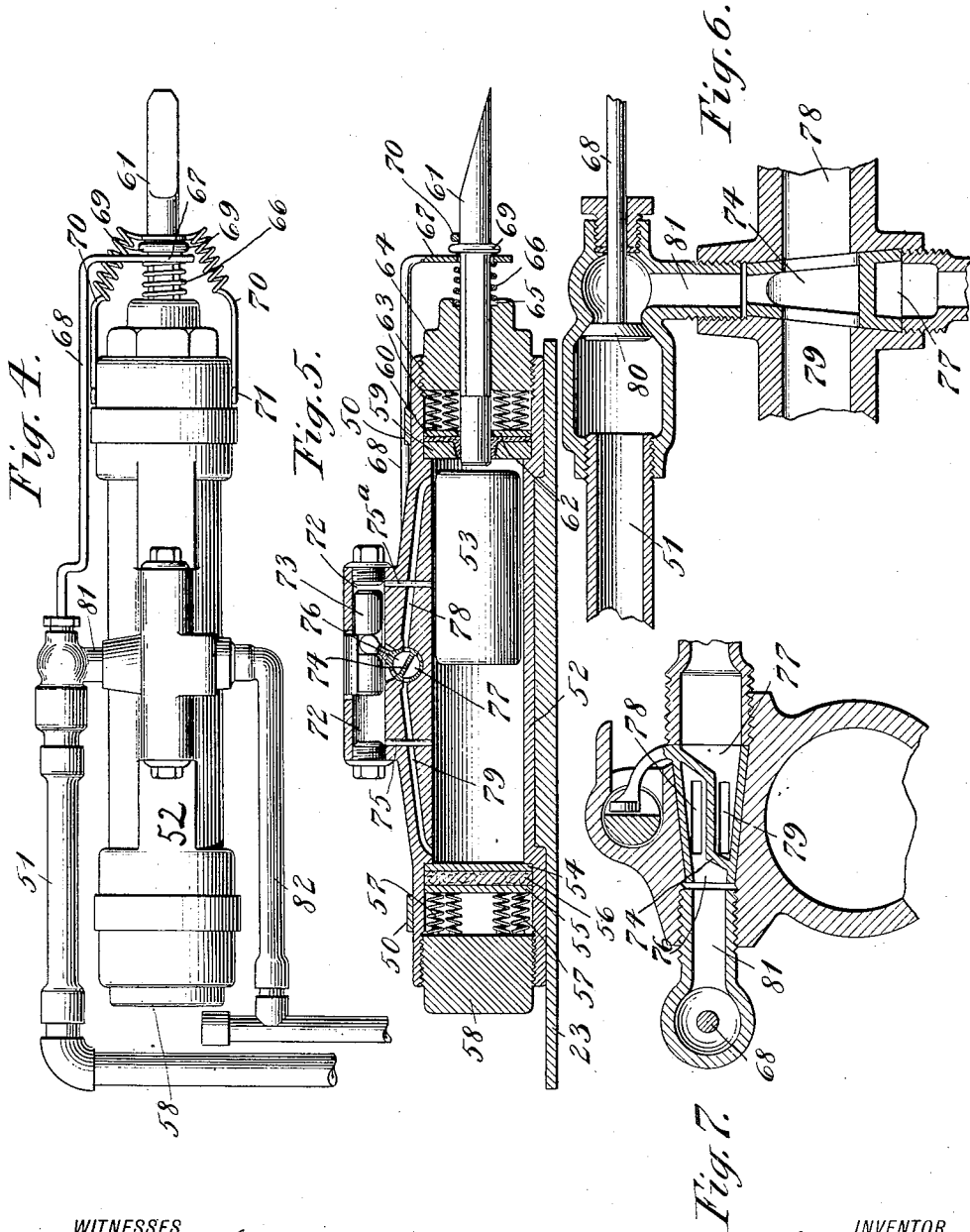
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3 SHEETS—SHEET 3.



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

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ROCK-BREAKING SHOVEL.

1,067,375.

Specification of Letters Patent.

Patented July 15, 1913.

Application filed August 18, 1908. Serial No. 449,137.

To all whom it may concern:

Be it known that I, OLIN S. PROCTOR, a citizen of the United States, and resident of the city of New York, county and State of New York, have invented certain new and useful Improvements in Rock-Breaking Shovels, of which the following is a specification.

It is the purpose of this invention to provide a mechanically operated shovel that will break the rock as well as shovel it up. It is adapted for use in all classes of rock excavations such as open cuts, subaqueous dredging, etc.

This invention comprises among its objects, first to provide a device of the class described, of simple construction and operation, which will be capable of breaking rock off of the solid. Second to provide percussive hammers in combination with the shovel, said hammers being adapted to break the rock as the shovel gathers it up. Third, to provide means for automatically controlling the operation of the hammers so that they work only when in contact with the rock. These objects are accomplished by a machine comprising a main body frame, mounted on trucks that can be transported from place to place as the work requires.

On this frame is mounted a steam boiler which supplies fluid under pressure to the three pairs of engines for performing the following respective functions: First. One mounted on the mast frame and adapted by means of suitable cables and pulleys to lift the shovel over the boom. Second. The engines on the boom adapted to operate the ram to which the shovel is attached. The third by means of a cable and bull wheel swings the shovel in the horizontal plane. In the bottom of the shovel a plurality of percussive hammers are mounted adapted to break the rock when the shovel is forced against it in the usual manner, the details of which will be fully described hereinafter.

In the illustration of the preferred form of device embodying my invention in the drawings herewith and hereafter described, I do not desire to limit myself to the exact form of the construction shown, since such construction may be capable of modification as desired, without departing from the spirit of the invention, neither do I limit the use of my invention to any particular class of excavation.

My invention consists in the design, ar-

range, construction, combination and operation of parts as set forth in and falling within the scope of the claims hereto appended.

In the drawings like characters of reference denote like parts in all the figures thereof.

Figure 1 is a side elevation of the complete machine with a section of the boiler housing removed. Fig. 2 a plan view of the complete machine with the boiler housing removed. Fig. 3 is a bottom plan view of the shovel showing the relation of the percussive hammers. Fig. 4 is a plan view of one hammer. Fig. 5 longitudinal section of one hammer. Fig. 6 is a longitudinal section of the valve that controls the air supply to the hammer. Fig. 7 is a transverse section through the valve 74.

The main frame 7 is mounted preferably on railroad trucks 8 and 8^a, attached to the frame 7 are steel braces 9 and 9^a, provided with hand wheel screws 10 and 10^a supported on timbers 11. The boiler 12 and the engines 13, 14 and 15 may be of any preferred type. Engine 13 is mounted on the mast frame 16 and by means of the friction drive 17 operates the reducing gear 18 which operates the drum 19 to wind in the cable 20 over the sheave wheel 21 which is mounted on the boom 22 and operates to lift the dipper 23. The engine 14 is mounted on the boom 22 and by means of the friction drive 24 operates the reducing gear 25 which is mounted on shaft 26; also mounted on shaft 26 is the spur gear, (not shown) which engages the rack gear 27 on the ram 28 the function of which is to thrust or draw the dipper 23. The engine 15 by means of the friction drive 29 operates the reducing gear 30 which drives the shaft on which the drums 31 and 31^a are mounted around which the ends of the cable 32 pass in opposite directions and are attached thereto. The cable 32 also passes around the bull wheel 33 so that revolving the drums 31 and 31^a correspondingly revolves the bull wheel 33 which swings the shovel in the horizontal plane.

The construction and operation of the steam shovel are well known, and I do not confine myself to any particular type of shovel because this invention may be operated successfully with various types.

The hammers preferably 3 or 4 in number are attached to the bottom of the dipper

23 by means of clamps 50. Fluid under pressure is supplied to the hammers through a flexible conduit 51. The detail of the preferred type of hammer is shown in Figs. 4, 5 and 6. It consists of the cylindrical casing 52 in which is placed the hammer 53 and the rear end of the casing 52 is closed by the metal disks 54 and 55 between which is interposed a layer of packing 56 and rearward of disk 55 is placed a plurality of springs 57 which rest against the rear cylinder head 58. These springs are to protect the cylinder head from the hammer. At the forward end of the cylindrical casing 52 is placed a metal ring 59 forward of which is placed a piece of hydraulic leather 60 adapted to fit around the steel 61 and forward to the hydraulic leather 60 is placed a metal ring 62 against which the springs 63 bear, being held in position by the chuck 64. The chuck 64 is provided with a recess 65 in which rests the coil spring 66 which engages the arm 67 of the valve rod 68. The steel is provided with the shoulder 69 which operates the valve rod 68 through the arm 67 or the spring 70 accordingly as the steel is forced backward or forward. The spring 70 keeps the steel 61 from dropping out and is provided with eyes which engage lugs 71 on the casing 52 so that it can be swung out to release the steel 61.

The cylindrical casing 52 is provided with a valve cylinder 72 in which is located the valve piston 73 adapted to operate the valve 74 as air pressure is supplied to the cylinder 72 through tubes 75 and 75^a. The supply of air to cylinder 72 through the tubes 75 and 75^a is controlled by the hammer 53. The valve 74 is provided with air pressure port 76 and exhaust port 77 so that as it is rotated by piston 73 the ports 78 and 79 are alternately caused to register with the live air port 76 and exhaust port 77 of the valve 74 so that the hammer 53 is reciprocated in the casing 52.

The valve rod 68 is provided with a valve 80 seated in valve casing 81 which also constitutes an elbow and nipple in the air line 51 to supply air pressure port 76 in valve 74 so that pressure on the steel 61 forces shoulder 69 against the arm 67, valve rod 68 thereby opens the valve 80 which admits air to operate the hammer 53 to strike the steel 61. The exhaust from port 77 is led away through conduit 82 to discharge at a point on boom 22 so that the hammer will operate under water as well as above water.

The operation of the machine is as follows:—The shovel 23 being forced against the rock in the usual manner the steel 61 is forced back against arm 67 of the valve

rod 68 which opens valve 80 and admits air to operate hammer 53 which drives the steel 61 into the rock to split and break it, and as it is broken it falls into the shovel 23 and is dumped into cars in the usual manner. When the steel 61 is freed the spring 66 operates to close the valve 80 and stop the hammer 53.

I claim:

1. The combination with the dipper of any preferred type of power shovel of pneumatic hammers suitably located on said dipper for breaking rock, substantially as described.

2. The combination with the dipper of any preferred type of power shovel of pneumatic hammers suitably located on said dipper for breaking the rock and means to automatically stop and start said hammers.

3. In an excavating machine, in combination, a dipper, power driven means to swing said dipper upwardly whereby it may engage the face of the work, and longitudinally reciprocating percussive tools mounted on said dipper with their cutting edges in advance of the engaging lip of said dipper and operable to engage the face of the work and dislodge the material therefrom during the upward thrust swing of the dipper whereby said dislodged material will be received by the dipper.

4. In an excavating machine, in combination, a frame mounted to swing on a pivot with an upwardly thrust movement, a dipper carried at the free end thereof, power driven means adapted to swing said frame upwardly whereby the engaging lip of said dipper will approach the face of the work, and longitudinally reciprocating percussive tools mounted on said dipper with the cutting edges of said tools extending forward and in advance of the engaging lip of the dipper and operable to engage the face of the work and dislodge the material therefrom during the upward thrust movement of the frame whereby the dislodged material will be received by the dipper.

5. In an excavating machine, in combination, a dipper, power driven means to swing said dipper upwardly and thrust said dipper close to the face of the work, and percussive tools rigidly carried in advance of the lip of said dipper with their cutting edges forward of and substantially in alignment with the engaging lip of the dipper whereby the material dislodged by said tools will be scooped into said dipper with the forward movement thereof.

OLIN S. PROCTOR.

Witnesses:

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