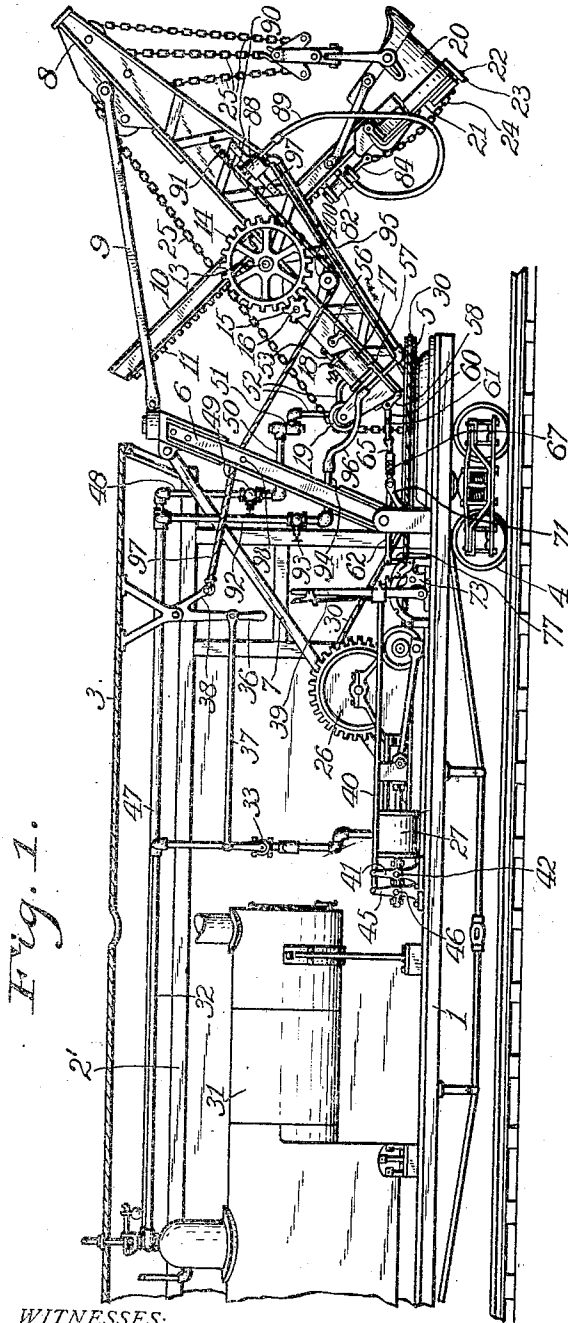


C. F. HINKLEY.
STEAM SHOVEL MECHANISM.
APPLICATION FILED MAY 23, 1912.

1,056,676.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.



WITNESSES:

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Fig. 5.

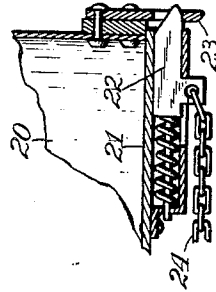


Fig. 4.

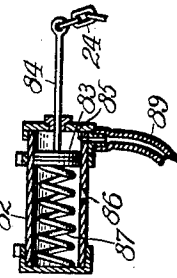
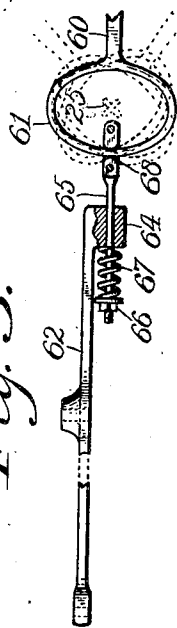


Fig. 2.



Fig. 3.



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2 SHEETS—SHEET 2.

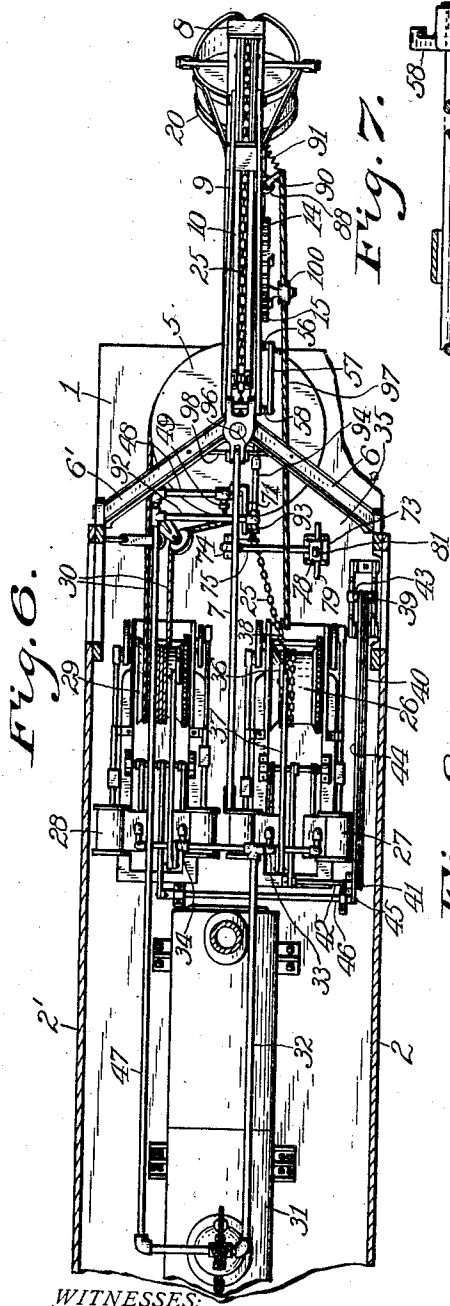


Fig. 7.

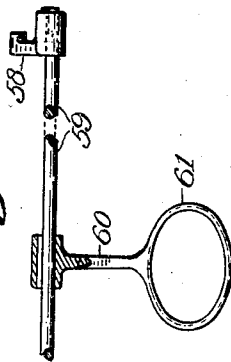


Fig. 9.

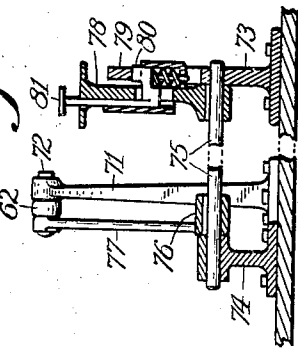
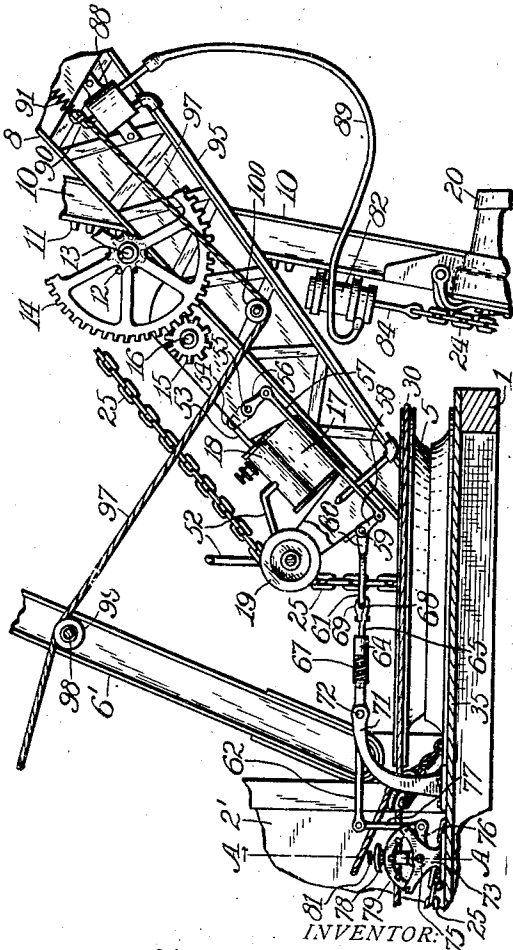


Fig. 8.



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STEAM-SHOVEL MECHANISM.

1,056,676.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed May 23, 1912. Serial No. 699,157.

To all whom it may concern:

Be it known that I, CHARLES F. HINKLEY, a citizen of the United States, residing at Mount Iron, in the county of St. Louis and State of Minnesota, have invented a new and useful Steam-Shovel Mechanism, of which the following is a specification, reference being had to the accompanying drawings and to the letters and figures of reference marked thereon.

This invention relates to the type of steam shovel that has a swinging crane or boom carrying a shovel or scoop, there being a platform or car and engines thereon for operating the crane or boom and the shovel or scoop, and a hoisting chain connected to the shovel or scoop and running over the crane or boom and vertically through the pivotal axis of the crane or boom and connected with one of the engines. In said type of steam shovel an auxiliary engine is mounted on the crane or boom for assisting in controlling the shovel or scoop, it being understood that a convenient position is occupied by an engineer who controls all the movements of the machinery, in some cases, however, an assistant being required on the crane or boom for operating the auxiliary engine.

The present invention has reference more particularly to improved mechanism designed to enable the engineer who controls the main engines to also operate the auxiliary engine and to control the discharging operations of the shovel or scoop.

An object of the invention is to improve and simplify the construction of apparatus of the character described and claimed in Letters Patent No. 901,101, granted to me on October 13, 1908, for enabling one engineer to control, from one position, all the movements of the shovel machinery.

A further object of the invention is to provide improved apparatus of the above mentioned character which shall be so constructed as to be reliable, durable and economical in use under the various severe conditions of operation.

With the above mentioned and other objects in view, the invention comprises mechanism extending from the position of the engineer on the platform to the auxiliary engine on the crane or boom for starting and for controlling the operation of the auxiliary engine, the mechanism being adapted to accommodate itself to the swinging movement of the crane or boom.

The invention comprises also improvements in means for releasing the bottom of the shovel for discharging the load, said means being adapted to be under the control of the engineer at his station and adapted to accommodate itself to the motions of the crane and the shovel. And the invention consists further in the novel parts and combinations and arrangements of parts as hereinafter particularly described and claimed.

Referring to the drawings, Figure 1 is a fragmentary side elevation of a steam shovel with the engine house thereof in section and having the improvements applied thereto; Fig. 2, a side elevation of the principal parts of the improved auxiliary engine controller; Fig. 3, a top plan of Fig. 2 partially broken away; Fig. 4, a central sectional view of the power cylinder for releasing the latch of the shovel bottom; Fig. 5, a fragmentary sectional view of the shovel showing the latch of the bottom thereof; Fig. 6, a top plan of the machine with the engine house in section below the roof thereof; Fig. 7, a fragmentary top plan of parts of the auxiliary engine controller; Fig. 8, a fragmentary sectional elevation on an enlarged scale showing the mechanism more clearly as applied to the auxiliary engine and showing also the improved apparatus for releasing the latch of the shovel bottom, and Fig. 9, a fragmentary sectional view on the plane of the line A A in Fig. 8.

Similar reference characters in the different figures of the drawings indicate corresponding elements or features of construction herein referred to.

A steam shovel of the character to which the present invention is especially adaptable having been fully described in said Letters Patent No. 901,101, a brief reference only is herein made to the well known features of construction thereof.

As usually constructed the steam shovel of the above mentioned character comprises a platform 1 on which are two side walls 2 and 2' provided with a roof 3 to constitute an engine house, the platform extending beyond one end of the house and being usually carried on a suitable number of pairs of wheels 4. The end portion of the platform pivotally supports a turn-table 5 adjacent to an A-frame comprising two members 6 and 6' connected together at their tops and constituting a mast for the crane being sup-

ported by a stay-rod 7. A jib 8 is fixedly secured to the top of the turn-table forward of its axis of rotation and is supported in inclined position by means of rods 9 connected therewith and also with the top of the A-frame. An arm 10 provided with a rack-bar 11 is mounted on the jib and operated by a pinion 12 secured to a shaft 13 that is mounted on the jib, the shaft having a gear wheel 14 secured thereto that is driven by a pinion 15 secured to the main shaft 16 of the auxiliary engine 17 which is mounted on the jib, the engine having a steam chest 18 in which is a suitable valve for starting, stopping, or reversing the engine, as is well known. A guide pulley 19 is mounted on the jib above the central opening in the turn-table. The arm 10 carries a shovel 20 provided with a hinged bottom 21, a spring-pressed latch 22 adapted to engage a latch plate 23 secured to the shovel, and the latch is provided with a chain 24 for withdrawing the latch from the plate. The shovel 20 is partially controlled and is hoisted by means of a chain or cable 25 that runs over suitable guide sheaves and over the pulley 19, being in vertical arrangement from the pulley downward through the turn-table so that its position corresponds to the axis of the crane-pivot. The machine includes also a hoisting-drum 26 operated by a suitable hoisting-engine 27 mounted on the platform for operating and controlling the chain 25, there being a crane-engine 28 including a drum 29 mounted also on the platform, a cable 30 being connected with the drum and also with the turn-table 5 for turning or swinging the crane about its axis. A boiler 31 on the platform supplies steam for the engines through a pipe 32 connected therewith and having branches extending respectively to the hoisting engine and the crane engine, one branch having a throttle valve 33, and the other branch a similar valve 34 connected therewith. The engineer's position is at 35 on the platform where he can observe the movements of the crane and the shovel, and a pivoted operating or throttle lever 36 is arranged at the engineer's position and connected with the throttle valves by means of a rod 37. The lever preferably has an arm 38 thereon extending at a suitable angle thereto. A reverse-lever 39 is arranged also at the engineer's position and has a reach-rod 40 connected thereto that is connected also to a rocker-arm 41 mounted on a shaft 42 which is suitably connected with the reversing gear of the hoisting engine 27; a reverse lever 43 being mounted also at the engineer's position and having a reach-rod 44 connected thereto, the reach-rod being connected to a rocker-arm 45 that is secured to a rock-shaft 46 which is connected by a suitable mechanism with the reversing gear of the engine 28. A steam pipe 47 extends from the boiler to the forward portion of the engine house and has a branch 48 connected therewith that is provided with a stop valve 49 within reach of the engineer, and a horizontal pipe 50 is connected with the valve and has a swivel joint 51 connected thereto, and arranged at the axis of the crane, a pipe 52 extending from the swivel joint to the steam chest 18 of the auxiliary engine. A valve stem 53 extends through one end of the steam chest 18 and is connected to a rocker-arm 54 secured to a rock-shaft 55 supported in the engine frame, a rocker-arm 56 being secured also to one end of the rock-shaft and having a connecting rod 57 connected thereto, the connecting rod being connected to a rocker-arm 58 that is secured to a rock-shaft 59 mounted on the crane in proximity to the axis of the crane pivot. The controlling connections between the valve stem 53 and the rock-shaft 59 may obviously be varied to conform to various structures relatively to the crane and the auxiliary engine.

In carrying out the objects of the invention an arm 60 is secured to the rock-shaft 59 and extends horizontally toward the axis of the crane pivot and has a loop 61 thereon comprising the end portion of the arm, the loop being preferably oval or elliptical and arranged with the major axis parallel to the rock-shaft 59, so that an opening is formed in the arm 60 through which the chain 25 extends. A lever 62 is provided which has a pivot hole 63 between its ends, one end portion of the lever having a horizontal guide 64 thereon in which an extension rod 65 is guided to move longitudinally, one end of the rod having an adjusting nut 66 thereon, and a spring 67 is interposed between the nut and the guide 64. The opposite end portion of the rod has an opening 68 therein which receives the loop 61, the opening being covered by a cap 69, so that while the loop may slide in the opening it may also move pivotally. The opposite end of the lever 62 has a pivot hole 70 therein whereby to operate the lever. A suitable stand 71 is fixedly supported on the platform 1 in proximity to the turn-table and is provided with a pivot 72 on which the lever 62 is supported between its ends in approximately horizontal position to maintain the extension end adjacent to the chain. A suitable stand 73 is supported on the platform 1 in proximity to the engineer's position and another stand 74 is supported a suitable distance from the stand 73, the two stands supporting a rock-shaft 75 to which an arm 76 is secured, a rod 77 being connected to the arm 76 and also to the end of the lever 62 that has the pivot hole 70 therein. A foot lever 78 is secured to the rock-shaft 75 adjacent to the stand 73, the latter having a quadrant 79 thereon with which a latch 80 mounted

on the foot-lever coöperates, the latch being provided with a suitable push bar 81 adapted to be operated by the foot of the engineer. When the foot-lever 78 is in mid-position the lever 62 and the arm 60 are horizontal and the valve in the auxiliary engine excludes the steam from the engine cylinder, and steam is admitted into the cylinder so as to operate the engine when the foot-lever is moved forward or backward as may be desired. When the lever 62 moves upward or downward the spring 67 permits the extension rod 65 to move in or out so as to practically lengthen or shorten the lever as required by the angularity of the connections between the rock-shaft 59 and the pivot 72.

A cylinder 82 is secured to the arm 10 near the shovel 20 and is provided with suitable heads, a piston 83 being movable in the cylinder and provided with a rod 84 extending through one of the heads, the rod being connected to the chain 24 of the latch 22. The cylinder has an inlet port 85 arranged at one head and an exhaust port 86 at a suitable distance from the inlet port. A spring 87, is arranged in the cylinder for pushing the piston toward the inlet port. A suitable controlling valve 88 is supported on the jib 8 and a flexible steam pipe 89 is connected therewith and also to the cylinder 82, the controlling valve being provided with an operating arm 90 which is yieldingly held with the valve in closed position by means of a spring 91 connected to the arm and to the crane. A branch pipe 92 is connected with the steam pipe 47 and has a stop valve 93 connected therewith in proximity to the engineer's station, a pipe 94 extending from the valve to a point near the axis of the crane. A pipe 95 is secured to the crane and extends to the controlling valve 88. A flexible pipe or hose 96 is connected with the pipes 94 and 95 and extends adjacently to the axis of rotation of the crane, so that the crane may swing in operation without fracturing the steam pipes. A cord 97 is connected to the operating arm 90 and also to the arm 38 whereby the arm 90 is controlled and also operated when the lever 36 is operated in one direction. The A-frame supports a horizontal shaft 98 on which is a sheave 99 that guides the cord 97, the sheave being loose so as to slide along the shaft. The cord is guided also by another sheave 100 that is mounted on the jib 8.

In practical use the engineer stands at the station on the platform indicated, from which position he may reach and move all of the devices above mentioned for controlling the operations of the engines for lifting the shovel, moving the crane pivotally or for moving the arm of the shovel by means of the auxiliary engine, or for releasing the

latch of the shovel bottom, thus facilitating the economical operations of the machine. When the crane is moved pivotally the arm 60 is carried partially about the pivotal axis of the crane, as illustrated by broken lines in Fig. 3, the loop 61 sliding in the opening 68. When the auxiliary engine is reversed the loop has a pivotal movement in the rod 65.

Having thus described the invention, what is claimed as new is:—

1. In a steam shovel, the combination with a platform, a crane pivoted on the platform, an engine mounted on the crane, and valve-controlling apparatus for the engine, of a lever pivotally mounted on the platform and extending toward the axis of the crane-pivot, an arm pivotally mounted on the crane and extending toward the axis of the crane-pivot, means extending about the axis of the crane-pivot and movably connecting the arm with the lever, and connections between the arm and the valve-controlling apparatus.

2. In a steam shovel, the combination with a platform, a crane pivoted on the platform, an engine mounted on the crane, and valve-controlling gearing for the engine, of a lever pivotally mounted on the platform and extending nearly to the axis of the crane-pivot, an arm pivotally mounted on the crane and extending about the axis of the crane-pivot, the extremity of the arm being curved and in pivotal and sliding connection with the lever, and operating connections between the arm and the valve-controlling gearing.

3. In a steam shovel, the combination with a platform, a crane pivoted on the platform, an engine mounted on the crane, and valve-controlling apparatus for the engine, of a lever pivotally mounted on the platform and having a guide thereon, an extension-rod movable in the guide and having an opening therein, an arm pivotally mounted on the crane and having a loop thereon extending about the axis of the crane-pivot, the loop extending movably through the opening of the extension-rod, and operating connections between the arm and the valve-controlling apparatus.

4. In a steam shovel, the combination with a platform, an A-frame fixed on the platform, a crane pivoted on the platform, a lever pivoted above the platform, a movable shovel-arm on the crane, a shovel on the shovel-arm, a bottom hinged to the shovel, a latch for the bottom, a cylinder secured to the shovel-arm, a piston movable in the cylinder and operatively connected with the latch, and a fluid-conduit connected with the cylinder, of a controlling-valve mounted on the crane and having an operating-arm, the controlling valve being connected with the fluid-conduit, a spring connected with and moving the operating arm in one direction, a shaft supported horizontally in the

A-frame, a guide sheave rotatably and slidingly mounted on said shaft, and a cord connected to the operating-arm and extending over the guide sheave and connected to the pivoted lever for moving the operating-arm in the opposite direction.

5. In a steam shovel comprising a platform, a crane pivoted on the platform, a shovel carried by the crane, a chain for hoisting the shovel extending vertically in the axis of the crane-pivot, an auxiliary engine mounted on the crane for assisting in controlling the shovel, and valve-controlling apparatus for the engine, the combination of an arm pivotally mounted on the crane and having a loop extending about the vertical portion of the chain, the arm being operatively connected with the valve-controlling apparatus, and a lever pivotally mounted on the platform and connected loosely with the loop.

6. In a steam shovel, the combination with a platform, a crane pivoted on the platform, an engine mounted on the crane, and valve-controlling apparatus for the engine, of a rock-shaft mounted on the platform, means for operating the rock-shaft, an arm secured to the rock-shaft, a lever pivotally mounted on the platform and connected at one end with the arm, the opposite end of the lever having a guide thereon, an extension-rod movably mounted in the guide and having an opening in one end thereof, a nut

on the opposite end of the extension-rod, a spring between the guide and the nut, an arm pivotally mounted on the crane and having a curved portion extending about the axis of the crane pivot and movably through the opening in the extension-rod, and operating connections between the last-described arm and the valve-controlling apparatus.

7. In a steam shovel, the combination with a platform, a crane pivoted on the platform, an engine mounted on the crane, valve-controlling gearing for the engine, a shovel mounted on the crane, and a chain on the crane connected with the shovel and extending vertically in the axis of the crane pivot, of a lever pivotally mounted on the platform and extending nearly to the said axis, an arm pivotally mounted on the crane and extending nearly to said axis and having an opening therein through which said chain extends in vertical arrangement, the extremity of the arm being curved and pivotally connected with the lever to slide in connection therewith, and connections between the arm and the gearing.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLES F. HINKLEY.

Witnesses:

OTTO A. POIRIER,
WILLIAM H. LINN.