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POWER SHOVEL.

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1,239,554. Patented Sept. 11, 1917.

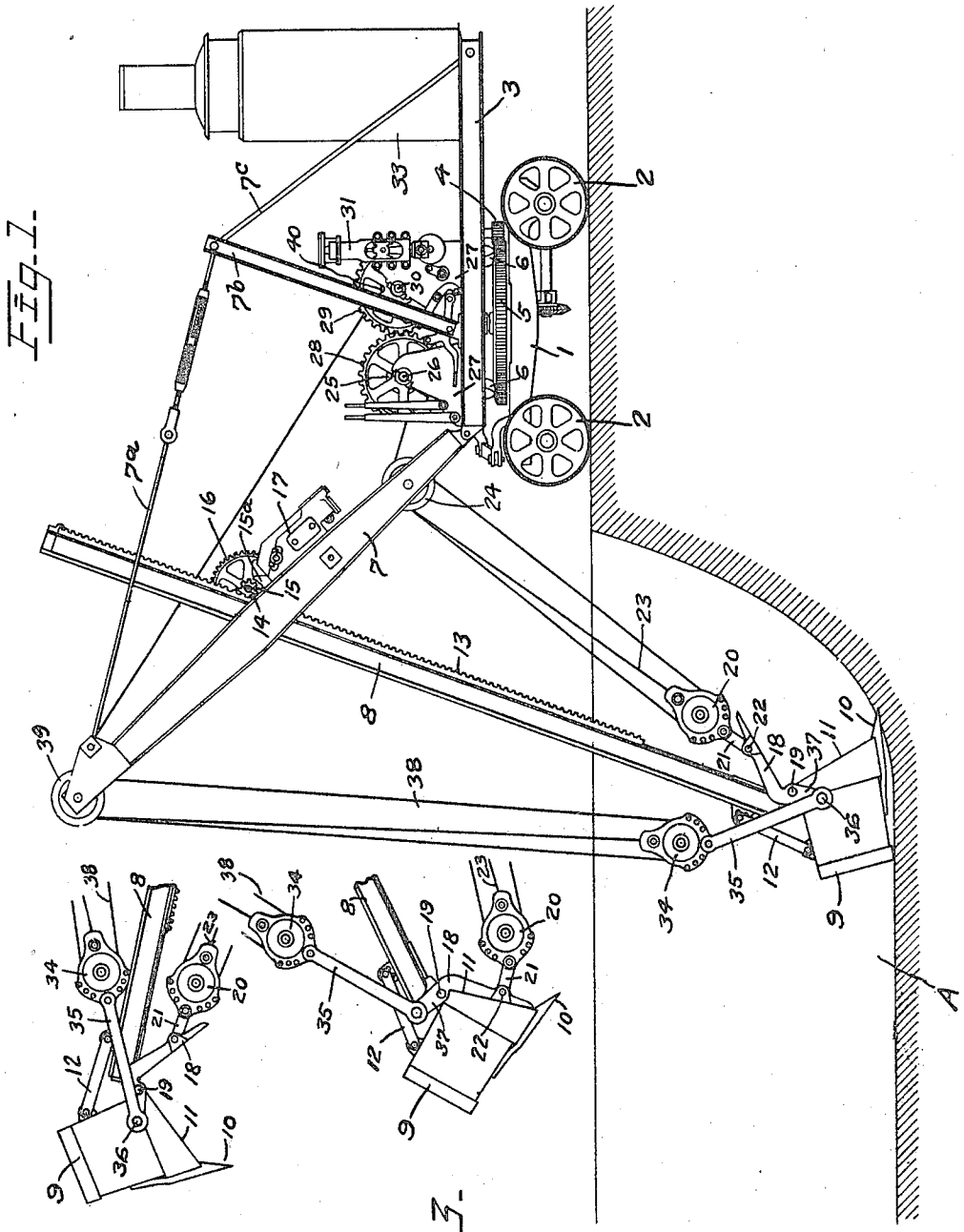


Fig. 1.

Fig. 2.

Fig. 3.

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POWER-SHOVEL.

1,239,554. Specification of Letters Patent. Patented Sept. 11, 1917.

Application filed September 20, 1915. Serial No. 51,525.

To all whom it may concern:

Be it known that we, EDWIN J. ARMSTRONG and HOLGER ROMMERDALE, citizens of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Power-Shovels, of which the following is a specification.

This invention relates to power shovels and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

More particularly the invention relates to a type of steam shovel wherein the digging advances toward the shovel rather than away from it as is the more common practice. By advancing the cut toward the shovel, the shovel is carried by the earth in advance of the trench and as this has been ordinarily undisturbed the difficulties of having the shovel on the trench and the advance made away from the shovel are obviated. In carrying out my invention the instrumentalities used in the ordinary shovel have been used as far as practical.

The invention is illustrated in the accompanying drawings as follows:—

Figure 1 shows a side elevation of the shovel.

Figs. 2 and 3 are detached views of the dipper and adjacent parts showing their position as the dipper is lifted.

1 marks the shovel frame, 2 the wheels on which it is mounted, 3 the turn table, 4 the turning pinion and 5 the gear on the frame which the pinion 4 meshes, 6 the wheels supporting the turn table, 7 the boom, 7^a a rod forming a boom support, 7^b a post to which the rod 7^a extends and 7^c a rod extending from the post to the turn table. These parts are of the ordinary construction used in steam shovels.

The dipper stick 8 has the dipper 9 rigidly mounted on the end of it. The shoe or cutting edge 10 of this dipper faces toward the shovel, the face 11 being the open face of the dipper. A brace 12 extends from the dipper stick. The dipper stick is provided with the rack 13 which engages the gear 14. The gear 14 is mounted on the shaft 15 and this shaft is journaled in bearings 15^a on the boom. A gear 16 is fixed on the shaft 15 and is driven by the crowding engine 17. The handling of the dipper stick by the operation of the crowding engine and its control follows ordinary practice.

A cover 18 is provided for the dipper. It is pivotally mounted on the dipper by means of the pins 19 and is adapted to close the face 11 of the dipper. A pulley block 20 is secured by a link 21 to the cover 18 at 22. A line 23 extends from the block 20 over the pulleys 24 on the drum and through the block 20 to a drum 25. The drum 25 is mounted on the shaft 26 and the shaft 26 is journaled in the engine frame 27. A drum gear 28 is mounted on the shaft 26 and is driven from a drum gear 29. The drum gear 29 is mounted on the shaft 30 and is driven from the hoisting engine 31. The ordinary steam boiler 33 is mounted on the turn table and supplies steam to the engine of the shovel.

A block 34 is connected by links 35 with the arms 37 by means of pins 36. The arm 37 extends from the rear of the cover 18 and forms an opposing lever to the lever formed by the cover around the pivot 19. The line 38 extends from the pulley block 34 over the pulley 39 and through the block 34 and over the drum 40 mounted on the shaft 30.

The drums 25 and 40 are operated from the engine in the usual manner with the usual devices for locking them with and releasing them from the shafts on which they are mounted (not shown) so as to pull in the lines 38 and 23 and to release the same from tension. It will be observed that the drums 25 and 40 rotate in opposite directions through the action of the intermeshing gears 28 and 29 when the engine is running in the same direction. The line 23 is carried under the drum 25 and the line 38 over the drum 40 so that with the engine running in the same direction both lines can be pulled in at the same time.

In the operation of the device, the dipper stick is lowered into the trench A and this is accomplished through the action of the crowding engine acting through the rack 13 on the dipper stick. Tension is then put on the line 23 and this not only holds the cover 18 in an open position but advances the dipper inwardly or toward the shovel thus

taking a cut in the trench, the dipper stick being of sufficient length to permit carrying the dipper considerably below the plane of the shovel frame. When the dipper is filled with material, tension on the line 23 is relieved and tension put on the line 38. This puts pressure on the arm 37 and closes the cover 18. The dipper is then elevated through the action of the line 38 and the crowding engine and swung outwardly through the action of the line 38. When the dipper reaches a sufficient elevation to make it desirable to open the cover, as for instance the position shown in Fig. 2, tension is put on the line 23, the dipper stick being held outwardly by the crowding engine. The effect of this is to open the cover. This is also accomplished even though equal tension is put on the two lines because the leverage through which the line 23 operates is greater, the distance between the pivot 22 and 19 being greater than the distance between the pivot 19 and the pivot 36. The effect is to open the cover with the shovel in the elevated position shown in Fig. 2 thus completely emptying the same. Both lines are then slacked off and the dipper stick crowded into the trench in proper condition for work when tension is again put on the line 23 and the dipper advanced. The operator by controlling the tension on the lines 23 and 38 can control the point at which the dipper strikes the work.

It will be observed that the shovel is carried by the earth before it is disturbed and on the original ground level. It makes it possible to dig very narrow trenches where this is desired without subjecting the walls of the trench to the weight of the machine.

While we use the term "a dipper rigidly mounted on the dipper stick" we do not wish to exclude by this structure a dipper which is mounted to swing on the dipper stick with an axis in alinement with the dipper stick.

What we claim as new is:—

1. In a power shovel, the combination of a shovel platform; a boom extending from the platform; a dipper stick slidingly mounted on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform and away from the dipper stick throughout its operation; two lines operating the dipper; a closure for the dipper closing the cutting face of the dipper; and means actuated by varying the tension on said lines and operating upon the closure for releasing the material from the dipper.

2. In a power shovel, the combination of a shovel platform; a boom extending from the platform; a dipper stick mounted on the boom; a crowding engine operating on the dipper stick; a dipper rigidly mounted on the dipper stick having its cutting edge extending toward the platform; two lines operating the dipper; and means actuated by varying the tension on said lines in connection with the crowding engine for releasing the material from the dipper.

3. In a power shovel, the combination of a shovel platform; a boom extending from the platform; a dipper stick mounted on the boom; a crowding engine acting on the dipper stick; a dipper on the dipper stick having its cutting edge extending toward the platform; two lines operating the dipper, one outwardly and one inwardly; a closure for the dipper for closing the cutting face thereof; and means actuated by varying the tension on said lines and operating upon said closure for releasing the material from the dipper.

4. In a power shovel, the combination of a shovel platform; a boom extending from the platform; a dipper stick mounted on the boom; a crowding engine operating on the dipper stick; a dipper on the dipper stick having its cutting edge extending toward the platform; two lines operating the dipper, one extending to a point on the boom outside the dipper stick and one extending inwardly to a point on the boom inwardly from the dipper stick; a closure for the cutting face of the dipper; and means actuated by varying the relative tension on said lines for actuating said closure for releasing material from the dipper.

5. In a power shovel, the combination of a shovel platform; a boom extending from the platform; a dipper stick mounted on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform; a crowding engine operating on said dipper stick; two lines operating the dipper stick; a closure for the cutting face of the dipper; and means acting upon said closure and with said lines and said crowding engine for advancing the shovel into the work, elevating and retracting the shovel and discharging the material therefrom.

6. In a power shovel, the combination of a shovel platform; a boom extending therefrom; a dipper stick mounted on the boom; a dipper mounted on the dipper stick and having its cutting edge extending toward the platform; a cover for the cutting face of the dipper; and means for automatically opening and closing the cover as the dipper is operated.

7. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover for the dipper; and two lines extending from the dipper, one adapted to open the cover and advance the dipper into the work and the other adapted to close the cover and retract the dipper.

8. In a power shovel, the combination of a

platform; a boom extending from the platform; a dipper stick mounted on the boom; a dipper mounted on the dipper stick having its cutting edge extending toward the platform; a cover on the dipper; and means for advancing the dipper and automatically opening the cover for closing the cover as the dipper is elevated and retracted.

9. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover for the dipper; two lines extending from the dipper, one adapted to open the cover and advance the dipper into the work and the other adapted to close the cover and retract the dipper; and means actuated by varying the relative tension on said lines opening the cover to release the material.

10. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick mounted on the boom; a dipper mounted on the dipper stick having its cutting edge extending toward the platform; a cover on the dipper; and means for advancing the dipper and automatically opening the cover for closing the cover as the dipper is elevated and retracted and for opening the cover with the dipper in an elevated retracted position.

11. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover pivotally mounted on the dipper for closing the dipper; and two lines for actuating the cover extending from the cover, one at one side of the pivot and the other at the opposite side of the pivot.

12. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover pivotally mounted on the dipper for closing the dipper; and two lines extending from the cover from opposite sides of the pivot, one inwardly and adapted to open the cover and advance the dipper and the other outwardly and adapted to close the cover and retract the dipper.

13. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover pivotally mounted on the dipper for closing the dipper; and two lines extending from the cover at opposite sides of the pivot, one inwardly and adapted to open the cover and advance the dipper and the other outwardly and adapted to close the cover and retract the dipper, the point of attachment of the line extending inwardly being more remote from the cover pivot than the point of attachment of the outwardly extending line.

14. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick mounted on the boom; a crowding engine operating on the dipper stick; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover pivotally mounted on the dipper and adapted to close the same; a line attached to the cover and extending inwardly, said line being adapted to open the cover and advance the dipper; and a second line attached to the cover at the opposite side of its pivot adapted to close the cover and retract the dipper.

15. In a power shovel, the combination of a platform; a boom extending from the platform; a dipper stick mounted on the boom; a crowding engine operating on the dipper stick; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover pivotally mounted on the dipper and adapted to close the same; a line attached to the cover and extending inwardly, said line being adapted to open the cover and advance the dipper; and a second line attached to the cover at the opposite side of its pivot adapted to close the cover and retract the dipper, the line extending inwardly being more remote from the cover pivot than the lien extending outwardly.

16. In a power shovel, the combination of a platform; a boom extending therefrom; a dipper stick mounted on the boom; a dipper on the dipper stick having its cutting edge extending toward the platform; a cover pivotally mounted on the dipper for closing the same; two lines extending from the cover, one at each side of the pivot, one extending to a point on the boom outwardly from the dipper stick and one extending inwardly; and a motor for simultaneously moving said lines in the same direction.

17. In a power shovel, the combination of a shovel platform; a boom extending therefrom; a dipper stick mounted on the boom; a dipper mounted on the dipper stick and having its cutting edge extending toward the platform; a cover for the cutting face of the dipper; and means for automatically opening and closing the cover.

18. In a power shovel, the combination of a shovel platform; a boom extending therefrom; a dipper stick mounted on the boom; a dipper mounted on the dipper stick and having its cutting edge extending toward the platform; a cover for the cutting face of the dipper; and means for automatically opening the cover as the dipper is advanced to the work.

19. In a power shovel, the combination of a shovel platform; a boom extending therefrom; a dipper stick mounted on the boom;

a dipper mounted on the dipper stick and having its cutting edge extending toward the platform; a cover for the cutting face of the dipper; and means for automatically closing the cover as the dipper is retracted from the work.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

EDWIN J. ARMSTRONG.
HOLGER ROMMERDALE.

Witnesses:
B. M. HARTMAN,
THOMAS C. MILLER.