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W. E. TRAPNELL ET AL

EXCAVATING MACHINE

Filed Oct. 16, 1922

2 Sheets-Sheet 1

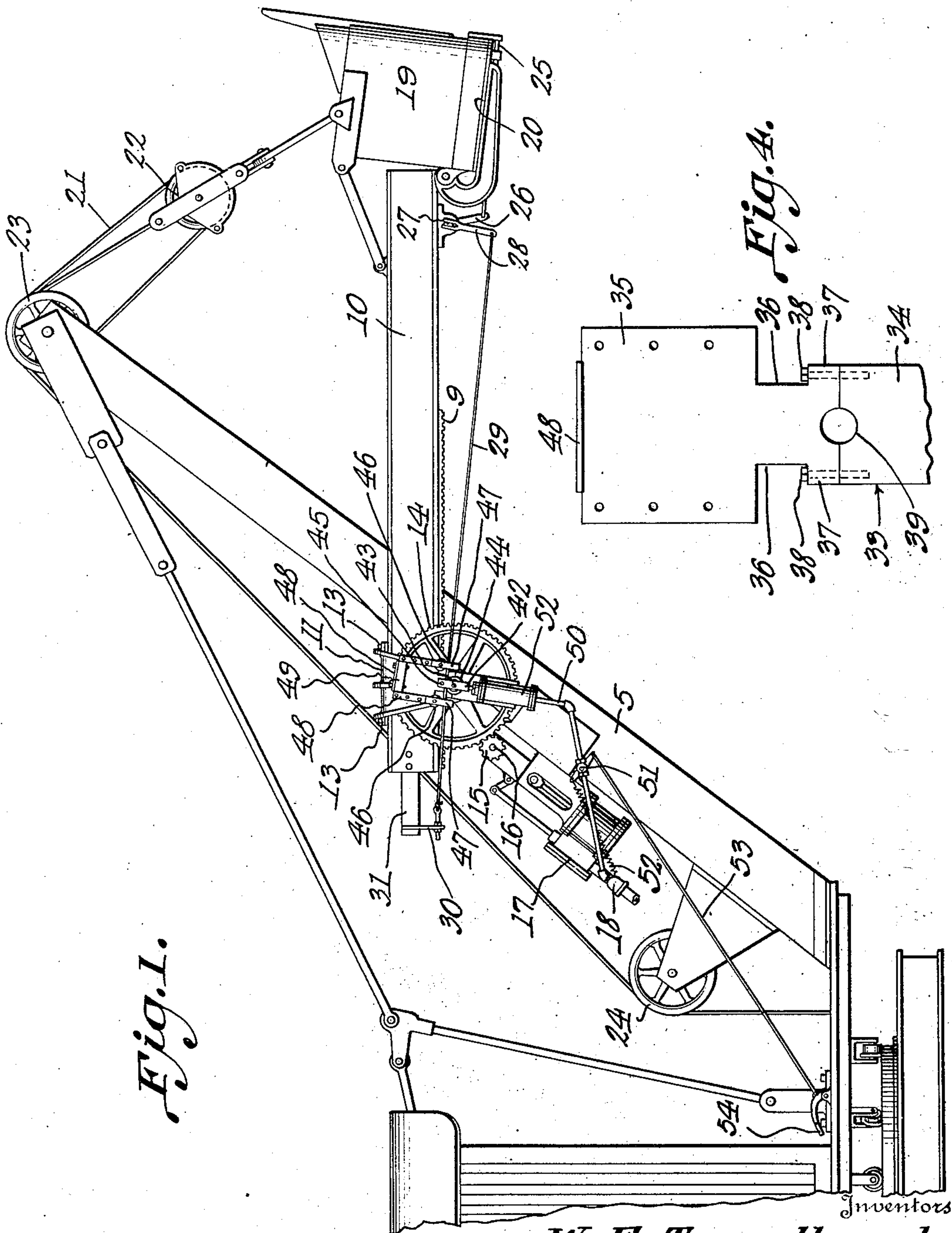


Fig. 1.

Fig. 4.

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By

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June 19, 1923.

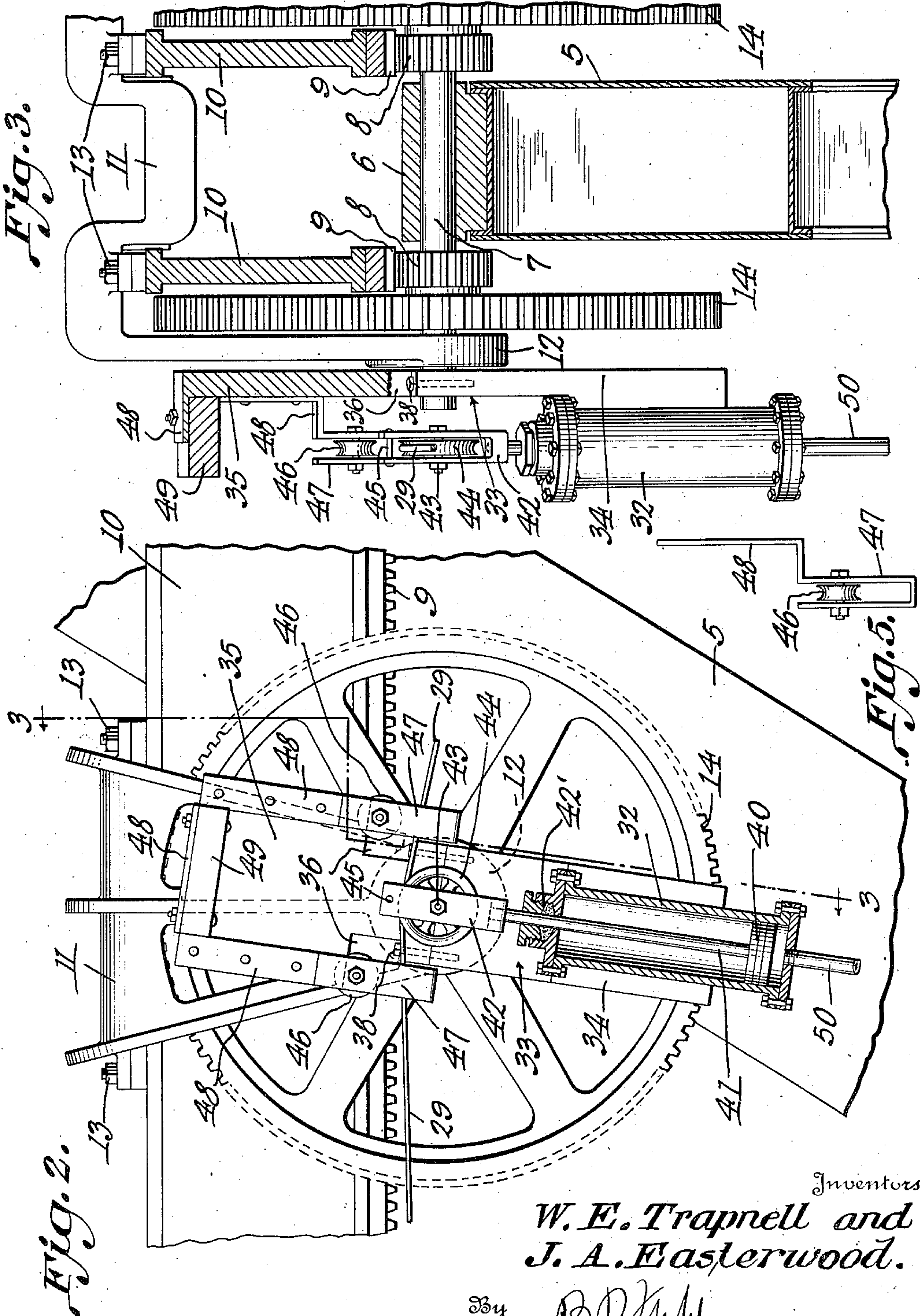
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UNITED STATES PATENT OFFICE.

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EXCAVATING MACHINE.

Application filed October 16, 1922. Serial No. 594,904.

To all whom it may concern:

Be it known that WILLIAM E. TRAPNELL and JOSEPH A. EASTERWOOD, citizens of the United States, residing at Madisonville, in the county of Hopkins and State of Kentucky, have invented certain new and useful Improvements in Excavating Machines, of which the following is a specification.

The present invention relates to power means for releasing or tripping the door of the dipper or shovel of an excavating machine.

An important object of the invention is to provide a device of the above mentioned character, which is adapted to be installed upon a steam shovel or excavating machine, of the ordinary type, without altering the construction thereof, and embodying a trip line which may be connected with the usual latch of the dipper door.

A further object of the invention is to provide a device of the above mentioned character, which is of simple construction, and is adapted to maintain the trip line substantially straight throughout its entire length, except when the line is employed to actuate the latch.

A further object of the invention is to provide a device of the above mentioned character, which is adapted to be mounted upon the transverse shaft carried by the crane, and may have connection with a pipe leading into the steam pipe of the driving engine, and which is also adapted to have a pedal arranged in convenient reach of the operator, and serving to actuate a valve, which supplies steam to the cylinder of the device.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of apparatus embodying my invention, showing the same in use,

Figure 2 is a similar view, upon an enlarged scale,

Figure 3 is a transverse section through the boom or handle, taken on line 3—3 of Figure 2, parts in section,

Figure 4 is a side elevation of a support base, and,

Figure 5 is an edge elevation of a pulley carrying bracket.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of our invention, the numeral 5 designates the crane of an excavating machine or steam shovel, which is mounted to be shifted horizontally, as is well known. As more clearly shown in Figure 3, the crane 5 has a block 6, rigidly mounted upon its upper side, which block has an opening for the reception of a transverse shaft 7, which is clamped rigidly within the block.

Rotatable upon the end portions of the shaft 7 are pinions 8, engaging racks 9, carried by a boom or traveler-beam 10. This traveler-beam may be of any well known or preferred type and is shifted longitudinally by means of the gears 8 and also turns about these gears as a pivot, as is well known.

The numeral 11 designates an approximately inverted U-shaped saddle, provided at its ends with apertured heads 12, pivotally receiving the transverse shaft 7. The sides of the boom 10 are bolted to the transverse portion of the saddle 11, as shown at 13.

The gears 8 receive their rotation from large gears 14, which are rotatable upon the shaft 7, and preferably cast integral with the gears 8. The gears 14 are each driven by a smaller gear 15, Figure 1, mounted upon each end of the crank shaft 16 of a steam engine 17, which is rigidly mounted upon the crane 5, as shown. The steam is supplied to the cylinder of the engine by a supply pipe 18.

The numeral 19 designates a shovel or dipper, suitably connected with the forward end of the boom 10, and having a door or bottom 20, of any well known or preferred construction. The shovel or dipper 19 is supported by the usual cable 21, passed about a pulley 22, connected with the shovel, and about pulleys 23 and 24, mounted upon the crane 5. Any suitable hoisting means may be mounted upon the crane for raising and lowering the shovel.

Our invention resides particularly in the provision of power apparatus to actuate the latch 25, which is employed to normally hold

the door 20 shut. This latch may be of the usual construction, such as a reciprocatory spring pressed bolt. The latch may be retracted by swinging the lever 26 rearwardly, which is secured to a rock shaft 27, mounted upon the boom 10, and this rock shaft is turned by a second lever 28. The lever 28 has connection with a rearwardly extending trip cable 29, which is arranged longitudinally of the boom and preferably slightly below it. The rear end of the cable 29 is attached to a bracket 30, secured to the extension 31 at the rear end of the boom 10.

The power apparatus embodies a cylinder 32, which is carried by a support base 33. This support base is formed in lower and upper sections 34 and 35. The cylinder 32 is preferably cast integral with the lower section 34.

The sections 34 and 35 of the support base are separate and are arranged in end to end relation. The upper section 35 has recesses 36 formed therein, producing shoulders 37. Bolts 38 serve to clamp the upper section to the lower section, as shown. The adjacent ends of the sections 34 and 35 have an opening 39 formed therein, for the reception of the end of the transverse shaft 7, and the diameter of this opening is slightly smaller than the diameter of the shaft, whereby the sections 34 and 35 may be rigidly clamped to the shaft 7. This is important, as it is desired that the support base remain stationary with respect to the shaft 7, in operation. Further, by proper manipulation of the bolts 38, the angular position of the support base 33 may be varied, and the support base again locked to the transverse shaft 7.

Mounted to reciprocate within the cylinder 32 is a piston 40, having a piston rod 41 secured thereto. This piston rod projects upwardly through a stuffing box 42', and carries a yoke 42 upon its upper end, which is rigidly secured thereto. Rotatably mounted within the yoke 42 by means of an axle 43 is a grooved pulley 44, to engage with the trip line 29, as shown. A transverse pin 45 is carried by the upper end of the yoke 42, and retains the trip line within the yoke. The numeral 46 designates coacting groove pulleys, normally spaced from the pulley 45, and arranged upon the opposite side of the trip line 29, in spaced relation thereto. The pulleys 46 are carried by U-shaped yokes or brackets 47, through which the trip line 29 passes. These yokes are secured to L-shaped brackets 48, which are bolted to the upper base section 35, as shown. The base section 35 is provided at its upper end with a lateral flange 48, having a lateral stop element 49 bolted thereto, and disposed in the path of travel of the yoke 42, to limit the upward movement of the yoke and its piston 40.

Steam is supplied to the lower end of the

cylinder 32 by means of a pipe 50, which is connected with the steam supply pipe 18 of the engine. The numeral 51 designates a two-way valve of any well known or preferred type. This valve is normally held in one position by means of a spring 52, whereby the passage of steam through the pipe 50 from the pipe 18 is prevented, while the lower end of the cylinder 32 is placed in communication with the atmosphere, by exhaust. When the valve is turned to the right, the exhaust is closed and steam will be supplied to the cylinder 32. This valve is operated by a link 53, extending rearwardly for connection with a pedal or foot lever 54, arranged in convenient reach of the operator, of the excavating machine.

The operation of the apparatus is as follows:

The boom 10 is moved longitudinally and raised and lowered, in the well known manner, and the door 20 is normally locked in the closed position. The piston 40 is now in the lowered or retracted position, and the pulley 44 does not exert any substantial pressure upon the trip line 29, or this pulley may be out of contact with the trip line. The trip line is therefore substantially straight throughout its entire length, and possesses the maximum freedom of movement with the boom 10. The shovel or dipper 19 is ordinarily dumped when in a more or less raised position, while the dumping may occur at any position, if desired. When it is desired to dump the shovel, the operator depresses the lever 54 with the foot, and steam is fed into the cylinder 32. This forces the piston 40 upwardly and the yoke 42 rises, bringing the pulley 44 into engagement with the trip line 29. This trip line is hence moved into engagement with the opposed pulleys 46, and a portion of the trip line is carried upwardly beyond these opposed pulleys, into a transverse bent portion. This causes the shortening of the trip line and the trip line will therefore pull upon the levers 26 and 28, and the latch 25 will be retracted and the door 20 freed to drop. When the steam is exhausted from the cylinder 32 the piston 40 will return to the lower position, and the door 20 will return to its closed position, and will again be locked in this position by the latch 25, as is well known.

It is to be understood that the form of our invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the size, shape, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. In an excavating machine, a crane, a

boom, a transverse shaft rigidly secured to the crane and supporting the boom, means rotatably mounted upon the transverse shaft to effect the longitudinal movement of the boom, a shovel carried by the boom and having a door adapted to be moved to opened and closed positions, a latch to hold the door closed, a trip cable having connection with the latch and with the rear portion of the boom and extending longitudinally of the boom and normally being substantially straight, a support base rigidly mounted upon the transverse shaft, a cylinder carried by the lower portion of the support base, a piston within the cylinder, a piston rod secured to the piston and extending outwardly of the cylinder, a pulley secured to the piston rod and movable into engagement with the trip line in a direction transversely of the same, pulleys arranged upon the opposite side of the trip line and supported by the upper portion of the base support, and means to supply fluid pressure to the cylinder.

2. In an excavating machine, a crane, a boom, a transverse shaft rigidly secured to the crane and supporting the boom, means rotatably mounted upon the transverse shaft to effect the longitudinal movement of the boom, a shovel carried by the boom and having a door, a latch to hold the door closed, a trip cable connected with the latch and with the rear portion of the boom and extending longitudinally of the boom, a support base mounted upon the transverse shaft, means whereby the support base may be angularly adjusted upon the transverse shaft and clamped thereto in adjustment at a selected angular position, a cylinder carried by the support base, a piston within the cylinder, a piston rod secured to the piston, a pulley secured to the piston rod and movable transversely of the trip line in a direction transversely thereof, pulleys arranged upon the

opposite side of the trip line and secured to the base support, and means to supply fluid pressure to the cylinder.

3. In an excavating machine, a crane, a boom, a transverse shaft rigidly secured to the crane and pivotally supporting the boom, means rotatable upon the transverse shaft to effect the longitudinal movement of the boom, a shovel carried by the boom and having a door, a latch to hold the door closed, a trip cable connected with the latch and extending longitudinally of the boom, a support base mounted upon the transverse shaft, means whereby the support base may be angularly adjusted upon the transverse shaft and clamped thereto in adjustment at a selected angular position, and mechanism mounted upon the support base to engage with the trip cable and move a portion of it laterally, said mechanism being so arranged that the trip cable is normally substantially straight throughout its entire length.

4. In an excavating machine, a crane, a boom, a transverse shaft carried by the crane and supporting the boom, means to move the boom longitudinally and to raise and lower it, a shovel carried by the boom and having a door, a latch to hold the door closed, a trip line connected with the latch and extending longitudinally of the boom and normally substantially straight throughout its length, a support base mounted upon the transverse shaft, and mechanism mounted upon the support base and adapted to engage the trip line and move a portion thereof laterally, said mechanism being so arranged that it normally allows the trip line to remain substantially straight throughout its length.

In testimony whereof we affix our signatures.

WILLIAM E. TRAPNELL.
JOSEPH A. EASTERWOOD.