Feb. 15, 1949. A. O. HALL 2,461,978

MECHANICAL MINE SHAFT SHOVEL

Filed Feb. 23, 1946

4 Sheets-Sheet 1

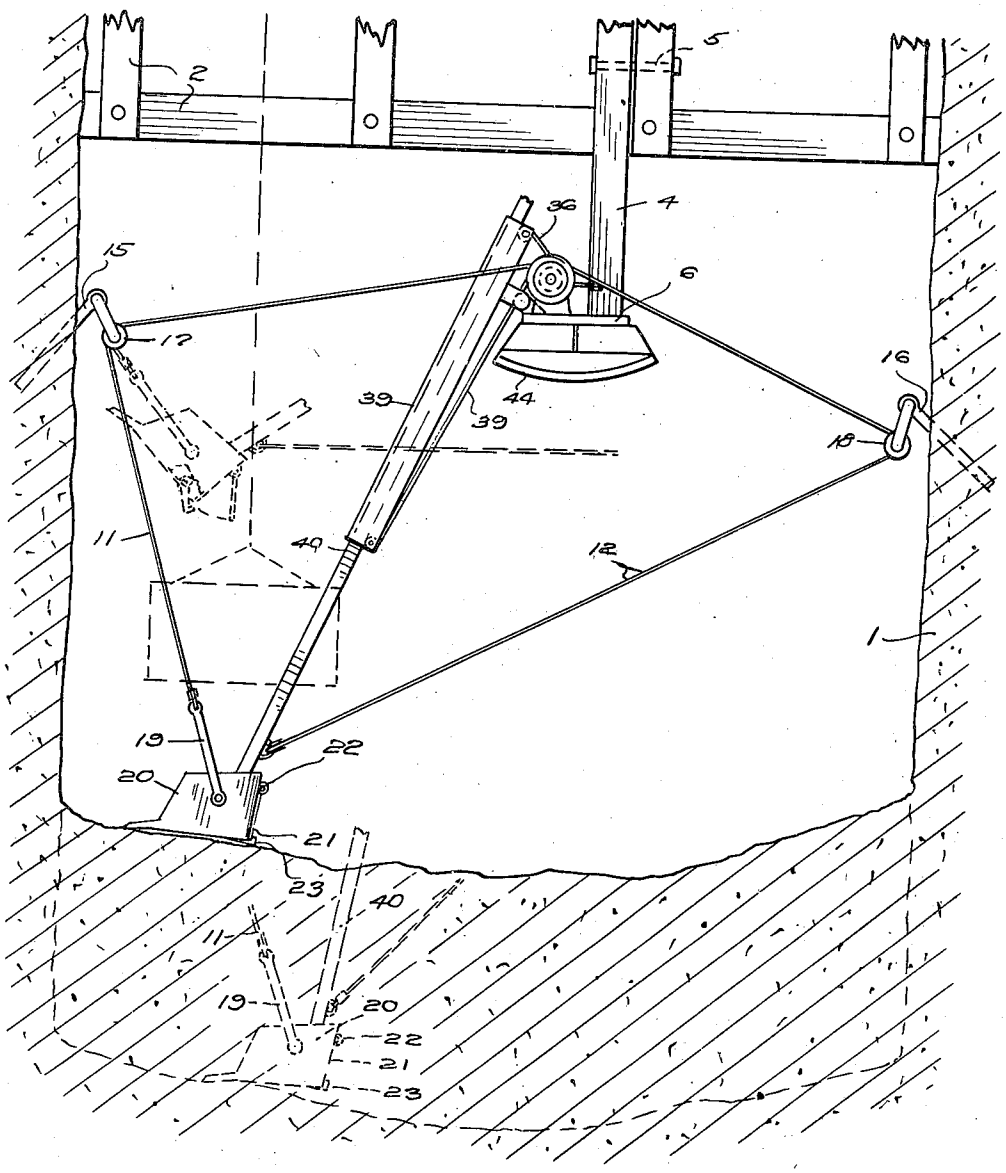

Fig. 1.

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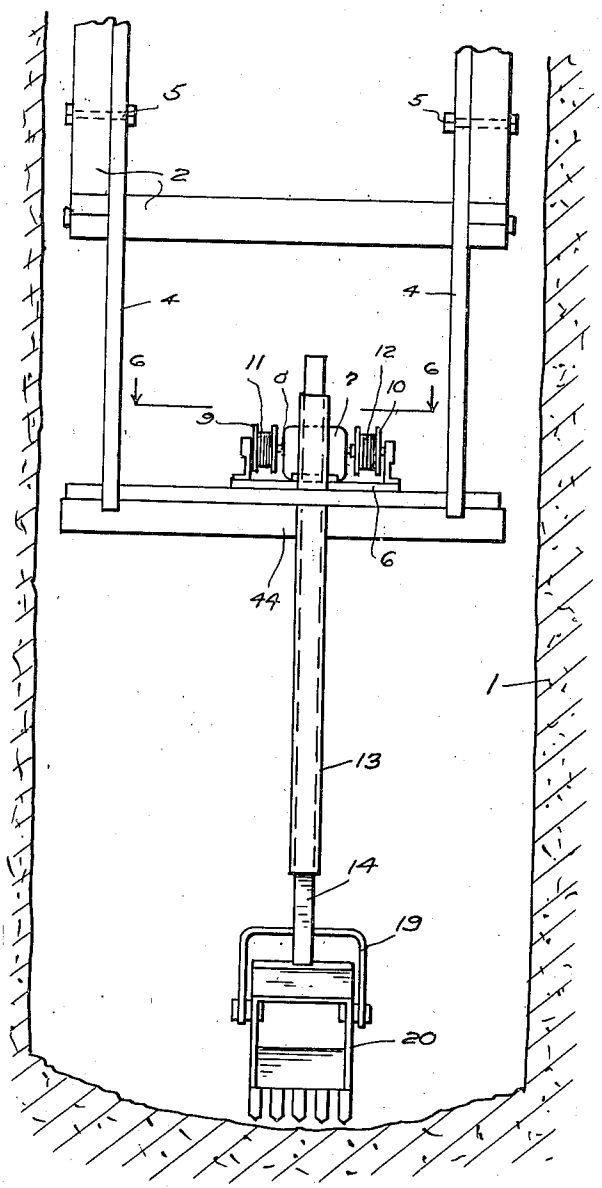

Fig. 2.

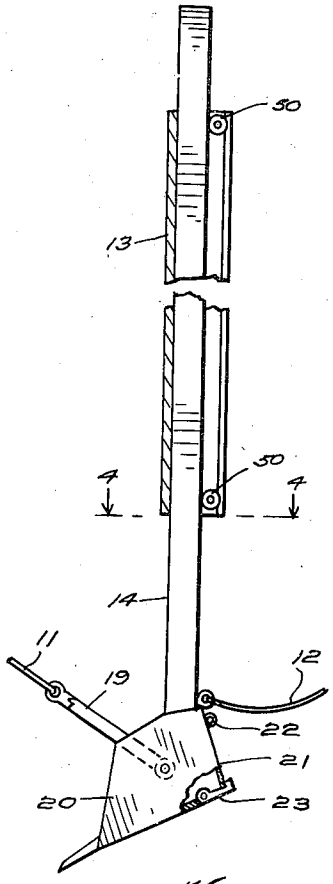

Fig. 3.

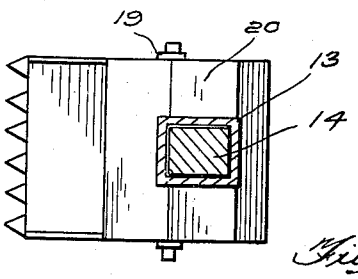

Fig. 4.

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MECHANICAL MINE SHAFT SHOVEL

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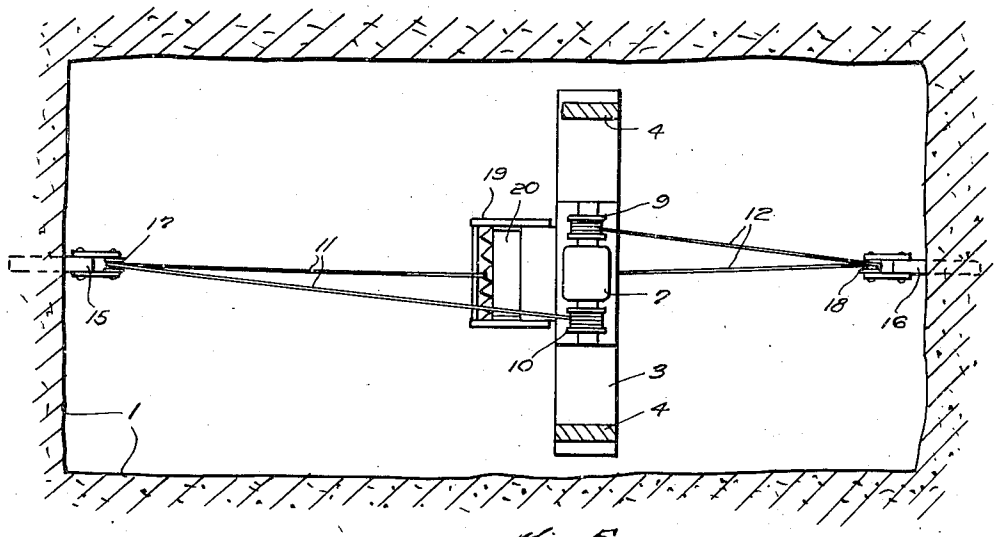

Fig. 5.

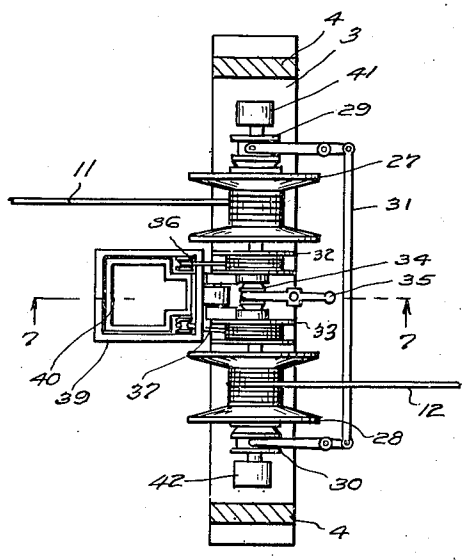

Fig. 6.

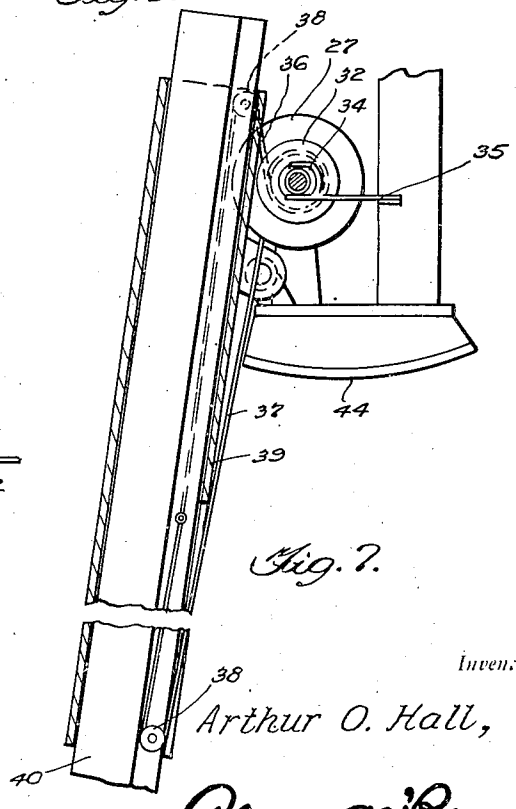

Fig. 7.

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MECHANICAL MINE SHAFT SHOVEL

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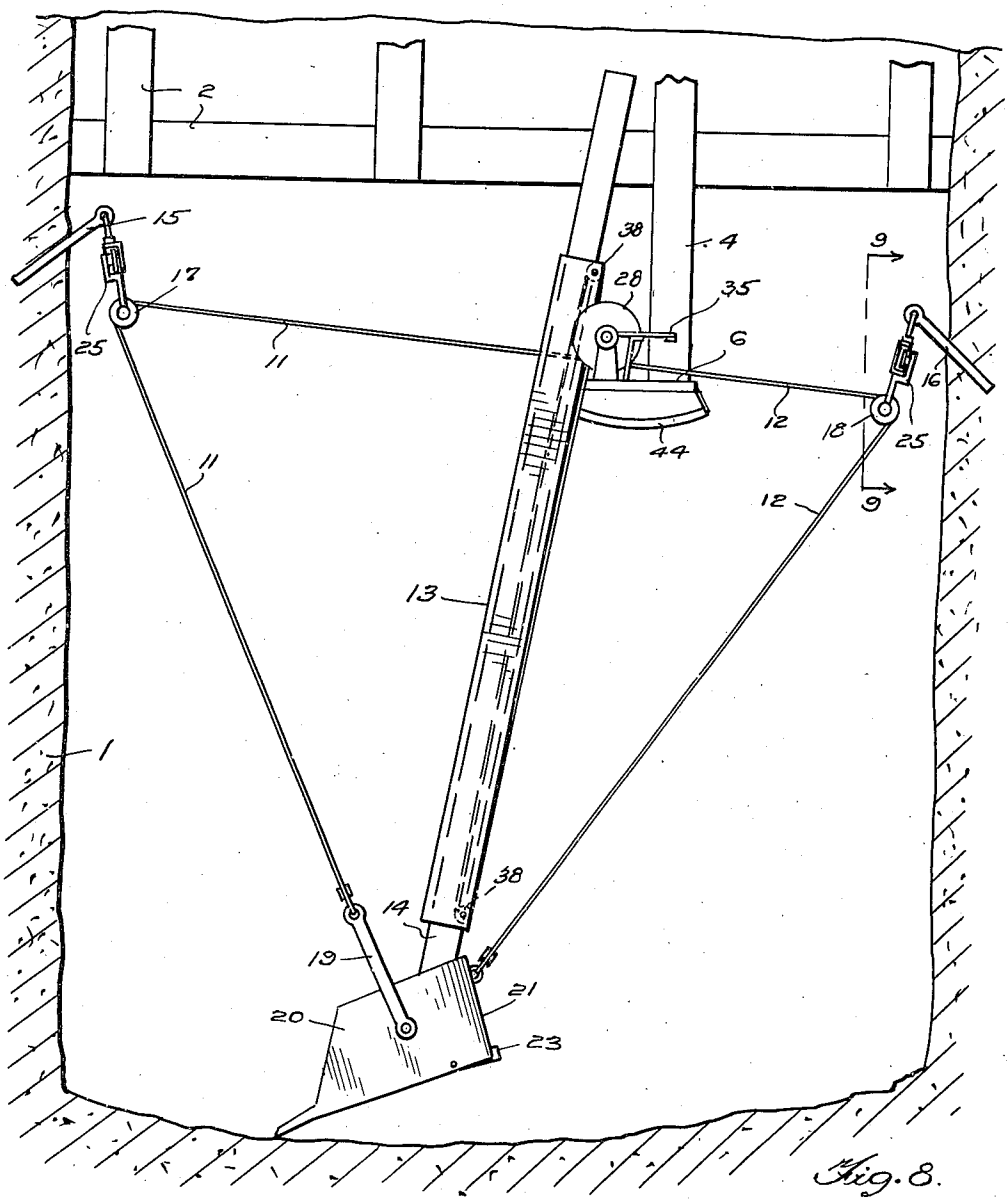

Fig. 8.

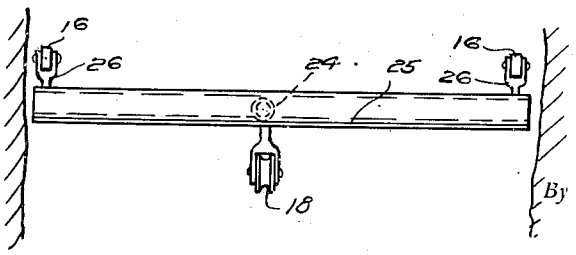

Fig. 9.

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Patented Feb. 15, 1949

2,461,978

UNITED STATES PATENT OFFICE

2,461,978

MECHANICAL MINE SHAFT SHOVEL

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Application February 23, 1946, Serial No. 649,575

2 Claims. (Cl. 214—141)

1

This invention relates to improvements in mechanical shaft shovels used in removing rock and muck that has been blasted loose in the bottom of a mine shaft.

An object of the invention is to provide an improved air motor or electric motor operated mechanical shaft shovel which may be lowered into a mine shaft and set up in a few minutes ready for operation.

Another object of the invention is to provide an improved power operated mechanical shaft shovel which will be supported upon a suitable framework or casing, constructed as the shaft is dug, to prevent caving in of the shaft walls, said shovel having a controlled extensible supporting boom operatively connected with a power means whereby the shovel may be moved forward or backward and also from side to side in the shaft.

A further object of the invention is to provide an improved power operated mechanical shaft shovel which will be highly efficient in operation and relatively inexpensive to manufacture and produce.

Other objects will appear as the description proceeds.

In the accompanying drawings which form a part of this application,

Figure 1 is a side elevation of the bottom of a mine shaft showing the improved mechanical shaft shovel in operative position therein, and showing in dotted lines the dumping position of the shovel;

Figure 2 is a front elevation of the mechanical shaft shovel in a shaft;

Figure 3 is a side elevation, partly in section of the extensible boom with shovel supported thereon;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a plan view looking down a mine shaft on top of a mechanical shaft shovel;

Figure 6 is a view taken on the line 6—6 of Figure 2;

Figure 7 is a view taken on the line 7—7 of Figure 6;

Figure 8 is a side elevation of the mechanical shaft shovel in retracted position in a mine shaft, and

Figure 9 is a view taken on the line 9—9 of Figure 8.

Like characters of reference are used throughout the following specification and the accompanying drawings to designate corresponding parts.

2

In carrying out the invention, there is provided a portable mechanical shaft shovel which may be lowered as a unit through a compartment in a mine shaft, and set up in operative position by two men within a few minutes, also the operation of the shovel only requires one man to operate the controls, and one man to be in the shaft bottom, thus accomplishing far more work within a given time with the use of a minimum number of workmen, and at the same time providing a high degree of safety to the operators or workmen.

The digging of a mine shaft is accomplished by a repetition of cycles of work. First, the shaft is drilled and then blasted to loosen rock and muck to a depth of from five to seven feet, after which the shovel is placed in position and scoops the rock and muck and deposits it in a bucket which is hauled up through the shaft to the surface of the ground and dumped, and the cycle repeated until the shaft has been completed.

In the drawings the wall 1 of the shaft is reinforced by a framework 2 to prevent cave-ins and to support apparatus used in the digging of the shaft. The shovel will be supported upon the cross member 3 which will be secured to the framework 2 by means of the connecting members 4, which are bolted at 5 to said framework.

Secured to the cross member 3 is a multiple-drum construction mounted on a base 6, and having a centrally disposed air or electric motor 7 suitably secured thereto. The shaft 8 of the motor extends outwardly from its opposite sides, and supports the drums 9 and 10, about which the shovel operating cables 11 and 12 are respectively wound, reference being had to Figure 2 of the drawings.

The shovel supporting boom comprises a rectangular shaped housing 13, in which the solid extensible boom 14 is mounted for reciprocable movement on the guide rollers 50 positioned in the housing 13 between the inner wall thereof and the adjacent surface of the said boom 14.

The steel pins 15 and 16 will be inserted into openings drilled in the face of the mine shaft, and will support the free sheaves or pulleys 17 and 18. The cable 11 will be wound on the drum 9 and will extend through the pulley 17 and to the clevis 19 on the shovel 20 at the end of the boom 14, while the cable 12 will extend from the drum 10 to and about the pulley 18 and back to the shovel where it will be secured to the back of the shovel 20. The shovel 20 will be provided with a hinged dumping back 21, hinged at 22, and provided with a locking latch 23.

From the foregoing description, it will be seen that the operation of the shovel is as follows:

The cable 11 is drawn in on the drum 9 to pull the shovel 20 forwardly to fill the same with rock and muck, after which the shovel is dumped into the bucket 24, the same being then hauled to the surface of the ground and dumped, and again lowered into the shaft. Then the cable 12 wound about the drum 10 will be wound in to pull the shovel to the opposite side of the shaft, ready to scoop up another load of muck and rock.

The pulleys 17 and 18 will be secured to and suspended below the guide rollers 24 arranged to be slidably supported upon the track 25, which in turn is connected to the U-shaped clamps 26 secured to the steel pins 15 and 16 driven into the face of the shaft 1. Figure 9 shows a detail of this construction.

In Figures 1, 5, 6, 7 and 8, there is shown a preferred form of operating mechanism, which comprises drums 27 and 28 upon which the cables 11 and 12 will be wound, said drums being provided with clutches 29 and 30 for controlling the same, and said clutches are connected together by means of the link 31. Narrow sheaves or drums 32 and 33 will be operatively connected to the clutch 34 and operated by the lever 35, said drums supporting the cables 36 and 37 extending down between the boom sections and over the pulleys 38 in the boom 39 between the same and the extensible boom section 40. Both of the boom sections 39 and 40 are hollow, and are so arranged that movements of the section 40 will be controlled by the clutch 34 to extend or retract the said section. Suitable driving means will be connected to the pulley wheels 41 and 42 at the ends of the shaft 43 on which the various drums are mounted.

A blasting guard 44 will be supported below the drums and their interconnected mechanism to protect the same from flying rock while blasting is being carried on in the shaft.

It is to be understood that the booms with attached shovel may be moved forwardly and backwardly and laterally from side to side, but they cannot be completely rotated.

If desired, suitable extensible bracing arms (not shown) may extend from the boom structure to the side wall to further brace the same.

While the preferred embodiment of the instant invention has been illustrated and described, it will be understood that it is not intended to limit the scope of the invention thereto, as many minor changes in detail of construction may be resorted to without departure from the spirit of the invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A power operated shaft shovel adapted to be supported in a mine shaft while excavating the same including a supporting base, a shaft journalled on said base, a pair of inner and a pair of outer horizontally aligned drums supported on said shaft, means for driving said drums, a two-part telescoping extensible boom, pulleys supported in the outer boom section at its opposite ends between the same and the inner boom section, boom reciprocating cables mounted over said pulleys being connected respectively with said inner boom section and with the inner pair of said aligned drums, a shovel on the lower end of said inner boom section, and cables connected between said shovel and the other pair of said aligned drums for controlling the movement and operation of said shovel.

2. A power operated shaft shovel adapted to be supported in a mine shaft while excavating the same incuding a supporting base, a shaft journalled on the base, a plurality of aligned drums supported on said shaft, means for driving said drums, a blasting shield disposed below said drums, a two-part telescoping, extensible boom, pulleys supported in the outer boom section at its opposite ends between the same and the inner boom section, means for reciprocating said inner boom in the outer boom including supporting cables mounted over said pulleys and connected respectively with said inner boom section and with a pair of said aligned drums, a shovel on the lower end of said inner boom section, cable guiding pulleys having supporting pins attached thereto adapted to be driven into the opposite side walls of the shaft being excavated, and cables connected with said shovel extending over said pin supported driving pulleys having their opposite ends connected with a second pair of said aligned drums for controlling the movement and operation of said shovel.

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