

[54] REVERSIBLE CAR PLOW FEEDER FOR STOCK PILE RECOVERY SYSTEMS

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[58] Field of Search..... 214/17 D, 17 DA, 10; 198/59; 222/142

[56] References Cited

UNITED STATES PATENTS

2,823,834	2/1958	Buschmann.....	214/17 DA
3,025,981	3/1962	Hannes	214/17 DA
3,206,045	9/1965	Booth et al.	214/17 DA

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[57] ABSTRACT

This invention relates to improvements in reversible plow feeders for recovering solid materials such as ores or coal from stock piles.

6 Claims, 3 Drawing Figures

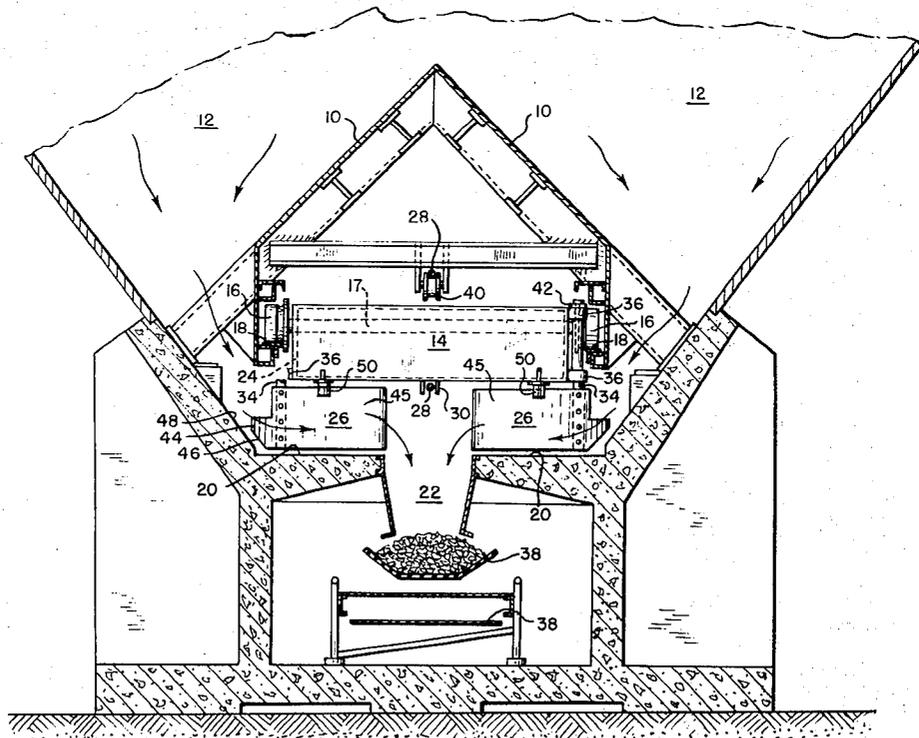
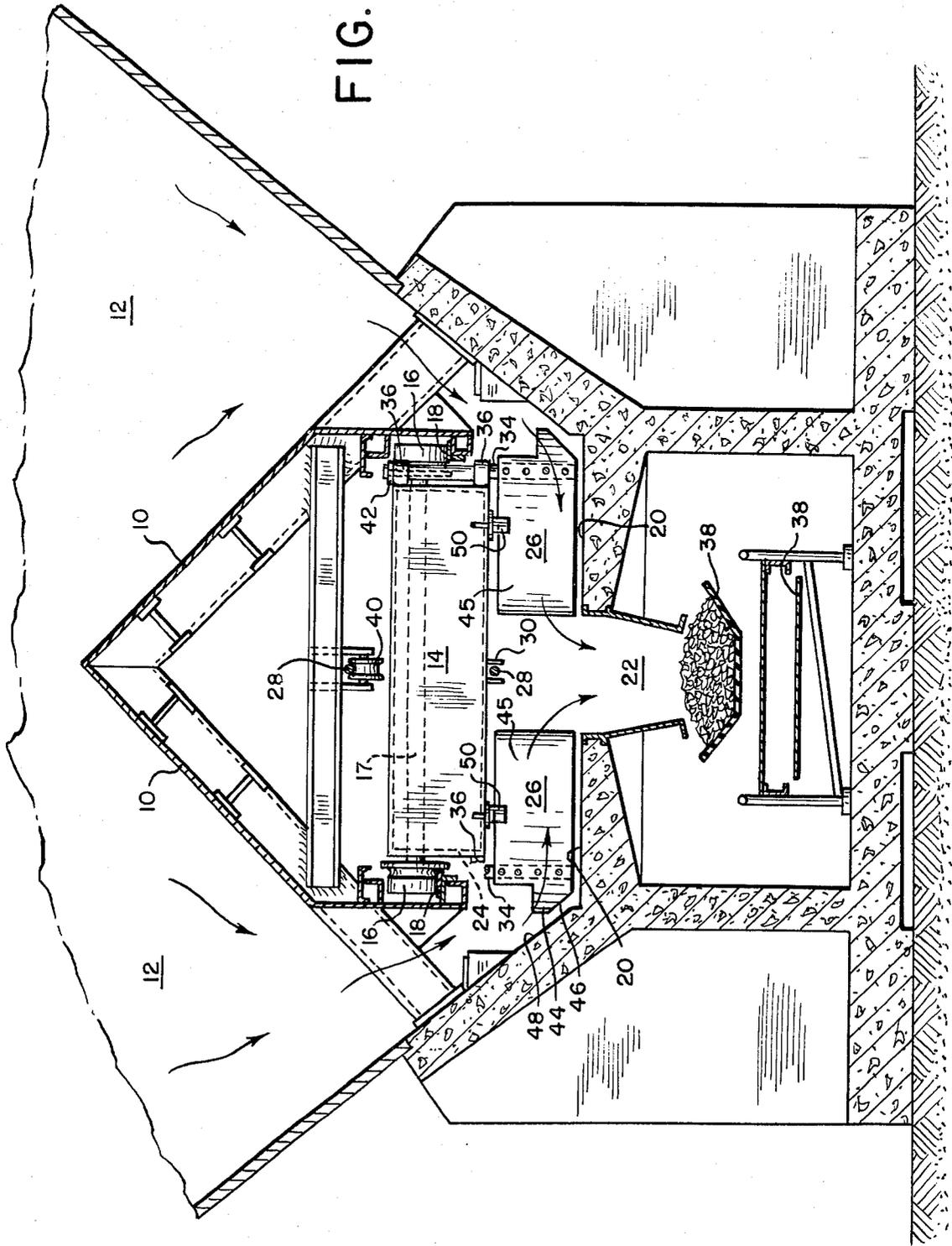


FIG. 2



REVERSIBLE CAR PLOW FEEDER FOR STOCK PILE RECOVERY SYSTEMS

BACKGROUND OF THE INVENTION

It may be noted, as background, that recovery systems of this general type are known from Koppers. U.S. Pat. Nos. 2,794,561 and 2,823,834 disclosing pivoted arms for moving material into a slit and onto a belt conveyor. In the first mentioned patent the arms are arranged in pairs one of which is used at a time. The arms of the second patent have rearward extensions secured with locking hooks. In both patents the arms extend outwardly from centrally located pivot pins providing a heavy strain on the arms because their free ends engage deeply into the material to be moved. The pivoted arms of the Booth U.S. Pat. No. 3,077,995 are different but are such that retaining means are necessary to hold the arms in operative position in the material.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a car plow carrying pivoting plows which automatically change directions with the reversal of the car plow and which are constructed and arranged so that they are fully operative without requiring locks, retaining means, or other controls.

BRIEF DESCRIPTION OF THE INVENTION

The car plow feeder of this invention is preferably arranged for use in a trench type stock pile and adapted to operate along a track located in the trench. It is particularly useful in connection with the loading and shipment of large quantities of crushed coal from the mine to a power plant, for example, by unit trains which may comprise up to one hundred cars each carrying 100 tons of coal. A long trench type stock pile may contain as much as 200,000 tons of coal.

The car plow feeder preferably has a plurality of plows on each side of the car arranged to sweep coal across a floor into a central delivery chute, extending along the bottom of the trench, onto a conveyor belt running the full length of the stock pile. The car is drawn through the trench by a car of known type arranged with means to reverse the direction of the car at each end of the trench, which action automatically changes the operating angle of the plows. Important features of the invention, described hereinafter in the detailed description are: the structure and location of the means for pivoting the plows, the structure and location of the plows on the car and the relationships between the car, the plows, the delivery chute and the coal on the floor.

In a preferred construction the plows are pivotally mounted on vertical shafts located on the outer side portions of the car and include short plow points projecting outwardly from the pivot shafts.

BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWINGS

An embodiment of the invention is illustrated in the accompanying drawings forming a part of this application, in which

FIG. 1 is a broken diagrammatic view partly in a vertical section of a part of the length of a trench type stock pile of coal showing the car plow at an intermediate point;

FIG. 2 is a diagrammatic vertical sectional view taken transversely through the trench structure and showing one end of the car plow; and

FIG. 3 is a diagrammatic plan view showing a portion of the car proper with parts removed illustrating the automatic operation of the plows when the direction of the car movement is reversed.

Referring to FIG. 1 a trench cover 10, supported by structural steel and shaped as in FIG. 2, is covered by stock pile 12 of coal and extends over a car plow 14 having four roller type wheels 16 mounted two on a shaft 17 and operable on spaced rails 18 (FIG. 2). The cover 10 is open along each lower side so that coal flows inwardly onto spaced floor sections 20 defining a central long coal delivery chute 22.

The car plow 14 has a rectangular shaped steel body 24 carrying plows 26 at each side. The car plow is hauled back and forth through the trench by a haul cable 28 the ends of which are attached by cable hitches 30 to the respective ends of the car. The cable extends around a return roller 32 at the right and a reversible haul system (not shown) at the left end of the stock pile 12. Each plow is made up of one or more steel plates riveted to a vertical shaft 34 rotatable in spaced bearings 36 attached to the side of the body 24. Five plows are shown in FIG. 1, but there may be more or less mounted on each side of the car body.

The structure, arrangement and operation of the plows is shown in greater detail in FIGS. 2 and 3. As the car plow is hauled along above the recovery chute 22 the plows push the coal across the floor sections 20, over their edges into the chute 22 and onto a conveyor belt 38. This belt carries the coal to the cars of a unit train or other desired locations. The return run of the conveyor belt 38 is shown below the loaded run in FIGS. 1 and 2. The upper run of the haul cable 28 is carried on rollers 40 located above the position or path of the car plow 14.

The plows 26 are preferably supported slightly above the floor sections 20 by their pivot shafts. As illustrated at the right in FIG. 2 the shaft 34 extends above its upper bearing 36 and carries a support ring 42 fixed to its upper end and resting on the upper bearing 36. The bearings are welded to the side of the car body. FIG. 2 shows the plows as each comprising a generally rectangular wide body extending inwardly from its pivot shaft 34 and a plow point 44 extending outwardly from the shaft 34. As shown the plow point 44 is about one half the height of the body 45 of the plow and is beveled off at 46 to correspond to the sloping wall 48. The plow points dig into the coal sliding down from the pile 12 along the wall 48 onto the floor section 20 in the manner indicated by the arrows in FIG. 2.

When the car plow is being hauled through the stock pile the plows 26 are positioned at the correct angle by stops 50 projecting from the bottom of the car body inwardly of the shafts 34 as shown in FIGS. 2 and 3. The stops 50 are fixed to the bottom plate of the car body and are symmetrically arranged with respect to the shafts 34 as in FIG. 3 so that when the car is reversed each plow swings to the adjacent trailing stop, for example, through an angle of approximately 90°, as illustrated by the full and dotted line positions of two of the plows 26 in FIG. 3. The shafts 34 and stops 50 are set to give plows an angle of 45°, for example, to the line of travel when they are moving coal into the chute 22. Any suitable angle may be used.

The plow point 44 is relatively short compared to the length of the main body 45 of the plow 26. This relationship gives quick automatic and easy shift of the plow when the car is stopped and being reversed. At that time coal is in front of the plow and has slid onto the floor section in back of the plow. As the car starts in reverse the shaft 34 moves the point 44 and the outer portion of the part 45 in the reversed direction against the coal on the floor section 20 and away from the coal formerly in front of the plow. Finally the coal on the floor causes the plow to be moved to the dotted line position, shown in FIG. 3, against the adjacent stop 50.

The plow 26 may comprise a single steel plate shaped to provide the plow point 44 or a pair of similar plates as illustrated in FIG. 3, and riveted to opposite sides of its shaft 34. The plates are cut and shaped to provide the point 44.

I claim:

1. An apparatus for moving material such as coal flowing from a stock pile as it flows onto a pair of spaced floor sections separated by an elongated delivery chute in which movement of the material from a spaced floor section to and into the delivery chute is accomplished, the apparatus comprising

- a. a reversible car moving back and forth in a direction substantially parallel to the axis of the elongated delivery chute, said car having a central portion which moves over the chute and corresponds in width to the chute and said car having a side portion which is positioned above and moves back and forth over a spaced floor section;
- b. a swingable car plow on the car;
- c. pivot means connected to the car and positioned to permit the car plow to swing about an axis which passes in a generally vertical plane through said side portion of the car and through the floor section;
- d. two material moving surfaces on the plow, one surface for causing material to move from the spaced

floor section into the delivery chute when the car is moved in one linear direction and the other surface for causing material to move from the same spaced floor section when the car is moved in the other direction, said plow swingably engaged with said pivot means at one end of said plow such that the pivot engaging end portion of the plow moves ahead of the rest of the plow as the car is moved in either direction; and

e. stop means to limit the swinging of the plow in each arcuate direction, said stop means being positioned to effect engagement with the plow surfaces in substantially vertical planes that pass through the side portion of the car.

2. An apparatus as claimed in claim 1, wherein the plow is mounted on a vertical shaft freely rotatable relative to the car plow, said plow having a plow point extending outwardly from the pivot shaft and adapted to dig into the material flowing onto the floor section from the stock pile.

3. An apparatus as claimed in claim 2, wherein the plow point is relatively short compared to the length of the elongated portion.

4. An apparatus as claimed in claim 1, wherein the car plow includes a body having top, bottom and side steel plates, vertically spaced bearings on each side of the body in which the plow shaft is mounted, and wherein the stops are fixed to the bottom plate of the body.

5. An apparatus as claimed in claim 1, wherein a series of plows are mounted on each side of the car plow, and wherein the series of plows on one side engage one series of stops when the car plow moves in one direction and respectively engage different stops when the car plow moves in the opposite direction.

6. The apparatus of claim 5 in which the surfaces of the plow are separated by an acute angle.

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