June 6, 1967 D. S. STRADER 3,323,663

ORE TRAIN LOADING ARRANGEMENT

Filed June 24, 1965 3 Sheets-Sheet 1

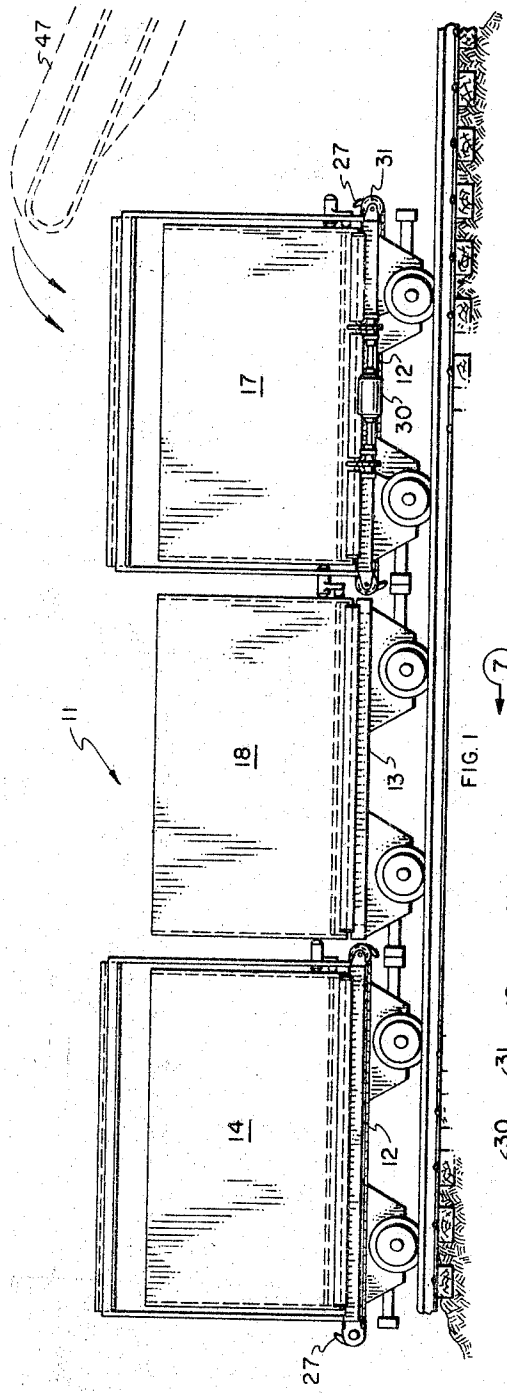


FIG. 1

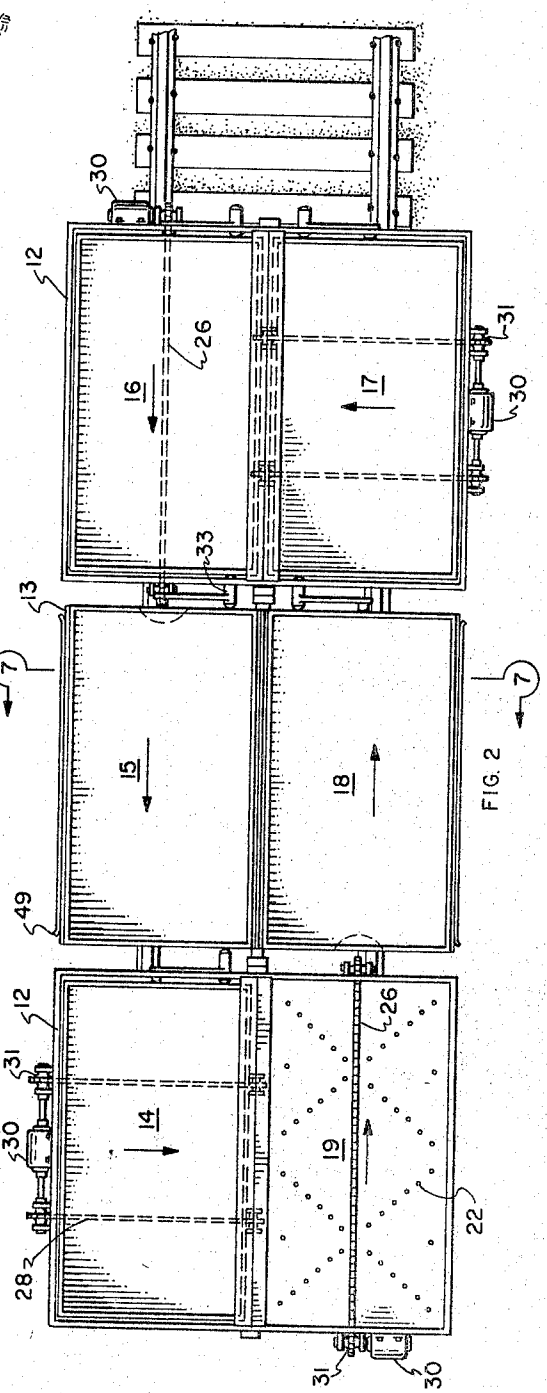


FIG. 2

INVENTOR.
DON S. STRADER
BY Robert R. Finch
ATTORNEY

June 6, 1967 D. S. STRADER 3,323,663

ORE TRAIN LOADING ARRANGEMENT

Filed June 24, 1965 3 Sheets-Sheet 2

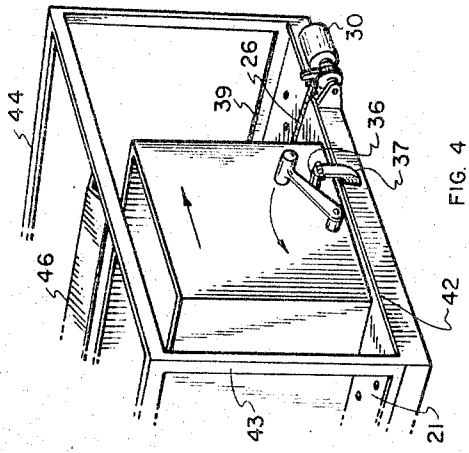


FIG. 4

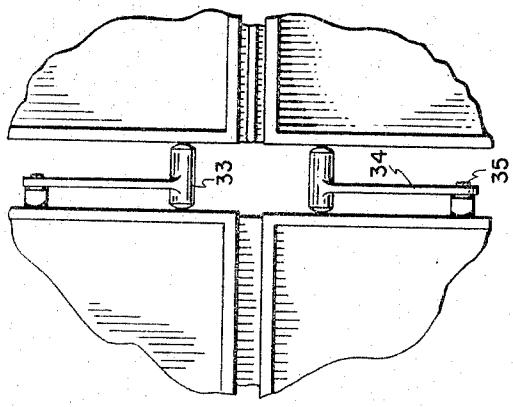


FIG. 5

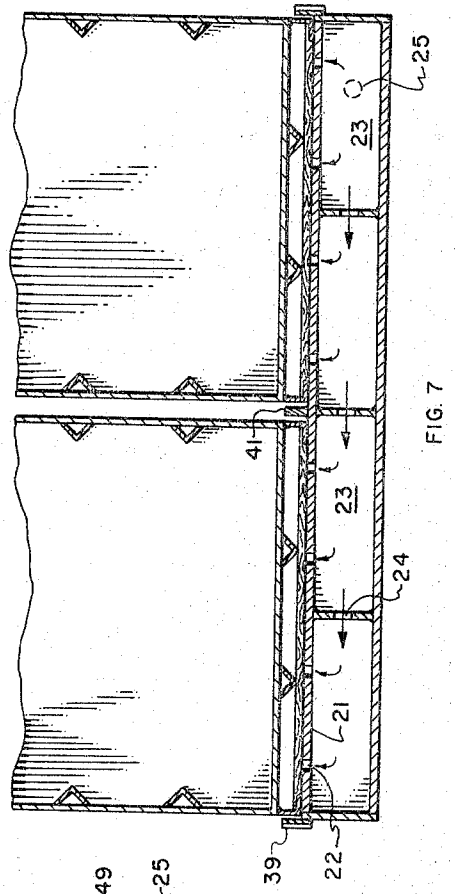


FIG. 7

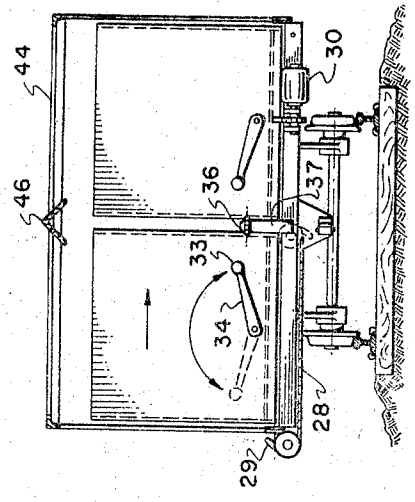


FIG. 3

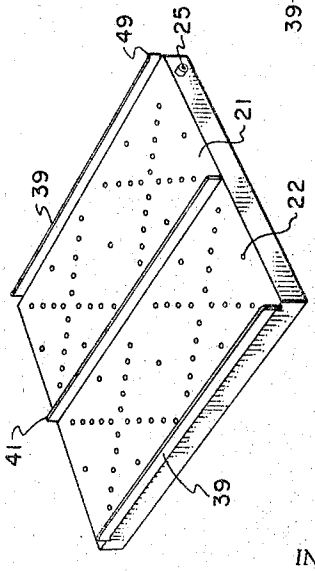


FIG. 6

INVENTOR.
DON S. STRADER
BY Robert A. Finch
ATTORNEY

June 6, 1967 D. S. STRADER 3,323,663

ORE TRAIN LOADING ARRANGEMENT

Filed June 24, 1965 3 Sheets-Sheet 3

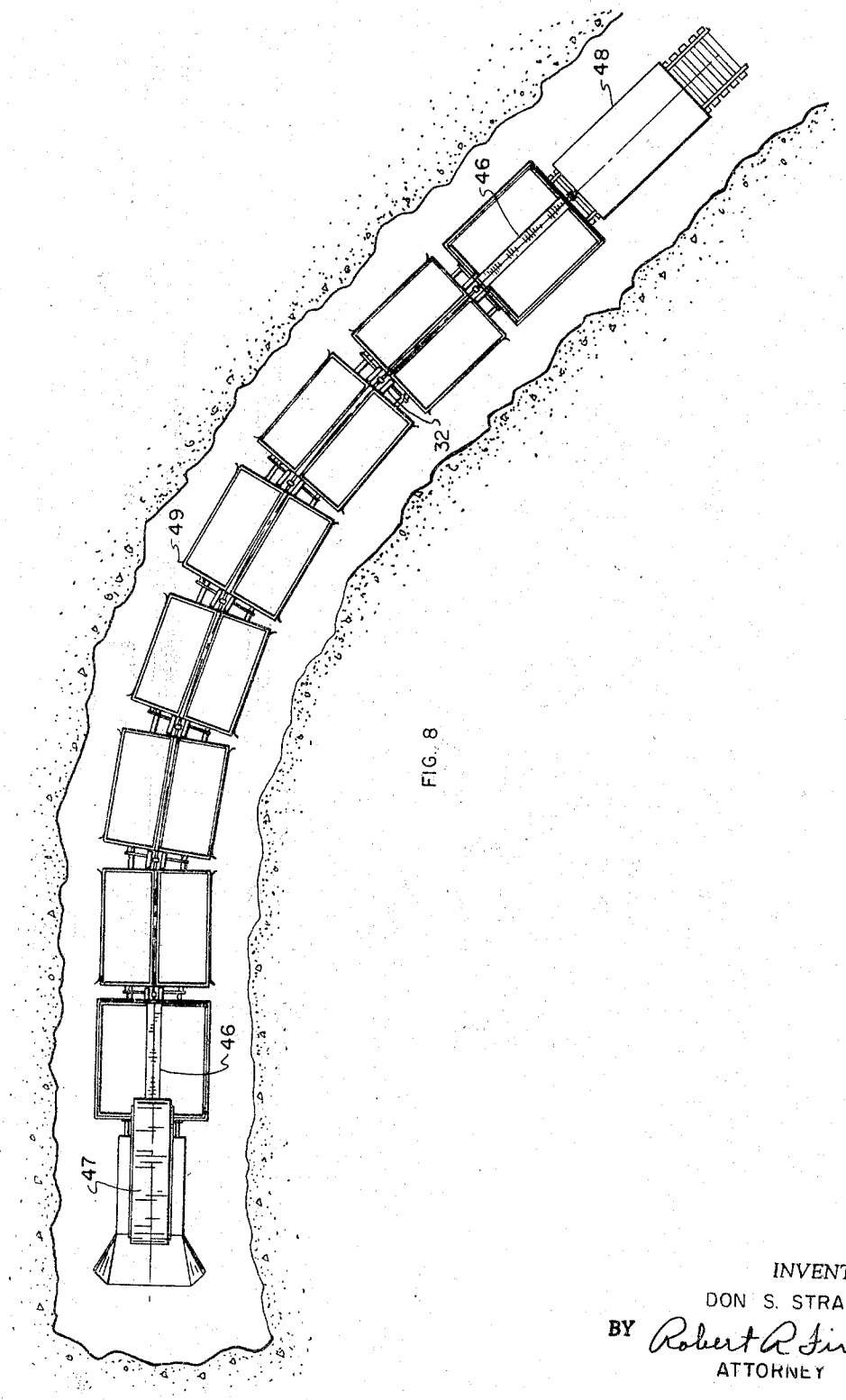


FIG. 8

INVENTOR.
DON S. STRADER
BY Robert A Finch
ATTORNEY

United States Patent Office 3,323,663 Patented June 6, 1967

3,323,663

ORE TRAIN LOADING ARRANGEMENT

Don S. Strader, Salt Lake City, Utah, assignor to The Eimco Corporation, Salt Lake City, Utah, a corporation of Delaware

Filed June 24, 1965, Ser. No. 466,757
3 Claims. (Cl. 214—38)

This invention relates generally to ore trains and in particular to an improved construction of such trains for use in underground excavating operations such as mining where side trackage for switching of the cars and overhead space for loading are limited.

A primary object of the invention is to provide ways and means by which a complete train may be loaded from one end without uncoupling and switching of separate cars to and from the loading point.

Another object is to provide a method and apparatus for loading a complete train of cars from only one end of the train even though the train is parked on a curve as for example, in a narrow mine passageway having curves of relatively short radius.

The invention broadly comprises a train including two end cars and preferably one or more intermediate cars, a plurality of identical tubs or containers arranged in side-by-side rows longitudinally on said cars, means for shifting one row of tubs longitudinally in one direction along said train thereby to transfer each tub from one car to the next adjacent car, means for shifting the end tubs of each transversely on the end cars of the train, means for shifting the other row of tubs longitudinally in the other direction along said train, and means for maintaining the tubs properly spaced and positioned in relation to each other and the cars.

With this arrangement, tubs are loaded on one end of the train, loaded tubs are shifted out of the loading area and replaced by empty tubs and the sequence is repeated until all tubs are filled. During a complete loading operation, each tub is moved stepwise along a circuitous path substantially completely around the entire train, that is, along one row in one direction and along the other row in the opposite direction.

In order that the invention may be more readily understood and carried into effect, reference is made to the accompanying drawings which are offered by way of example only and not in limitation of the invention, the scope of which is defined by the appended claims rather than by the description preceding them.

FIG. 1 is a side elevational view of a train embodying the invention.

FIG. 2 is a top elevational view of the train of FIG. 1 with some hidden elements being shown in broken lines.

FIG. 3 is an end elevational view of the train of FIG. 1 the pivoting action of the spacers on the tubs being shown in broken lines.

FIG. 4 is a perspective view of a portion of an end car illustrating transverse shifting of a tub and simultaneous repositioning of the spacers.

FIG. 5 is an enlarged fragmentary top view of the center area between cars showing location of the spacers between adjacent tubs in each row.

FIG. 6 is a perspective view of the floor of an intermediate car of the train of FIG. 1.

FIG. 7 is an enlarged sectional view of the car floor and a portion of the tubs taken in the plane of line 7—7 of FIG. 2.

FIG. 8 is a top view of a mine train embodying the invention in loading position on a curve in a mine tunnel.

As shown in the drawings, the invention is embodied in a train, generally designated 11, comprising a pair of end power cars 12 and any number of intermediate transit

cars 13, only one of the latter being shown in FIGS. 1 and 2. A plurality of similar flat bottom tubs 14, 15, 16, 17 and 18 are carried by the train in side-by-side relationship on each car with one vacant space left as at 19 to enable shifting thereof.

As shown in greater detail in FIGS. 3 through 7, all cars have flat beds 21 each of which is perforated by a plurality of spaced apart air ports 22. Plenum chambers 23 underlie each perforated bed and the necessary reinforcing ribs are ported as at 24 to equalize pressure throughout the chamber. When pressured air is introduced through the single inlet 25 it is supplied to all of the air ports 22 to provide an air cushion under each of the flat bottom tubs to enable shifting of the tubs between adjacent cars. Suitable hoses (not shown) interconnect the plenum chambers of separate cars through openings 25 so that air may be supplied to the entire train from a single source.

The use of pressured air to form a frictionless supporting air cushion to facilitate lateral movement of loads is well known, hence requires no further detailed discussion other than to note that for best operation, the tubs should have flat imperforate bottoms and the volume of pressured air must be sufficient to provide the necessary cushion despite air and pressure loss through uncovered ports of empty cars. If desired, rollers or skids may be employed in lieu of the air cushion. The tubs are constructed with false bottoms to protect the tub bottom against denting by the material being carried.

Actual shifting of the tubs is accomplished by employing any suitable means to apply horizontal forces solely to the tubs on the end cars 12. In the illustrated embodiment this is accomplished on each end car by endless chains 26 having spaced hooks 27 mounted to engage the bottom edge of a tub. Force applied to the end tub moves it and the entire row of adjacent tubs in a longitudinal path along the train. Transverse shifting of the tubs across the end cars is effected by similar chains 28 with hooks 29, two of which are provided on each car extending only half the width thereof. The chains are recessed in the car bed. Suitable means such as motors 30 and sprockets 31 are provided to selectively drive the chains and hooks as required. A small recess 32 in the bed of each car opposite the sprocket on the end cars insures ample space between cars to accommodate the sprocket and hooks even while the train is on a curve.

Spacers 33 are provided on one end of each tub to maintain correct spacing and proper positioning of tubs on the cars during operation on either straight or curved tracks. The spacers 33 are mounted on an arm 34 pivotably journaled on a shaft 35 extending from the median bottom portion of one end of each tub. As best seen in FIGS. 3–5, this permits the spacers to be positioned adjacent the inside edge of the tub and center line of the train regardless of which side of the car the tub is on thereby maintaining sufficient space between tubs to navigate curves.

Automatic repositioning of the spacers on transverse shifting of the tubs is accomplished by a cam 36 hinged to a bracket 37 on the car. As the tub shifts, arm 34 engages the cam and is pivoted to the opposite position then passes under the hinged cam 36 which swings upwardly to permit such passage.

During longitudinal shifting, the tubs are guided by side flanges 39 and center rails 41, however, the center rail is not used on the end cars where transverse shifting takes place.

End flanges 42 are provided on the end cars to limit longitudinal travel of the tubs. Additional rigidity and support is provided by upstanding corner members 43 and interconnecting beams 44. A deflector 46 is supported on

the beams to overlie the inner edges of the tubs to prevent material from falling between tubs and to distribute feed between tubs.

Operation of the apparatus to effect complete loading may be visualized by reference to FIGS. 1 and 2. Starting with the tubs in the positions shown and the space 19 empty, tubs 16 and 17 are first filled with ore from a suitable loader. When these tubs are filled, pressured air is supplied to the plenum chambers of all cars from a suitable pressured air source (not shown), motor 30 is energized and empty tub 14 is shifted transversely into the empty space 19. Thereafter, tubs 15 and 16 are shifted longitudinally toward the rear of the train by drive chain 36 and hooks 27 which engage the front end tub 16, the shifting force being transmitted to tub 15 by the spacer 33. This action shifts these tubs into positions formerly occupied by tubs 14 and 15. Tub 17 is then shifted transversely into the position formerly occupied by tub 16; and tubs 14 and 18 are moved longitudinally toward the front of the train so that tub 18 is in the position formerly occupied by tub 17. The shifting is repeated until two empty tubs 14 and 18 are in the loading position. The entire sequence is repeated until all tubs are full, whereupon the train is withdrawn. For simplicity, the embodiment illustrated in FIGS. 1 and 2, uses only one intermediate car. A usual train will contain several intermediate cars, as shown in FIG. 8, but the same operating sequence will apply. Of course, a train may comprise only two cars and three tubs, but such an abbreviated train would be of no practical use.

Faster loading can be accomplished if two empty spaces are provided on the train. In such a case the extra space permits some of the several shifting operations to be carried out simultaneously.

An important advantage of the invention is that the train may be loaded while on a curve as illustrated in FIG. 8, wherein there is shown a train of eight cars, comprising six intermediate transit cars and two end power cars plus a conventional mine locomotive 48. Because the spacers 33 are always near the center of the train there will be only an iinsignificant difference in the spacing between the tubs of one row as compared to the spacing in the adjacent row.

It is desirable that the spacers 33 be fabricated of solid rubber or other resilient material or be otherwise constructed as by outwardly urged telescoping ends to have limited compressibility to compensate for variations in the gap between tubs.

It will be appreciated that the broad concept of the invention envisions the circuitous shifting of tubs around a train and this could be carried out by using wider end

cars and guiding the tubs around a track or other guide thereon. In such a case no empty spaces would be required and only a single power car to effect shifting would be needed and this could be located any place on the train. However, the illustrated embodiment is preferred in most cases because it uses only narrow cars of standard configuration hence is adapted to use in existing tunnels and with existing equipment for unloading.

Although the apparatus is referred to as an ore train in the specification and claims, it is obvious that such term is descriptive only as the train may be used to convey any materials.

I claim:

1. An ore train comprising a train of flat bed cars, a plurality of containers aligned on said cars in two parallel rows longitudinally of the train each container occupying approximately half the bed surface area of a single car, means on each car for movably supporting said containers, means for shifting said rows of containers in opposite directions longitudinally of said train while maintaining said containers in predetermined spaced apart relationship, and means for shifting containers transversely from one row to the other row on each end car of said train.

2. An ore train comprising a train of flat bed cars including a pair of end cars and at least one intermediate car therebetween, a plurality of containers aligned on said cars in two parallel rows extending longitudinally of said train at least one of said rows having one less container than there are cars in the train, spacers providing end to end contact between longitudinally aligned containers adjacent only the center of said train, each of said containers having a bottom area approximately one-half the bed area of a single car, first shifting means on each end car for shifting a container on one side thereof transversely to the other side, and second shifting means on each end for shifting a container on one side thereof longitudinally of said car to the next adjacent car.

3. An ore train according to preceding claim 2 with the addition of a plenum chamber underlying the bed surface of all cars, perforations in said bed surface, and means for supplying pressured air to said plenum chamber while said containers are being shifted.

References Cited

UNITED STATES PATENTS

2,346,659	4/1944	Bruce	198—92
3,204,797	9/1965	Chandler	214—83.36 X
3,209,929	10/1965	Petersen et al.	214—1

GERALD M. FORLENZA, *Primary Examiner.*

R. G. SHERIDAN, *Assistant Examiner.*