E. McGOWAN AND P. UPHAM.

MATERIAL HANDLING APPARATUS.

APPLICATION FILED FEB. 24, 1916.

1,389,888.

Patented Sept. 6, 1921.

2 SHEETS—SHEET 1.

Fig. 2.

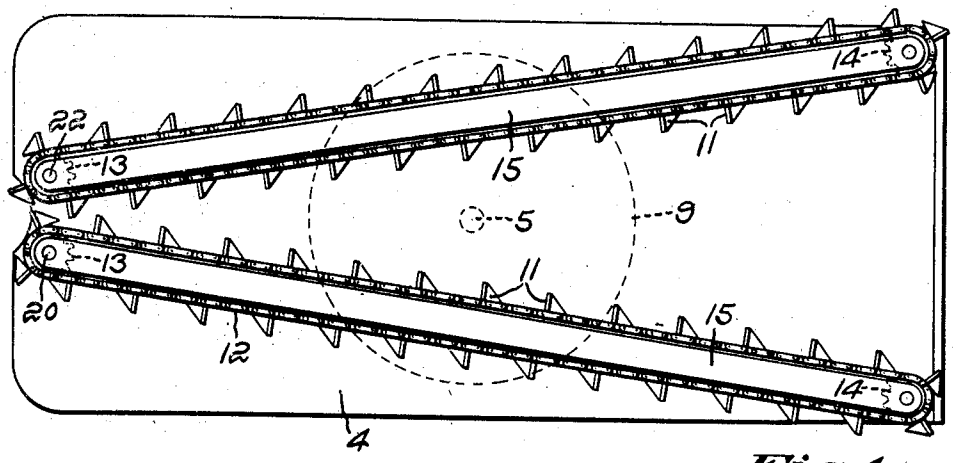


Fig. 4.

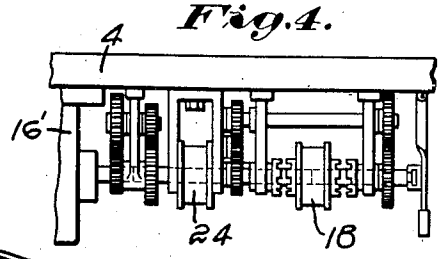


Fig. 1.

Fig. 7.

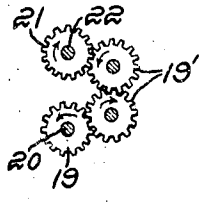
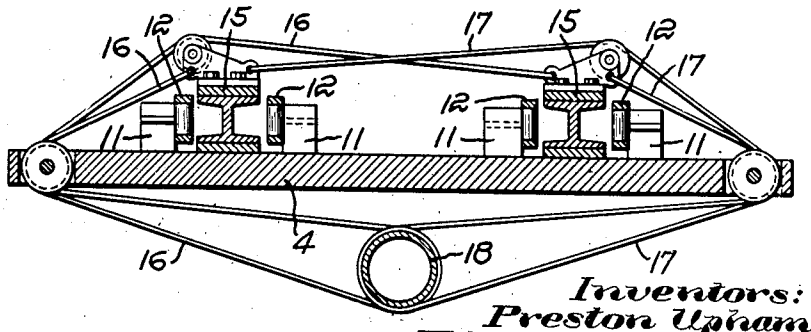


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 5

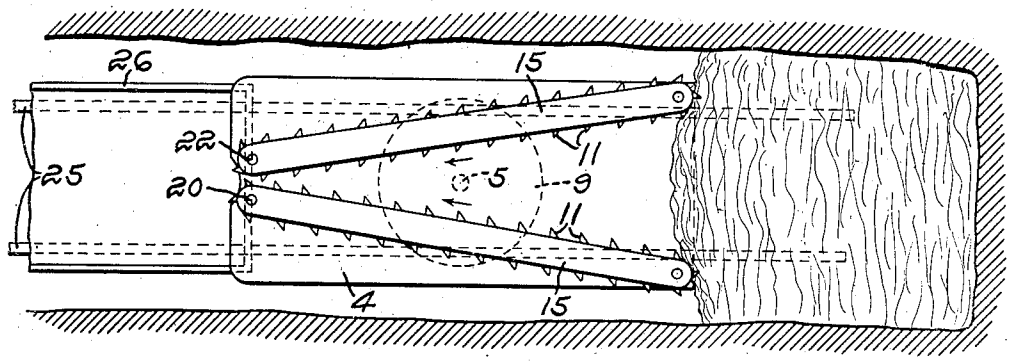
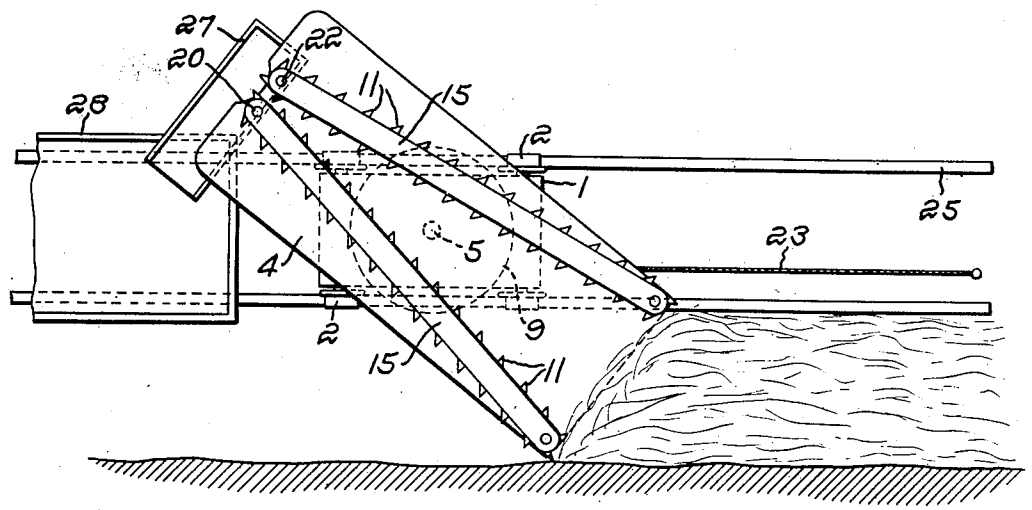


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD McGOWAN, OF MULBERRY, KANSAS, AND PRESTON UPHAM, OF BOSTON, MASSACHUSETTS; SAID UPHAM ASSIGNOR OF HIS ENTIRE RIGHT TO SULLIVAN MACHINERY COMPANY, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF MASSACHUSETTS.

MATERIAL-HANDLING APPARATUS.

1,389,888. Specification of Letters Patent. Patented Sept. 6, 1921.

Application filed February 24, 1916. Serial No. 80,275.

To all whom it may concern:

Be it known that we, EDWARD McGOWAN and PRESTON UPHAM, both citizens of the United States, and residents, respectively, of Mulberry, county of Crawford, and State of Kansas, and Boston, county of Suffolk, and State of Massachusetts, have invented an improvement in Material-Handling Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention pertains to improvements in material handling appliances and more particularly, though not exclusively, to improvements in loaders adapted for use in coal mines for loading coal into cars after such coal has been "shot" or otherwise broken from the solid vein.

The drawings show a preferred construction of an illustrative construction constituting one embodiment of our invention.

Figure 1 is a vertical side elevation of one embodiment of our invention, with parts omitted;

Fig. 2 is a plan view thereof;

Fig. 3 is a transverse section on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged vertical side elevation of details of transmission not shown in Fig. 1;

Figs. 5 and 6 are plan views illustrating preferred methods of operation of the machine shown in Fig. 1; and

Fig. 7 is a plan view of part of the driving mechanism.

Referring to Fig. 1, we preferably mount our apparatus on suitable supporting means which may take the form of a truck 1 provided with wheels 2 preferably flanged as shown to run on rails 3. Supported on the supporting means, we have shown and preferably provide a plate 4 which is preferably connected to the supporting means by horizontally, angularly movable or adjustable means, herein typified by the substantially vertical pivot 5, so that the plate 4 may be adjusted into a plurality of horizontally different angular positions relative to the supporting means, two of which angular positions are illustrated in Figs. 5 and 6, the purpose of which adjustment will be more fully explained hereafter.

It is also desirable that means be provided for adjusting and permitting variance of the vertical angle of the plate 4 and the superimposed loading mechanism, and to this end we have shown a preferred construction comprising the substantially horizontal pivot 6 and a preferred construction of tipping means, including the screw 8 preferably pivoted to the plate 4 and operatively connected to the plate 9 which is preferably rotatable with the plate 4 about the pivot 5. The screw 8 may engage the plate 9 by any suitable means, but we prefer that the engagement be of such character that the angle of the plate 4 relative to the supporting means may be varied.

A tension spring 10 extends between the plates 4 and 9 on the side of the pivot 6 opposite the heavy transmission elements. The preferred form of loading mechanism on the plate 5 includes a plurality of scraping or conveying elements 11, which may conveniently be attached to chains 12 running over driving sprockets 13, and idler sprocket 14.

If desired, the sprockets 14 may be mounted on levers 15, preferably pivoted about the axis of the driving sprockets 13 and preferably provided with power actuated swinging means for moving the levers 15, 15 toward and from one another. The power actuated swinging means may take the form of flexible cables 16 and 17, which may be wound about a drum 18 in opposite directions. It will be understood that this mechanism is illustrative only and other suitable means for this purpose could obviously be substituted.

Where two scraping units are provided we prefer that their driving sprockets 13, 13 be relatively close together and driven in synchronism, the scraping elements 11 being arranged to overlap in their course adjacent the sprockets but spaced alternately so that no interference of the scraping elements 11 takes place.

We preferably mount the actuator for the scraping elements 11 on the plate 4, preferably below it. In the embodiment of our invention illustrated, an electric motor 16′ imparts movement to the scraping elements through bevel gears 17′ and 18′ on the shaft 20 of one driving sprocket 13, while a spur

gear 19 on the shaft 20 meshing with intermediate gears 19′ which drive the gear 21 on the shaft 22, imparts movements to the other driving sprocket 13 on the shaft 22.

The motor 16′ may also drive the drum 18, any suitable speed reducing and reversing mechanism being interposed to permit relatively slow rotation of the drum 18 in either direction.

In certain uses of our invention it is necessary to feed the whole apparatus to the work and while this may be performed in any suitable manner, we prefer to provide a flexible feeding cable 23 adapted to be wound on any suitable winding element such as the drum 24 which may be and preferably is actuated by the motor 16′, suitable guiding means (not shown) being provided for the cable 23.

The loading apparatus illustrated, may be used for loading coal after it has been "shot" in entries, rooms, or on long wall work.

When used for loading from entries or rooms, Fig. 5, the machine is preferably advanced on a track 25 leading up to the coal to be loaded. The table 4 is preferably tipped so that its forward portion rests on the floor of the mine. The motor 16′ is then started, imparting scraping or conveying movement to the scraping elements 11. These will gather the coal and convey it up the inclined plate 4, dumping it over the rear and upper end of the plate 4 into a car 26. The levers 15, 15, may be swung to and fro through limited arcs to facilitate the gathering of the lumps of coal. From time to time or continuously, the whole machine may be advanced toward the pile of coal to be loaded.

Where the coal to be gathered has been mined by the long wall method, we may make use of another process of loading typified by Fig. 6. In such case, the plate 4 and superimposed mechanism is preferably secured at an angle relative to the advance of the machine with the plate 4 preferably pressed against the floor of the mine. The whole machine is then fed forward by the cable 23, the coal being crowded onto the plate 4 and conveyed by the scraping elements to a chute 27 emptying into a car 28. When used in this connection, we preferably do not swing the levers 15 relative to the plate 4. If desired, a single set of scraping elements may be used.

Our invention is peculiarly useful in mines where the height of the vein of coal gives only limited headroom. The preferred parallel arrangement of the plane of the scraper or conveyer chains with the coöperating surface over which the material is scraped or conveyed, not only effects a saving of space vertically, but enables our apparatus to handle relatively large lumps of coal. Where embodiments of our invention, including the tipping adjustment are used, but little coal, no matter how fine, escapes the scraping action of the plate 4. This is particularly true where the floor of the mine is even because of the coal having been undercut by mining mechanisms of the well known chain cutter type.

Where the lateral angular adjustment is provided, the machine may operate from either end of the truck or support and on either side of the track on which the machine runs.

Where the double set of scraping or conveying elements is used, particularly in connection with the pivoted supports whereby they may be swung one relative to the other, the scrapers or conveyers of each scraping or conveying element assist those of the other element in gathering and conveying the coal up the inclined scraper plate. Our invention may, if desired, be utilized to clear the passage and tracks in the mine of loose coal which accumulates from the lumps falling from the mine cars, and not only greatly increases the traction cost but increases the risk of mine explosions from finely powdered coal ground by the wheels of the cars and disseminated through the air by the passage of the cars, mules or locomotives used in mine haulage.

While we have illustrated and described preferred constructions and operations of our invention, it will be understood that radical changes involving omission, substitution, alteration and rearrangements of elements and of steps of the methods of operation may be made without in any sense departing from the spirit and scope of our invention.

Our invention and what we desire by Letters Patent to procure is best set forth in the following claims.

Claims:

1. Loading apparatus for use in loading coal in mines comprising, in combination, an inclined plate providing at its lower end a scraping edge, a support on and with which said plate may be advanced into the work as a unit, and a pair of relatively adjustable scraper conveyer units operatively mounted on said plate and providing two adjacent runs of chain having projecting scrapers moving in the same general direction for scraping the coal up said inclined plate, and over the top thereof into a mine car.

2. Loading apparatus for use in loading coal in mines, comprising, in combination, an inclined plate, a pair of coöperating relatively adjustable scraper conveyer units operatively mounted on said plate, and means for simultaneously moving said units in opposite directions.

3. Loading apparatus for use in loading

coal in mines, comprising, in combination, an inclined plate, a pair of coöperating relatively adjustable scraper conveyer units operatively mounted on said plate, and means comprising a driving member and a flexible driven means for simultaneously moving said units in opposite directions.

4. Loading apparatus comprising, in combination, an inclined plate, a pair of coöperating relatively adjustable scraper conveyer units operatively mounted on said plate, flexible means for advancing said apparatus during loading operation, and a single motor and connections therewith for operating said units, adjusting the relative positions of said units, and actuating said flexible means to advance the apparatus toward the work.

5. Material loading apparatus comprising, in combination, an inclined plate, a truck carrying said plate, truck driving means, a turn table comprising stationary and movable portions and locking means coöperating therewith interposed between said truck and said plate to permit lateral swinging of said plate and its locking in a plurality of angularly different adjusted positions, a transverse pivot also interposed between said truck and said plate to permit variation of the inclination of said plate, adjustable means extending between the movable portion of said turn table and said plate, and a laterally disposed continuous chain scraper unit moving in an orbit parallel to the plane of said plate for scraping material up said plate.

6. Material loading apparatus comprising, in combination, an inclined plate, a truck carrying said plate, truck driving means, a turn table comprising stationary and movable portions and locking means coöperating therewith interposed between said truck and said plate to permit lateral swinging of said plate and its locking in a plurality of angularly different adjusted positions, a transverse pivot also interposed between said truck and said plate to permit variation of the inclination of said plate, adjustable means extending between the movable portion of said turntable and said plate, and oppositely traveling similarly effective laterally disposed conveyer units for scraping material up said plate.

7. Material loading apparatus comprising, in combination, an inclined plate, a truck carrying said plate, truck driving means, a turn table comprising stationary and movable portions and locking means coöperating therewith interposed between said truck and said plate to permit lateral swinging of said plate and its locking in a plurality of angularly different adjusted positions, a transverse pivot also interposed between said truck and said plate to permit variation of the inclination of said plate, adjustable means extending between the movable portion of said turn table and said plate, pivotally disposed conveyer units for scraping material up said plate, and means for positively increasing or decreasing the angle between said units.

8. Material loading apparatus comprising a truck, means for causing it to traverse a predetermined path during loading operation, an inclined plate carried by said truck and fixedly disposable thereon in a plurality of different positions in which the projection of the longitudinal axis of said plate on a horizontal plane will make different angles with the line of movement of said truck, said plate being provided with an edge adapted to be forced under the material to be loaded upon movement of said truck, and orbitally moving conveying means disposed to intercept material into which said plate is forced with that portion of the orbit in which the movement of the conveying means is upward and to transport it to the upper edge of said plate.

9. Material loading apparatus comprising a truck, means for causing it to traverse a predetermined path during loading operation, an inclined plate mounted on said truck and having a lower edge adapted to follow the surface upon which the material to be loaded is disposed, means interposed between said plate and said truck for securing the former in fixed positions in which the projection on a horizontal plane of the longitudinal axis of the plate will make different angles with the direction of movement of said truck, and conveying means movable in an orbit having major and minor axes and disposable in a plurality of positions in which the major axis makes different angles with the center line of said plate and operative to intercept material forced up said plate and to convey it to the top of said plate.

10. Material loading apparatus comprising a truck, means for imparting to said truck movement along a predetermined path, and material elevating means carried by said truck and comprising an inclined plate, a mounting therefor on said truck comprising means for fixedly positioning said plate with the lower edge thereof at either side of said path or therein, and orbitally moving material transporting means moving in an orbit parallel to the plane of said plate and disposed to intercept material moving thereon, said orbit being determined by pivots perpendicular to the plane of said plate at points within the lateral boundaries thereof and rearward of the lower edge thereof.

11. Material loading apparatus comprising a truck, means for imparting to said truck movement along a predetermined path and material elevating means carried by said truck and comprising an inclined plate, a

mounting therefor on said truck comprising means for fixedly positioning said plate with the lower edge thereof at either side of said path or therein, orbitally moving material transporting means moving in an orbit parallel to the plane of said plate and disposed to intercept material moving thereon, said orbit being determined by pivots perpendicular to the plane of said plate at points within the lateral boundaries thereof and rearward of said lower edge, and means for varying the orbit by changing the locus of one of said pivots.

12. Material loading apparatus comprising a base member, means for causing bodily movement of translation thereof, material elevating means dosposed on said base and comprising a plate along which material is moved during loading, said plate being so disposed on said base as to make a dihedral angle with the surface from which said material is to be collected, means interposed between said base and plate for adjusting the position of said plate and securing it with respect to said base in such manner that the edge of said angle may occupy a plurality of fixed angularly different positions relative to the line of movement of said base, material transporting means carried on said plate and movable in an orbit parallel to said surface, the said orbit being determined by a plurality of pivots, and means for adjusting one of said pivots relative to said surface in such manner that said transporting means may extend diagonally from a lateral edge of said plate to the top thereof and operate to convey material under which said surface is forced to the top thereof.

13. Material loading apparatus comprising a base mamber, means for effecting bodily movement of translation thereof, material elevating means mounted on said base and comprising a member having a straight edge adapted to be forced beneath the material to be loaded and a surface on which said material is to be moved, said surface sloping upward from said edge, means disposed between said member and said base for varying the position of said member relative to said base whereby said edge may make different angles with the line of movement of said truck, and material transporting means carried on said member and comprising conveying elements moving in an orbit having major and minor axes, said material transporting means being disposable on said member with the major axis thereof extending from the side of said edge remote from said base to the top of said surface, and with the upwardly moving conveying elements successively traversing the upper edge of the material forced up on said surface by the forcing of said first mentioned edge under said material.

14. Material loading apparatus comprising a base, means for imparting a movement of translation thereto, material elevating means disposed on said base and comprising a member having an inclined surface up which material is to be moved, said surface terminating at its lower end in an edge adapted to be forced under the material to be loaded, said member having a mounting on said base by means of which it is adjustable relative to said base so that said edge may be fixedly positioned at either side of the line of motion of said base or in intermediate positions, and conveying means disposed on said surface and comprising members moving in a path which traverses said surface in a direction generally longitudinally thereof and crossing at an angle the stream of material moving onto said plate.

In testimony whereof, we have signed our names to this specification.

EDWARD McGOWAN.
PRESTON UPHAM.