Dec. 16, 1930. J. A. PAISLEY 1,785,594

METHOD OF AND APPARATUS FOR HANDLING GRANULAR MATERIAL

Filed July 17, 1929 3 Sheets-Sheet 1

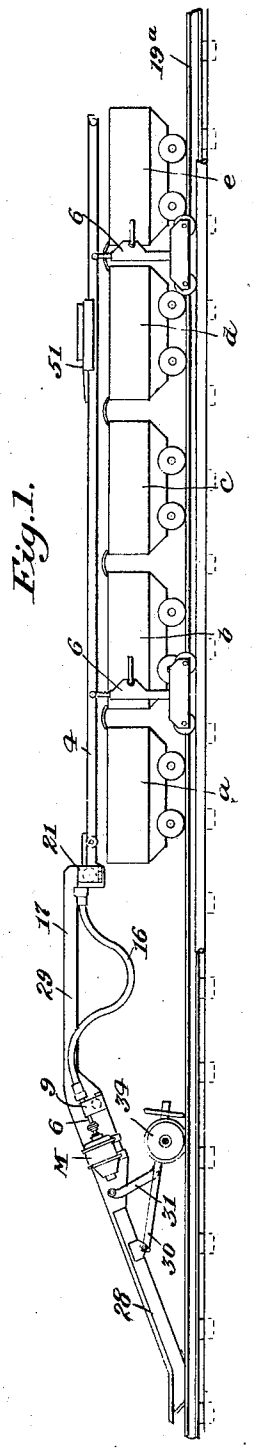


Fig. 1.

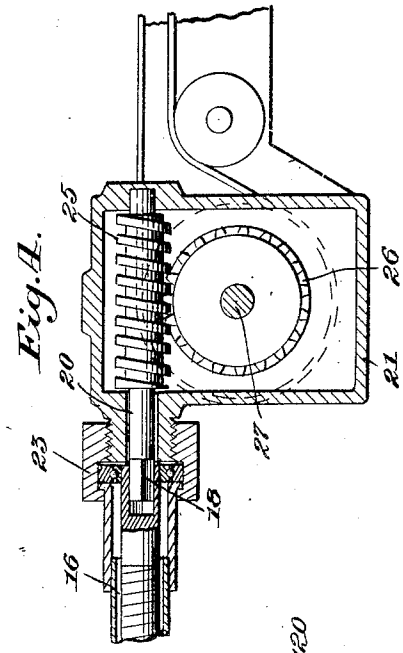


Fig. 4.

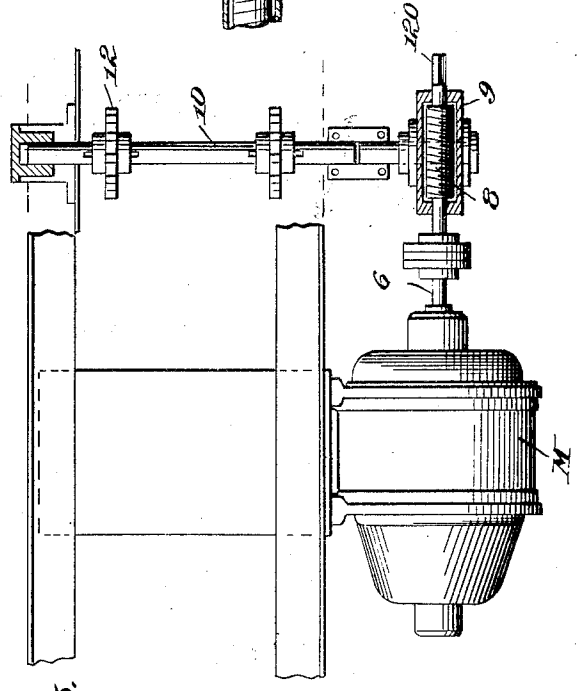


Fig. 3.

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Filed July 17, 1929 3 Sheets-Sheet 2

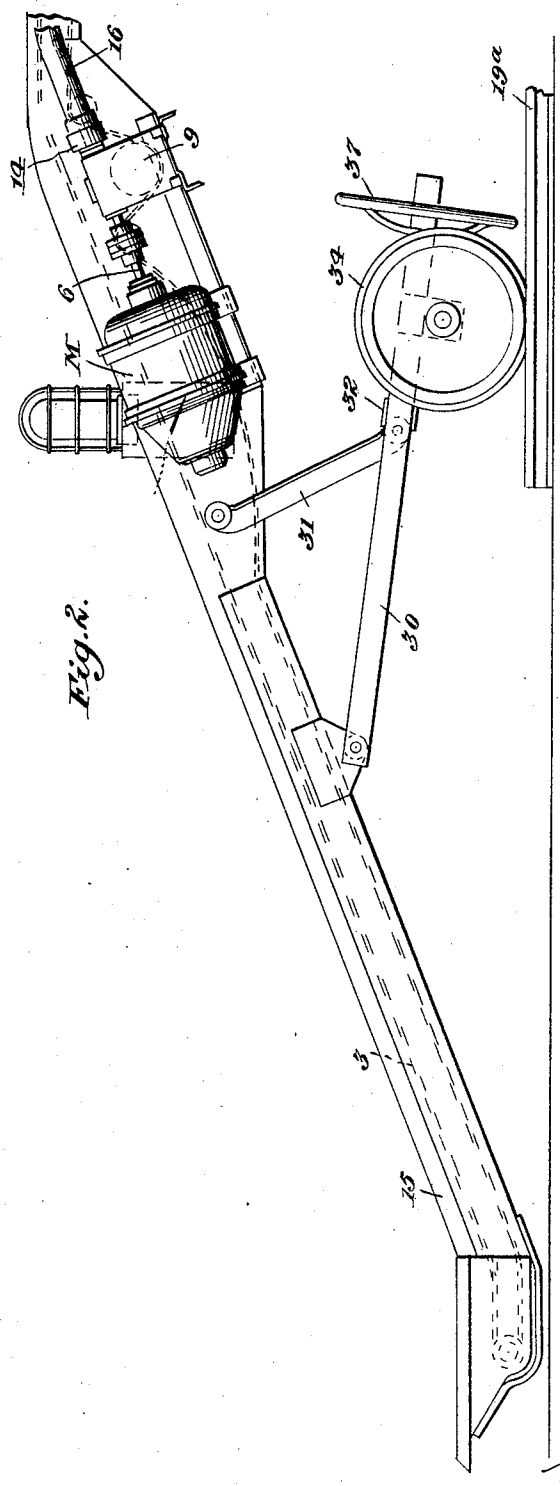


Fig. 2.

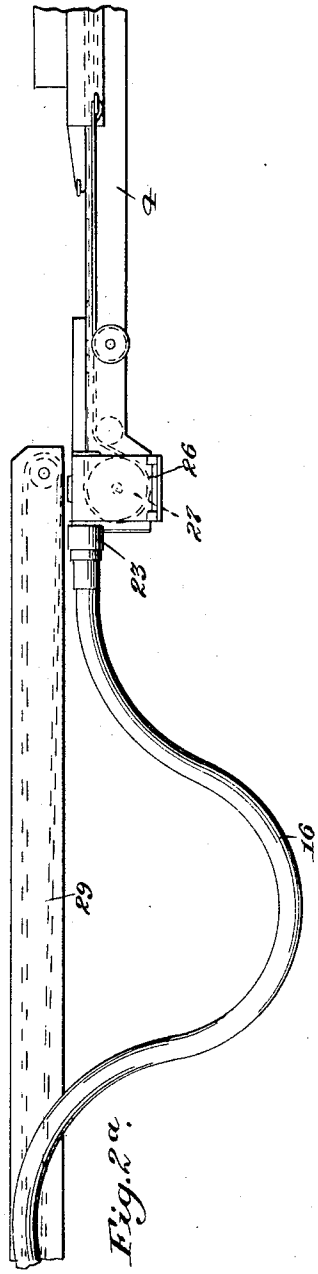


Fig. 2a.

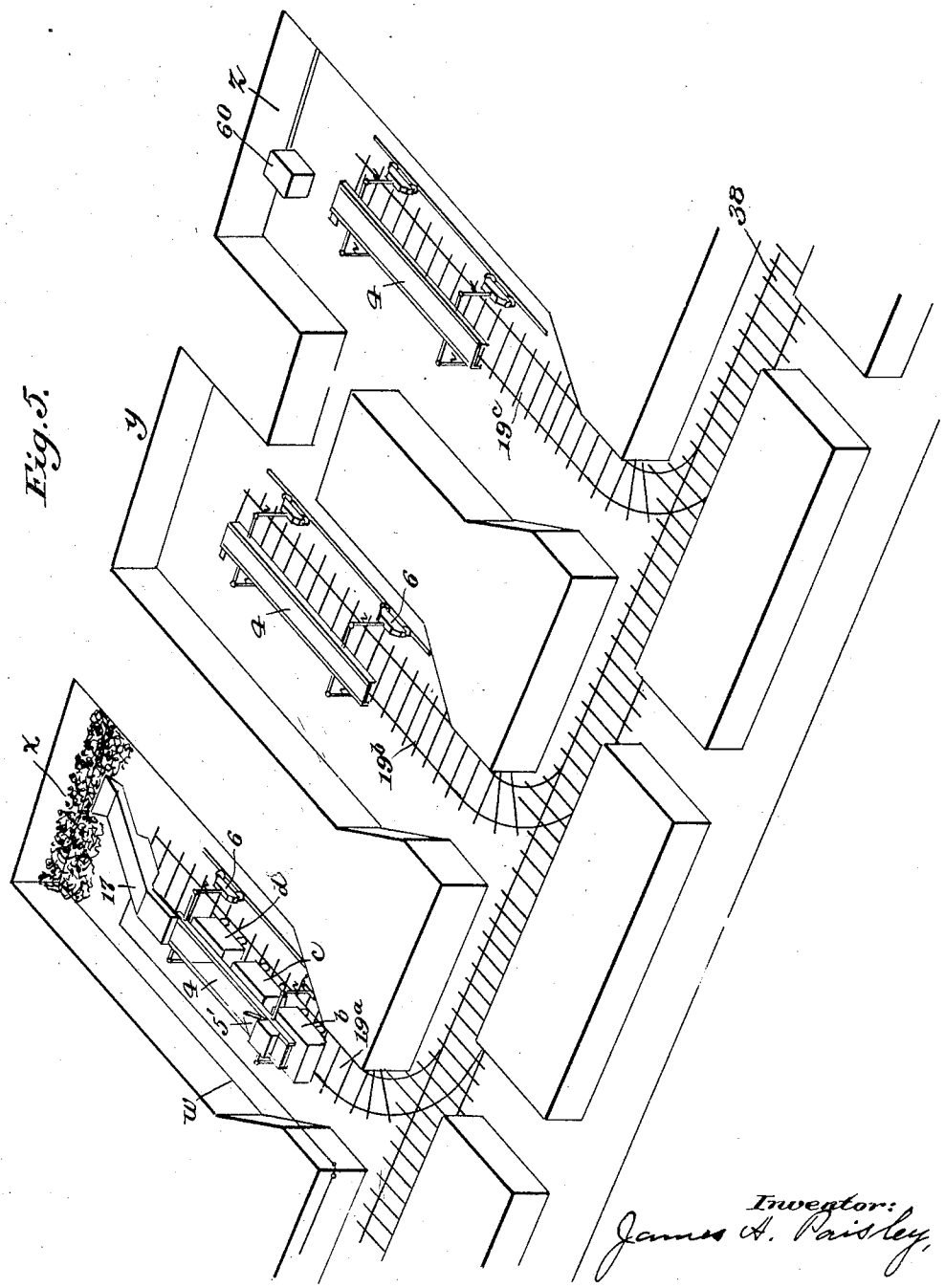
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METHOD OF AND APPARATUS FOR HANDLING GRANULAR MATERIAL

Filed July 17, 1929 3 Sheets-Sheet 3

Fig. 5.



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UNITED STATES PATENT OFFICE

JAMES A. PAISLEY, OF CLEVELAND, OHIO, ASSIGNOR TO THE VALLEY CAMP COAL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF PENNSYLVANIA

METHOD OF AND APPARATUS FOR HANDLING GRANULAR MATERIAL

Application filed July 17, 1929. Serial No. 379,009.

This invention relates to method of and machinery for handling granular material and more particularly to such a method and apparatus for use in loading mine or other cars with coal, broken stone, or any loose or granular material.

One of the objects of the invention is to provide for loading cars, as mine cars, with coal in a plurality of rooms or compartments located in a mine by apparatus, a part of which remains in each of the rooms, while another loading instrumentality which carries power applying means, is moved from one room to another and is separately applied to the apparatus in each room in succession.

Another object of the invention is to provide an improved loading machine of the portable type, with power applying means thereon and a flexible connection leading therefrom to a coupling member which may be readily applied to a co-operating coupling element on any one of a number of conveyors, in succession, located in the several mine rooms.

Another important object of the invention is to provide a loading machine of the type referred to, in which the power for operating the moving conveying element is applied also, through a flexible connection and coupling, to a horizontally located receiving conveyor which is arranged over the cars to be loaded, whereby both conveyors may be driven by a single motor and through a simple connecting means, which is carried by the loading conveyor, and may be operatively coupled to or uncoupled from, the second conveyor referred to.

Other features of the invention, such as important combinations of parts and details of construction, will be hereinafter more particularly referred to and pointed out, in the following description and claims.

In the drawings:

Fig. 1 illustrates, in side elevation, one form of apparatus embodying the several features of the invention; Fig. 2 is a view in side elevation, much enlarged, of the inclined, or receiving portion of the loading conveyor; Fig. 2*a* is the upper portion of said conveyor, together with a portion of the receiving end of the horizontal conveyor, Figs. 2 and 2*a* showing the flexible connection between the motor and the driven mechanism of the two conveyors; Fig. 3 is an enlarged, detail plan view, partly sectional, showing a portion of the loading conveyor with the motor, and parts driven thereby; Fig. 4 is a detail view in vertical section, showing the worm gear driving mechanism with the coupling for securing the end of the flexible shaft operatively thereto, and Fig. 5 is a diagrammatic view of the interior of a portion of a coal mine illustrating the use of the invention.

Referring to Figs. 1 and 5, it will be seen that a train of mine cars, *a*, *b*, *c*, *d*, *e*, have been drawn by the locomotive along the main track 18 and on the side track leading into the first room X of the mine, where said cars are to be loaded by a horizontal conveyor, 4, which may be of the type shown and described in my copending application Serial #320,097 filed November 17, 1928, or of any other approved form, is supported adjustably by the jacks 6 over the cars. This conveyor may and preferably is of the endless web or belt type, and is driven, as herein shown, by an electric motor M whose armature shaft 6 is coupled to the shaft of a worm 8, enclosed in a casing 9. The worm 8, is in driving engagement with a worm gear contained in the casing and said gear is coupled to the driving shaft 10 which is supplied with sprockets 12 or other driving members for an endless conveyor belt 3 in the loading conveyor 15.

An extension of the worm 8 has a non-circular end 120 which is operatively connected through a detachable coupling 14 with a flexible drive shaft 16. The shaft 16 extends along the horizontal part 29 of the loading conveyor, and at its end is provided with a socket which receives the non-circular terminal 18 of a worm shaft 20, the flexible shaft 16 being connected to the shaft 20 of this worm by a detachable coupling member 23 (see Fig. 4). The worm 25 meshes with a worm gear 26 on a shaft 27. This worm gear mechanism and its casing are supported at the receiving end of the horizontal conveyor 4, the shaft 27 having fixed thereto suitable belt driving sprockets for the con-

veyor 4. It will be seen from the construction as thus far described, that the electric motor M, not only drives the worm gearing for the belt of the loading conveyor, but also through the coupling 23 is attachable to and capable of driving the worm gearing which actuates the belt of the horizontal conveyor 4. Thus both conveyors are driven from the same source of power and by a very simple connecting means such means including as an important element the flexible drive shaft 16, which permits a certain amount of relative movement between the discharging end of the loading conveyor 17 and the receiving end of the horizontal conveyor 4, which receives the granular material from the loading conveyor. As shown the discharging end of the horizontal portion of the loading conveyor is arranged above and overlaps the receiving end of the receiving conveyor, and the flexibility of the pipe 16 permits relative movement between these parts without straining, and of a wide range of adjustment of the discharging and receiving ends of the two conveyors, respectively.

The loading conveyor, otherwise known as a "buggy", comprises, as shown, an inclined upwardly directed portion 28, and a horizontal portion 29. This conveyor is supported through frame members 30, and struts 31, and a horizontally adjustable bar 32 upon truck wheels 34 which are adapted to run upon the track 19*a*, or on to the main track 38 upon which the mine cars travel. The amount of elevation of the conveyor 15 may be varied by turning the hand wheel 37, which through a suitable screw connection moves the bar 32 along the frame 30, thus changing the inclination of the struts 31, and raising or lowering the conveyor in accordance therewith.

In the use of my invention, assuming that the conveyors 4 in the rooms *y* and *z* are in the positions shown, a cutting machine, referred to by the numeral 60 in Fig. 5, would be in operation to cut the coal in room *z*, and while this is proceeding the coal which has previously been cut in room *x* is being loaded upon the loading machine or "buggy" 17, it being understood that the horizontal conveyor 4 is located over the cars of a train which are to be loaded. Current is supplied to the motor M through a lead wire W and the motor being operated thereby, power is applied to the loading conveyor 17, and through the flexible connection 16, to the conveyor 4, whereby the coal is carried upwardly and is deposited by the loading conveyor upon the horizontal conveyor. The latter is supplied preferably with a plow 51 or other means for causing the coal to be deposited in each of the cars, consecutively, beginning with the last car in the train. While this loading operation is in progress, the conveyor 4 is elevated a suitable distance above the cars by the jacks 6.

After the several cars in the train have been loaded with coal, the jacks will be operated to raise the conveyor above the cars so as to provide sufficient clearance for the cars to be carried out of that room and to be drawn away to discharge their load. The coupling 23 may then be unscrewed from its threaded connection with the gear casing 21, and the flexible shaft then removed from operative connection with the worm shaft. The loading conveyor or buggy is then moved along the tracks 19*a*, and into one of the other rooms, such as *y* or *z*, the end of the flexible shaft 16 being then coupled to the driving worm for the horizontal conveyor in that particular room, the parts being united in the same manner as they were in the previous room. A train of empty cars having been located on the track 19*b*, for example, as in the case previously described, and the switch controlling the supply of current to the motor being thrown, the loading conveyor 28 and the horizontal conveyor 4 in room *y* will then be operated in the same manner as these parts were operated in the room *x*, until the coal in room *y* has been deposited in the empty cars, which are subsequently withdrawn from this room. The loading conveyor or buggy is then moved into still another room of the mine, the operation of the coupling the flexible shaft to the driving gear mechanism of the horizontal conveyor in that room is carried out, and the loading of coal upon empty cars therein is proceeded with, as before described.

It will be seen from the above description that the operations of cutting, loading and withdrawing the loaded coal from the several rooms of a mine may be carried out consecutively by the use of a single loading conveyor, or buggy, carrying a flexible drive shaft with coupling means for attaching it to the worm of the driving gear for each conveyor in turn, and while the loading operation is taking place in one room, the cutting operation for the coal is proceeding in another room or rooms into which latter the loading conveyor will be moved so that the operations are carried out uninterruptedly. The important feature of this method of loading coal or similar material lies in the fact that a single loading conveyor, portable in its nature, and equipped with a flexible shaft connecting the worm driving gears of one conveyor with the worm driving gears of a second conveyor, is readily attachable to and detachable from the latter of these conveyors at will. The foregoing method and apparatus secures great economies of time and labor in mine and other operations and enables the work to be done more rapidly and without necessitating the use of a separate loading conveyor for each compart-

ment or room of a mine or for use with each of a plurality of independent receiving conveyors for depositing granular material in a plurality of underlying cars, or the like.

I claim:

1. A method of loading cars with material consecutively in a plurality of rooms, each containing a receiving conveyor, which consists in locating a single loading conveyor in one of said rooms, making an operative connection between a power device on said loading conveyor and the movable element of the conveyor in said room, acutating said conveyors from a single source of power to cause the material to be loaded upon a train of cars, uncoupling said power connection of the loading conveyor from the conveyor in said room, moving said loading conveyor to a second room, making an operative connection between the power device on the loading conveyor and the receiving conveyor in said room, and proceeding to load the material in the cars as before described.

2. Apparatus for loading cars, comprising a stationary, horizontal conveyor located over a plurality of cars to be loaded, driving gears for said conveyor, in combination with a portable loading conveyor, comprising an upwardly inclined and a horizontal portion, the latter having its discharge end overlying the receiving end of the first-named conveyor, a motor supported upon said loading conveyor, driving gears from said motor to said conveyor, a flexible drive shaft connected to the shaft of one of the driving gears, and means for detachably connecting said flexible shaft with the driving gears of the first-named conveyor.

3. Apparatus for loading cars comprising a horizontal conveyor having distributing means for loading cars therefrom, driving means for said conveyor, a loading conveyor comprising an inclined and a horizontal portion the latter having its discharge end overlying the receiving end of the first-named conveyor, driving gearing therefor, a motor supported from the side of the frame of said conveyor, and having its shaft operatively connected with a shaft of said gearing, a flexible shaft arranged to extend from the driving gearing of the loading conveyor to the rear end of the loading conveyor, and a detachable coupling for connecting the end of said flexible shaft with the driving means for the first-named conveyor.

4. Apparatus for loading cars comprising a receiving conveyor arranged to be located horizontally above a train of cars, material distributing means movably mounted thereon, driving gearing for said conveyor located near the forward end thereof, in combination with a portable loading conveyor comprising an inclined and a horizontal portion the latter having its discharge end overlying the receiving end of the first-named conveyor, gearing for driving said conveyor, a motor supported from the side of the frame of said conveyor and having its drive shaft connected with said gearing, a flexible drive shaft having detachable coupling means connecting one end of said shaft with a shaft of said gearing said drive shaft extending thence to the rear end portion of the loading conveyor and provided at its end with detachable coupling means for connecting it with the driving gearing of the receiving conveyor.

5. Apparatus for loading cars comprising, in combination, a receiving conveyor, a loading conveyor having an upwardly inclined and a horizontal portion the latter having its discharge end overlying the receiving end of the first-named conveyor, worm gearing for driving the movable element of said loading conveyor, a motor supported laterally from the frame of said conveyor and having its shaft operatively connected with the drive shaft of said gearing, a flexible drive shaft having one end conected with said gearing shaft and its opposite end provided with detachable coupling means for connecting or disconnecting said flexible shaft with the driving gearing of a receiving conveyor, a truck frame connected with said loading conveyor with means to vary the elevation thereof, the parts being so constructed and arranged that the loading conveyor may be moved from one location to another, and its power conveying shaft connected with, or disconnected from the driving elements of different receiving conveyors located in the compartments of a mine.

6. Apparatus for loading cars comprising in combination, a receiving conveyor arranged to be adjustably located in a horizontal position above a plurality of cars, a distributing device thereon constructed and arranged to cause said cars to be loaded consecutively with the material conveyed by said conveyor, a worm and worm gear, the latter fast to a shaft through which the conveyor belt is driven located at the forward end of said conveyor, a loading conveyor comprising an inclined and a horizontal portion the latter having its discharge end overlying the receiving end of the first-named conveyor, and means for movably supporting said conveyor, a motor sustained laterally from and at one side of the frame of said loading conveyor, a worm and worm gear for driving the belt of the loading conveyor, the shaft of said motor being connected with said worm, a flexible drive shaft having a coupling at one end for detachable connection with the shaft of said worm and a coupling at the opposite end for detachable connection with the shaft of the worm of the driving gear of the receiving conveyor.

7. Apparatus for loading cars, comprising

a horizontal conveyor arranged over a plurality of cars to be loaded in a mine compartment, driving gears for said conveyor, a shaft carrying one of said gears, in combination with a portable loading conveyor comprising an upwardly inclined and a horizontal portion, a motor supported upon said conveyor, driving gears from said motor to said conveyor, a flexible drive shaft connected at one end with one of said driving gears, means at the opposite end of said shaft constructed for detachable connection with an end of the drive gear shaft of the first-named conveyor, and quick-detachable coupling means between said last-named parts.

In testimony whereof I have hereunto set my hand this 6th day of July, A. D. 1929.

JAMES A. PAISLEY.