Jan. 7, 1936. R. MOORE 2,027,284

DRIVE FOR SHAKER CONVEYERS

Original Filed May 29, 1933 3 Sheets-Sheet 1

Fig. 1.

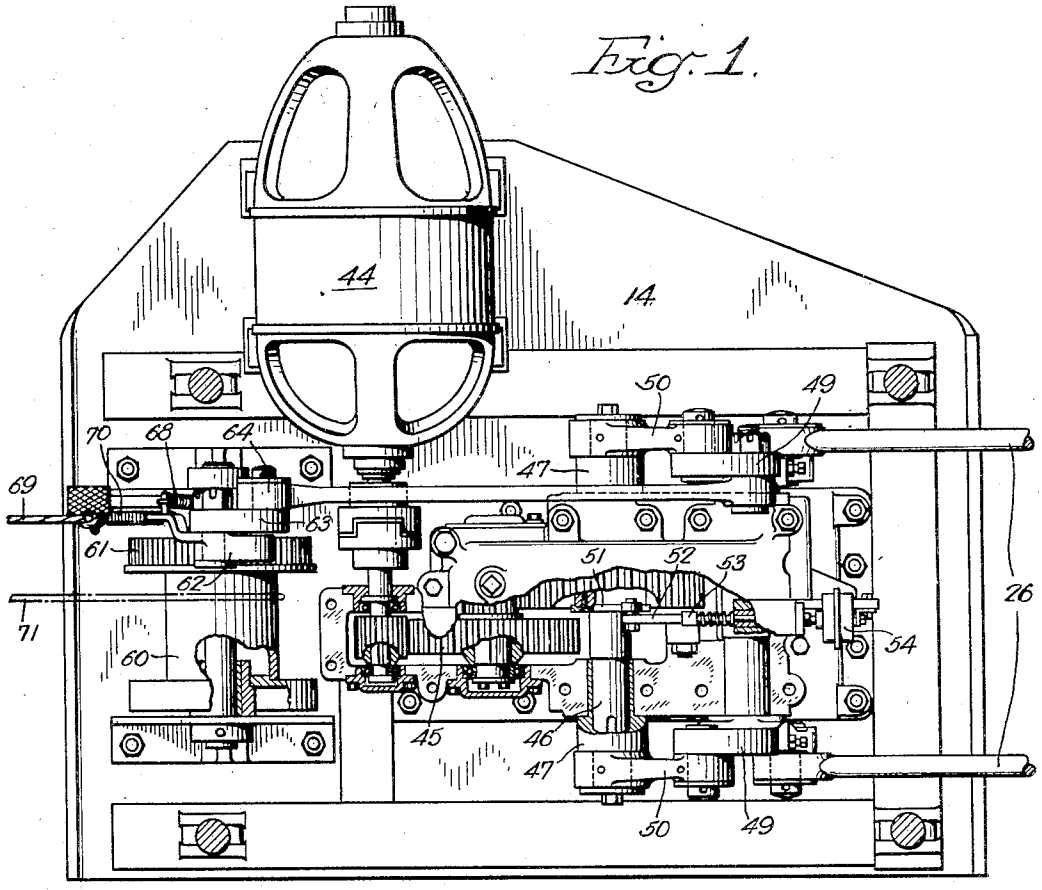
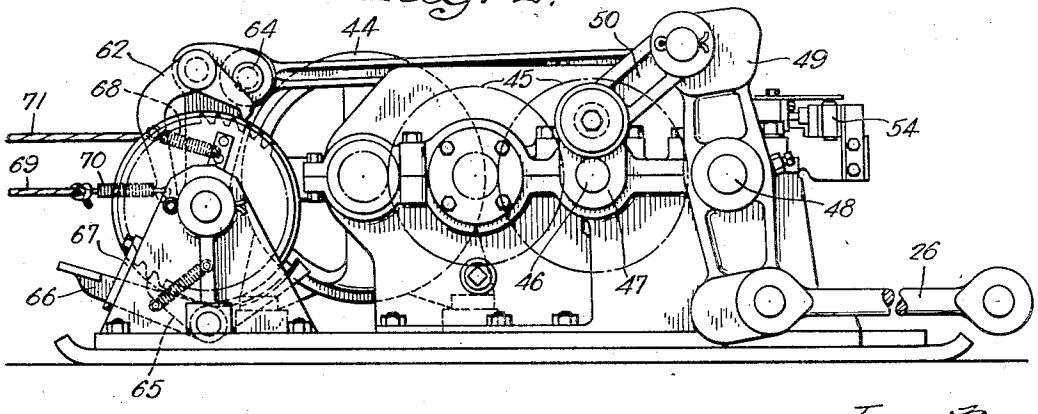


Fig. 2.



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Fig. 3.

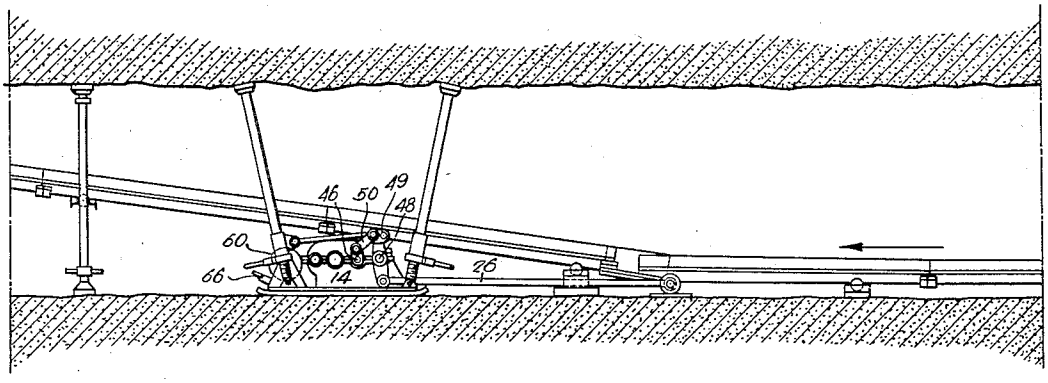
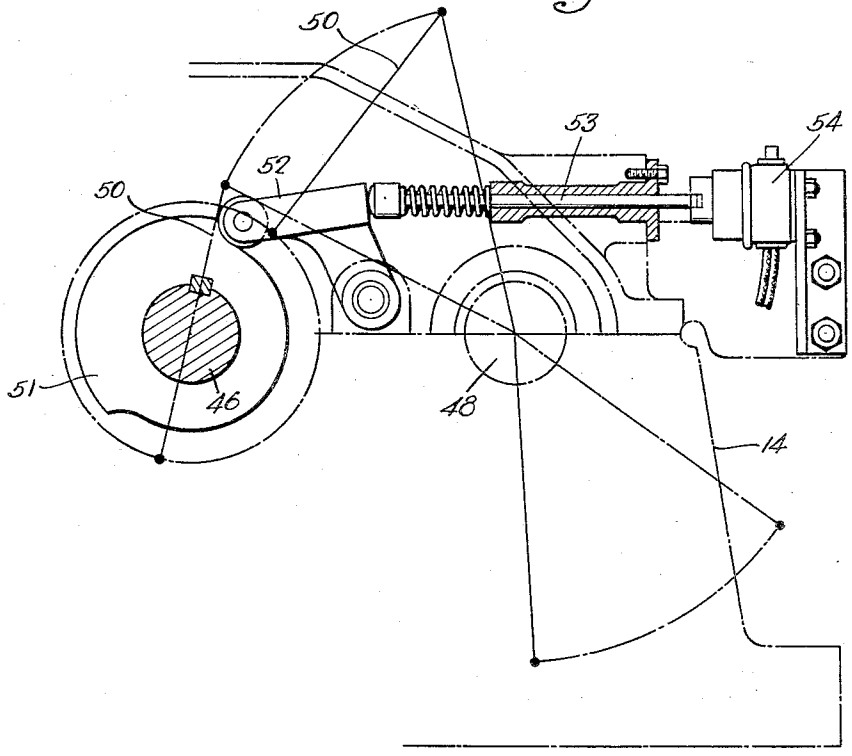


Fig. 4.



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Fig. 5.

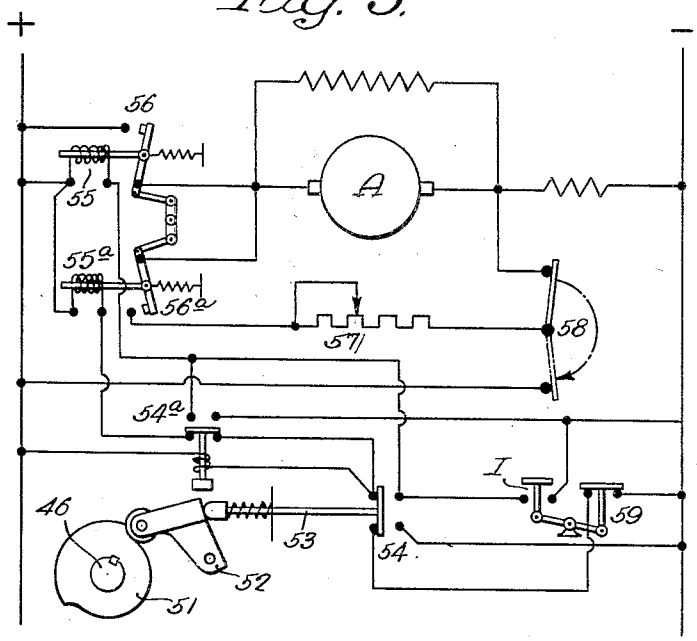
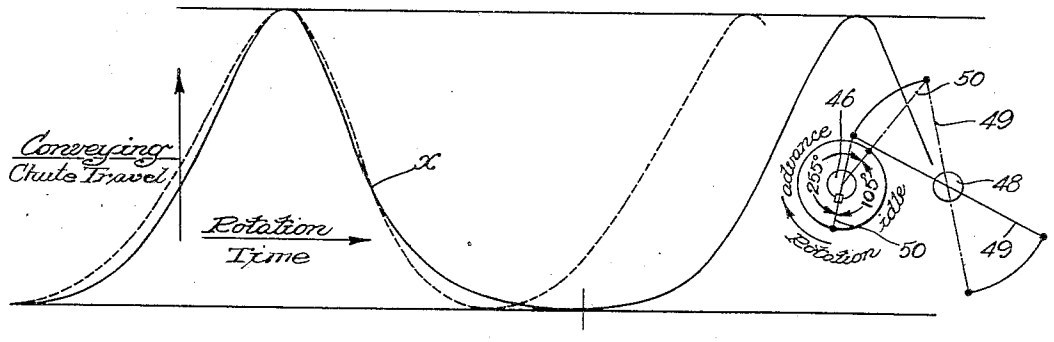


Fig. 6.



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UNITED STATES PATENT OFFICE

2,027,284

DRIVE FOR SHAKER CONVEYERS

Roscoe Moore, Kingston, Pa.

Original application May 29, 1933, Serial No. 673,532. Divided and this application May 3, 1934, Serial No. 723,754

8 Claims. (Cl. 198—220)

This invention relates to drives for shaker conveyers, and more particularly to a drive for shaker conveyers of the type employed in transporting materials from a mining point to a loading point in a mine, and is a division of my prior application Serial No. 673,532 filed May 29, 1933 for Shaker conveyer, which matured into Patent No. 1,997,495, Apr. 9, 1935.

It has heretofore been impossible to practically produce a shaker conveyer which would successfully elevate material up an incline of any appreciable grade, such devices being employed only after the placement for the conveyer is level or has a slight slope from the loading to the discharge point. For this reason it is necessary that these conveyers have some type of elevator associated therewith for elevating the material to a carloading position and the multiplicity of handlings thus necessary for the coal causes an excessive breakage thereof in addition to the excessive cost in maintenance.

One of the principal reasons for the failure of the ordinary type of shaker conveyer to elevate material moving therealong through any appreciable incline lies in the fact that the operating mechanism employed with such conveyers is of such character that the material does not come to a complete rest between alternate advancing strokes, with the result that the frictional engagement between the material and the trough of the conveyer is reduced to a point where it is insufficient to cause such elevation.

An important object of this invention is the provision of operating mechanism for shaker conveyers which will permit the material to come to complete rest in reference to the chute at the terminus of each stroke.

A further object of the invention is the provision in an apparatus of this character of an arrangement such that the operating mechanism may be employed either in its improved manner, or in the manner in which such devices ordinarily operate.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a plan view of a shaker conveyer drive constructed in accordance with my invention, portions of the mechanism being broken away to expose certain novel details;

Fig. 2 is a side elevation of the drive mechanism;

Fig. 3 is a view showing the drive mechanism connected with the conveyer;

Fig. 4 is a detail view illustrating the control switch;

Fig. 5 is a diagrammatic view showing the manner of making the connections for controlling the drive motor; and

Fig. 6 is a diagrammatic view comparing the operating stroke of the ordinary mechanism and the operating stroke of the improved mechanism.

Referring now more particularly to the drawings, the driving mechanism comprises a drive motor **44** connected through a train of gearing generally designated at **45** with a shaft **46** having cranks **47**. A rock shaft **48** has arms **49** centrally connected thereto, one end of each arm being connected with a crank **47** by a link **50** and the other end thereof being connected to the conveyer through one of connecting rods **26**.

The construction, so far described, is one fairly commonly employed in one form or another in the operating mechanisms of shaker conveyer troughs and sorting tables, and the connections between the arms **49** and the cranks are so proportioned and relatively positioned that the reciprocating stroke of the connecting rods **26** produced at each rotation of shaft **46** is of greater duration in one direction than in the other. In Fig. 6 I have diagrammatically illustrated both the mechanical operating mechanism and the stroke obtained thereby, this stroke being illustrated by the dotted line. In the diagram of the mechanism it will be noted that the advancing stroke extends through 255 degrees of rotation of shaft **46** while the idle stroke extends through only 105 degrees. Obviously, material on the conveyer at the end of the advancing or working stroke, since its movement is accelerated, tends to continue its movement during the relatively short period of the idle stroke. During the first half of the idle stroke the material is still moving rapidly and during the latter half thereof it tends to slow down but not to become stationary, with the result that when the working stroke is repeated the material is still moving in the direction of the working stroke or in other state of unrest, and, accordingly, has little, if any, frictional engagement with the trough at this time.

While this condition is satisfactory in horizontal transportation by shaker conveyer methods, it is unsatisfactory and renders inoperative any shaker conveyer disposed upon an appreciable incline. For this reason, I incorporate in the operating mechanism **14**, means for increasing the duration of the return stroke and more par-

ticularly means for increasing the duration of the latter portion of this stroke by slowing down or stopping entirely the motor 44 during the latter part of the stroke. I have at present illustrated shaft 46 as equipped with a cam 51 acting through a rocker 52 and a plunger 53 upon a switch 54 which controls the operating coils 55 and 55—*a* of interlocked switches 56 and 56—*a*. Shunting the motor armature A of motor 44 is an adjustable resistance 57. Switches 56 and 56—*a* alternately close this shunt and one side of the motor line. Through a double throw switch 58, the switch 56—*a* may be employed to place the adjustable resistance 57 in series with the armature. The circuit of the coil 55—*a* of switch 56—*a* may be opened through a suitable switch 59. It will be obvious that with switch 59 open at I the motor will operate continuously and the only actuation of the conveyer will be that normally given to conveyers through the mechanical motion of the drive. With switch 59 closed at I and switch 58 in its solid line position, each time the cam 51 releases switch 54 and thus closes switch 56—*a*, switch 56—*a* completes the circuit of the resistance about the armature of the motor and opens the circuit to the line at switch 56. With switch 58 in its dotted line position at each closing operation of switch 56—*a* through cam 51 and switch 54, the resistance is placed in series with the armature. With switch 58 in mid position, the armature circuit is opened at each closure of switch 56—*a*. Obviously, any of these arrangements will cause a slowing down of the motor, one applying a dynamic braking thereto and the others a reduction or interruption of the input thereto. The particular type of dynamic braking herein illustrated may, of course, be varied and the switches 56 and 56—*a* operated in various manners.

It is apparent that the adjustment of the resistance 57 may be improper or some unusual friction may occur during the operation of this device causing the motor to come to rest with the rocker 52 bearing upon the depressed portion of cam 51, in which case the machine would fail to start. Pilot device 54—*a* with a time element somewhat greater than one normal cycle will now open the circuit to switch 56—*a* and close switch 56 causing the motor to start. This pilot device may be any of the well known time element relays.

The resulting stroke is diagrammatically illustrated by the solid line in Fig. 6, the point X indicating approximately the point at which dynamic braking of the motor begins its operation. It will be noted by comparison of these stroke diagrams that the entire added length of the stroke is confined to the latter half of the return or idle stroke, with the result that a sufficient interval is provided for the material to come to rest upon the trough so that it may move therewith. The use of the rheostat permits the duration of the idle stroke to be adjustably regulated so that the period is of just sufficient duration to permit the material to come to rest. This is necessary due to the fact that transportation systems embodying shaker conveyer troughs are kept in touch with the source of supply by elongating the receiving end of the trough. Under these circumstances, with each addition to the length of the trough the greater load is obviously imposed thereon which load, of itself, acts as a brake, necessitating the modification of the dynamic braking applied at the motor.

The operating mechanism further incorporates a reel 60, one end of which is provided with a ratchet 61 having associated therewith an operating pawl 62 mounted upon a rocker arm 63 operated by a link connection with one of the arms 49, as indicated at 64, and a holding pawl 65. Holding pawl 65 is withdrawable by a pedal 66, which pedal may be held in its released position by a latch cam 67. The actuating pawl 62 is normally held out of engagement with the ratchet 61 by a spring 68 and is engageable with the ratchet through an operating cord 69, preferably including a spring 70. This operating cord may be extended to an operator station and a cable 71 wound upon the reel may be connected to a train of cars which is to be moved past the discharge end of the conveyer.

While I have illustrated the apparatus in Fig. 5 as arranged for use with direct current, obviously alternating current may be employed by substitution of equivalent elements suitable for use therewith.

Since the construction illustrated is obviously capable of considerable modification without in any manner departing from the spirit of the invention, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. In a shaker conveyer including horizontal and inclined sections, operating means to reciprocate the conveyer comprising a mechanism to provide working and idle strokes of different durations, an operating motor for the mechanism, and means operating in timed relation to the mechanism for braking operation of the motor during the later portion of the idle stroke of the mechanism.

2. In a shaker conveyer including horizontal and inclined sections, operating mechanism to reciprocate the conveyer providing working and idle strokes of the conveyer of different duration, and electric operating motor for the mechanism, a switch operating in timed relation to the mechanism for dynamically braking the motor during the later portion of the idle stroke.

3. In a shaker conveyer, including horizontal and inclined sections, operating mechanism to reciprocate the conveyer providing working and idle strokes of the conveyer of different duration, an electric operating motor for the mechanism, switch means operating in timed relation to the mechanism for braking the motor during the later portion of the idle stroke, and means to again start the motor in case of excessive braking or friction.

4. In a shaker conveyer including horizontal and inclined sections, operating mechanism to reciprocate the conveyer providing idle strokes of the conveyer of different durations, an electric operating motor for the mechanism, switch means to open the circuit of the motor and apply dynamic braking to the motor during the later portion of the idle stroke, and means to restart the motor in event of stoppage thereof during the operation of said switch means.

5. Operating mechanism for a shaker conveyer comprising means to reciprocate the conveyer which when driven at a uniform rate provides working and idle strokes of different duration, an electric operating motor for the mechanism, and a switch operating in timed relation to the mechanism for dynamically braking the motor during the later portion of the idle stroke.

6. Operating mechanism for a shaker conveyer comprising means to reciprocate the conveyer which when driven at a uniform rate provides working and idle strokes of different duration, an

electric operating motor for the mechanism, a resistance associated with the motor to vary the current delivery thereto and a switch operating in timed relation to the mechanism for inserting the resistance in and withdrawing the resistance from the motor circuit.

7. Operating mechanism for a shaker conveyer comprising means to reciprocate the conveyer which when driven at a uniform rate provides working and idle strokes of different duration, an electric operating motor for the mechanism, means for braking the motor during the later portion of the idle stroke and means to render the last-named means inoperative.

8. Conveyer drive mechanism comprising means to reciprocate the conveyer including means constructed and arranged to brake operation of the conveyer during its movement in one direction and thereby provide opposite strokes of different duration, and further means to additionally brake operation of the mechanism through the later portion of the shorter stroke whereby to permit the conveyed material to come to rest prior to the inception of the longer stroke.

ROSCOE MOORE.