April 24, 1928. 1,666,908

R. S. MOORE

BIN GATE

Filed Oct. 18, 1926

Fig. 1

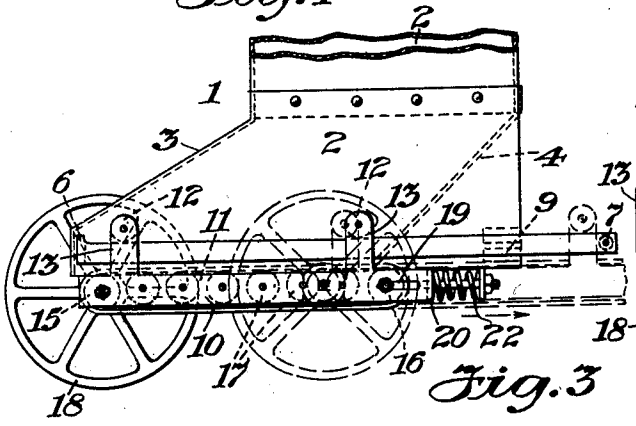


Fig. 2

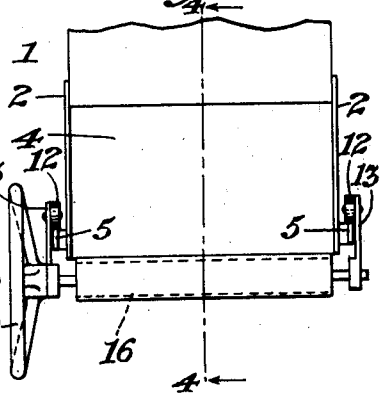


Fig. 3

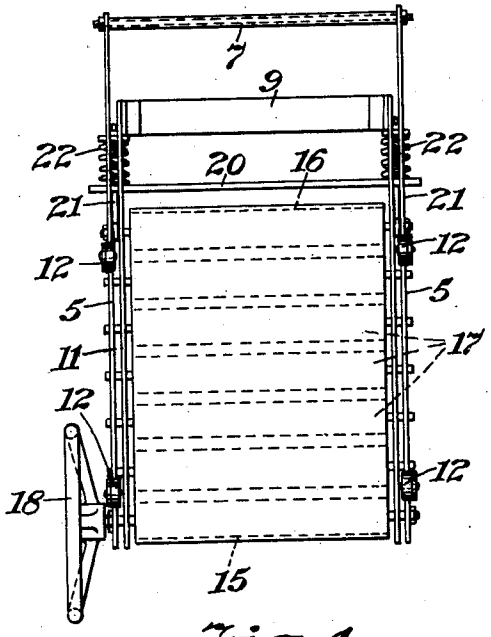
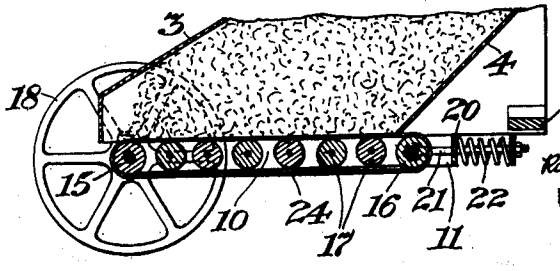


Fig. 4



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UNITED STATES PATENT OFFICE.

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BIN GATE.

Application filed October 18, 1926. Serial No. 142,254.

The invention relates to gates for closing storage bins, and, more particularly, to a gate that will open and close with a minimum friction with the ore or other material contained in the bin.

According to the invention, a bin gate is provided which may be in the form of an endless belt disposed across the opening in the bin. When it is desired to open the gate, the belt is rolled in a manner similar to a well known type of so called caterpillar tractor across the opening. Mechanism necessary for operating the gate may be provided which makes use of the traction caused by the pressure of the stored material against the belt, or independent gearing cooperating with the adjoining portion of the bin may be provided for operating the gate.

A further feature of the invention is the provision of a pad or pressure member located in the line of travel of the gate against which the belt may obtain traction when it is almost entirely open and therefore has little stored material pressing against it for traction purposes.

Various other features and advantages of the invention will be obvious from the following particular description of one form of a device embodying the invention or from an inspection of the accompanying drawings; and the invention also consists in certain new and novel features of construction and combinations of parts hereinafter set forth and claimed.

In the accompanying drawings I have shown for purposes of illustration one form of a device embodying the invention, in which

Fig. 1 is a side elevation of the closure device;

Fig. 2 is an end elevation thereof;

Fig. 3 is a plan view of the endless belt and operating mechanism; and

Fig. 4 is a section taken on the line 4—4 of Fig. 2.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring now to the drawings, the bin or other storage hopper is denoted by 1, and comprises main side walls 2, the opening of the bin facing downwardly. It will be understood that the hopper will also have front and rear end walls 3 and 4.

Secured to each side wall 2 may be a longitudinally extending track member 5, the track members being secured to the side walls in any desired manner. The front end of each track member 5 may have an abutment 6 to prevent the gate from riding over the end. At the rear end of the tracks 5 may be a tie rod 7 for tying the ends of the tracks together for strengthening purposes, and also to provide abutments to prevent the gate from sliding off the tracks 5 in a rearward direction.

Disposed between the side walls 2 may be a pad or pressure member 9 secured to the side walls in any desired manner as by means of angle irons. The purpose of the pressure member will hereinafter be described more in detail.

The gate 10 which for purposes of illustration, is shown in the form of a belt conveyor or caterpillar tractor, may comprise spaced frame members 11 extending generally parallel to but below the track members 5. Disposed on the track members and near the ends of the frame members 11 may be wheels 12. Hangers 13 may be provided near the ends of the track members 5 connecting the track members to appropriate wheels 12 to support the weight of the gate 10 and of the ore above. Journalled between the frame members 11 may be a front end roll 15, a back end roll 16 and a plurality of smaller intermediate rolls 17, each roll having a shaft journalled in the frame members. The front end roll 15 may have a hand wheel 18 keyed to its shaft for a purpose hereinafter described.

The frame members 11 may have at their rear end a pair of longitudinally extending slots 19 in which the rear end roll 16 may have its shaft disposed. Connecting the rear ends of the frame members 11 may be a cross member 20 having holes near its ends. Eye bolts 21 having their eyes surrounding the shaft of the rear end roll 16 may have their shanks disposed through the holes in the cross member 20, and coil springs 22 may be provided between the cross member 20 and abutments on the ends of the eye bolts 21, this construction being for the purpose of maintaining always a taut condition of the endless belt 24 which surrounds the rolls. It

will be appreciated that the endless belt 24 may be made in any manner which may be necessary or desirable, such as, for instance, articulated slats or in the form of a sheet ribbon of fabric or other material.

When it is desired to open the gate to allow ore to flow out or to drop from the bin, the hand wheel 18 is turned in an appropriate direction to cause the gate 10 to travel as a tractor backwards, acting against the pressure of the ore. The wheels 12 guided by the tracks 5 operate to guide the gate in the proper direction. When the gate is opened a sufficient distance and the pressure of the ore is consequently diminished, the endless belt 24 may engage the pad or pressure member 9 to obtain sufficient additional traction to operate the gate, either to open it further or to close it.

Instead of relying upon the traction of the endless belt 24 against the ore, the gate may be opened by providing a gearing between the gate and the side walls of hopper. For instance, a rack may be provided on the side of the hopper and a pinion may be provided concentric with the hand wheel.

It will be obvious that a gate according to the invention may be opened against the pressure of the ore with a minimum of friction. The pressure of the ore merely operates to provide the necessary traction for causing the gate to function. The tremendous friction caused by the pressure of the ore and which must be overcome before the usual gate may be operated, not only causes no difficulty in the case of the invention but is actually an advantage. No part of the gate slides against the ore, but the gate functions by progressively succeeding portions of the belt moving away from the opening in the direction of the axis of the opening.

Thus a gate is provided which may be made inexpensively and ruggedly, which will be efficient in operation and which will last a long time without getting out of repair. Furthermore, the gate can be opened with very little effort on the part of the operator with a consequent minimum of wear on the mechanism used for opening the gate.

While I have shown and described and have pointed out in the annexed claims certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and, in its operation may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In a device of the class described, a chamber having an opening, a gate including an endless belt-like member for said opening, and means for operating said gate by rolling said member across said opening.

2. In a device of the class described, a chamber having an opening, said chamber having traction material associated therewith, a gate including an endless belt-like member for said opening and means for operating said gate by rolling said member across said opening and using as sole tractor the traction of said member against said material.

3. In combination, a bin having an opening, a guide disposed near said opening, a belt gate for said opening, said gate comprising a frame and guide devices cooperating with said guide, rollers in said frame, an endless belt-like member around said rollers, a pressure pad adjacent said opening to provide traction for said member.

4. In combination, a bin having side walls with an opening therebetween, a guide disposed near each side wall, an endless belt gate for said opening, said gate comprising a frame, guide devices on said frame cooperating with said guide, front and rear end rolls and a plurality of intermediate rolls, shafts for said rolls journalled in said frame, one of said end rolls having a hand wheel secured to its shaft, an endless belt around said rollers, and means for holding said belt taut.

5. In combination, a bin having parallel side walls with an opening therebetween, a track secured to each side wall, an endless belt gate for closing said opening, said gate comprising a frame including spaced frame members, a pair of wheels for each frame member, one wheel located near each end thereof, said wheels riding on their respective tracks, each frame member having a supporting arm near each end, each arm being secured to an appropriate wheel, front and rear end rolls and a plurality of smaller intermediate rolls, shafts for said rolls journalled in said frame members, the front end roll having a hand wheel secured to its shaft, an endless belt around said rollers, means for holding said belt taut, and a pad member extending between said side walls in the line of motion of said gate.

6. In combination, a bin having parallel vertical side walls with an opening therebetween, a track secured to each side wall, an endless belt gate for closing said opening, said gate comprising spaced frame members, a pair of wheels for each frame member, one wheel located near each end thereof, said wheels riding on their respective tracks, each frame member having a hanger near each end, each hanger being secured to an appropriate wheel, front and rear end rolls and a plurality of smaller intermediate rolls, shafts for said rolls journalled in said frame members, the front end roll having a hand wheel secured to its shaft, said frame members having longitudinal slots for the rear end roll shaft, a cross member connecting said frame members at

their rear end, eye-bolts having their eyes around said rear end roll shaft and their shanks extending through said cross member, springs between the ends of said bolts and said cross member, an endless belt around said rollers and a pad member extending between said side walls in the line of motion of said gate.

7. In combination, a container having an opening, a gate including a belt-like member for said opening, means for supporting said member including a roll, and means for operating said gate by applying a rotating force to said roll.

8. In combination, a container having an opening, a gate for said opening, said gate including a frame, a roller journaled therein and a belt disposed on said roller, and a hand wheel secured to said roller.

9. In storage apparatus, a chamber having an opening, a gate including an endless belt-like member, means for automatically holding said member taut, and means for operating said gate by rolling said member across said opening.

10. In storage apparatus, a chamber having an opening, a gate for said opening, said gate including a frame, an endless belt-like member, supports for said member, and a spring mounting between said frame and one of said supports to hold said member taut.

11. In a device of the class described, a chamber having an opening, a gate including an endless belt-like member for said opening, said gate being operable by rolling said member across said opening, and a pressure pad adjacent said opening to provide traction for said member when the material in said bin is insufficient.

In testimony whereof I have hereunto set my hand.

RALPH SWITZER MOORE.