E. H. McCONNELL.

APPARATUS FOR HANDLING MATERIALS.

APPLICATION FILED JUNE 9, 1920.

1,407,333.

Patented Feb. 21, 1922.

3 SHEETS—SHEET 1.

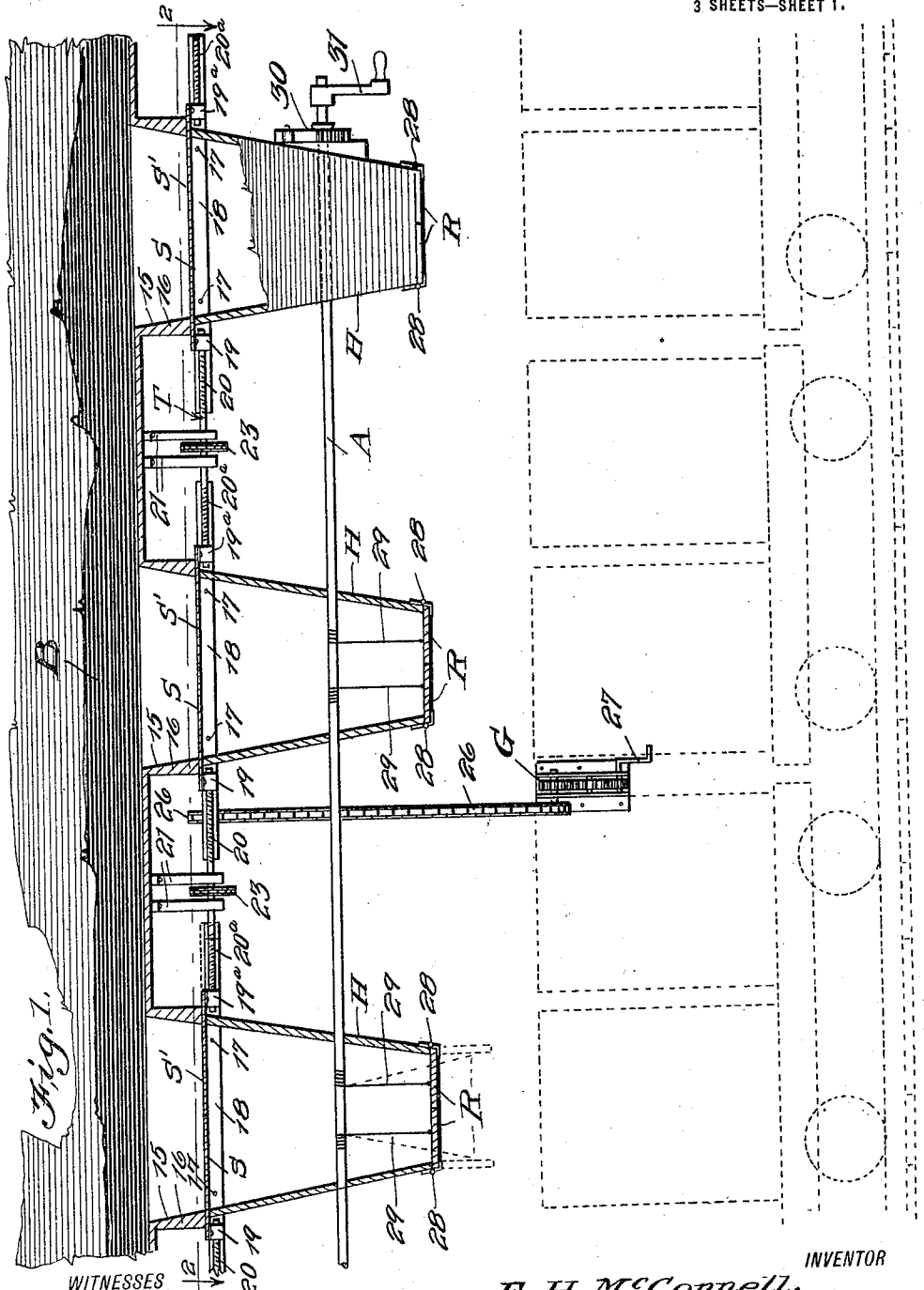


Fig. 1.

WITNESSES

Wynne Johnson

G. Dawes.

INVENTOR

E. H. McConnell,

BY Munn & Co.

ATTORNEYS

E. H. McCONNELL.

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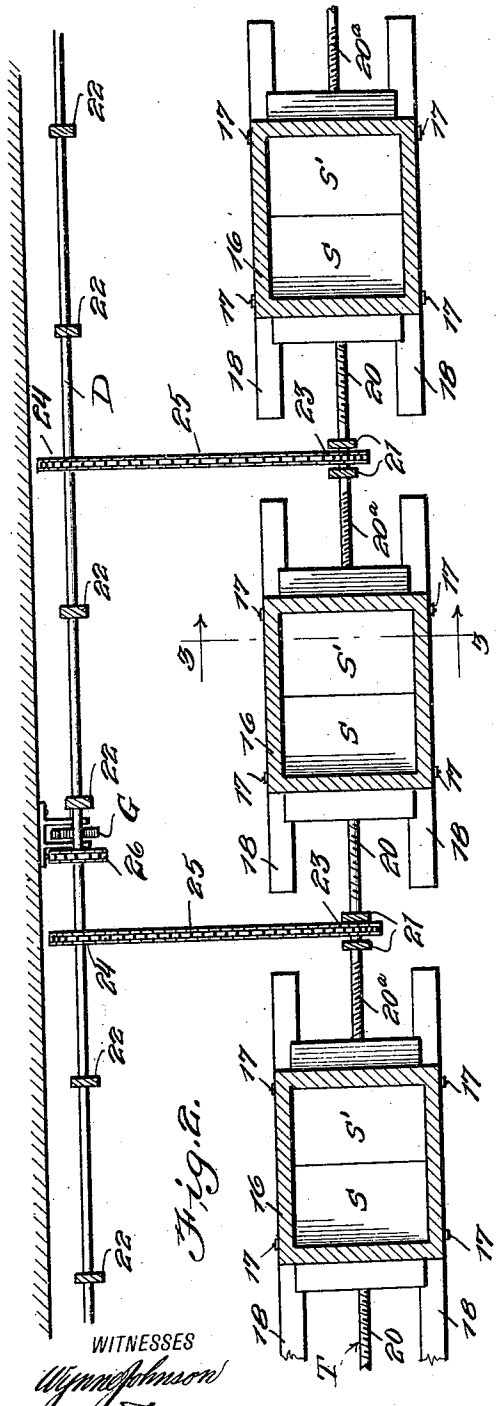


Fig. 2.

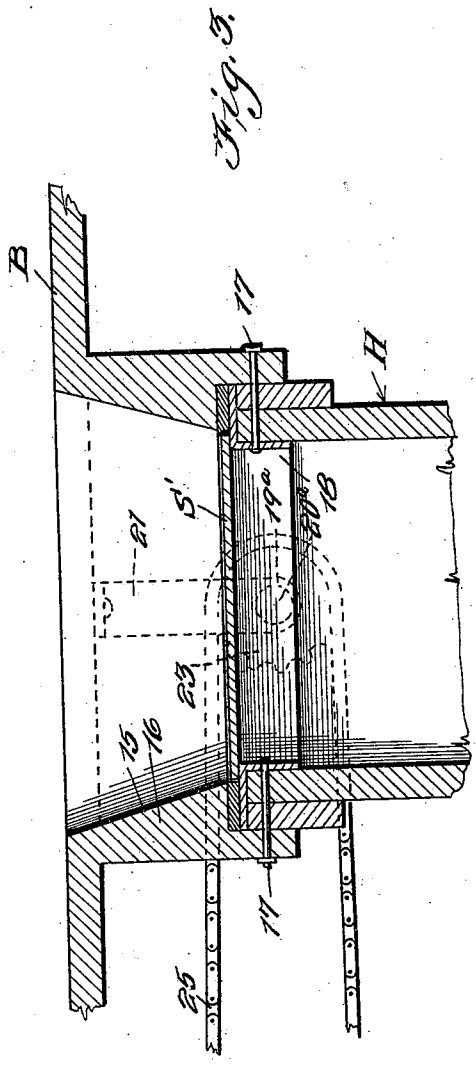


Fig. 3.

WITNESSES

Wynn Johnson

E. F. Bruce.

INVENTOR

F. H. McConnell,

BY Munn & Co.

ATTORNEYS

F. H. McCONNELL.

APPARATUS FOR HANDLING MATERIALS.

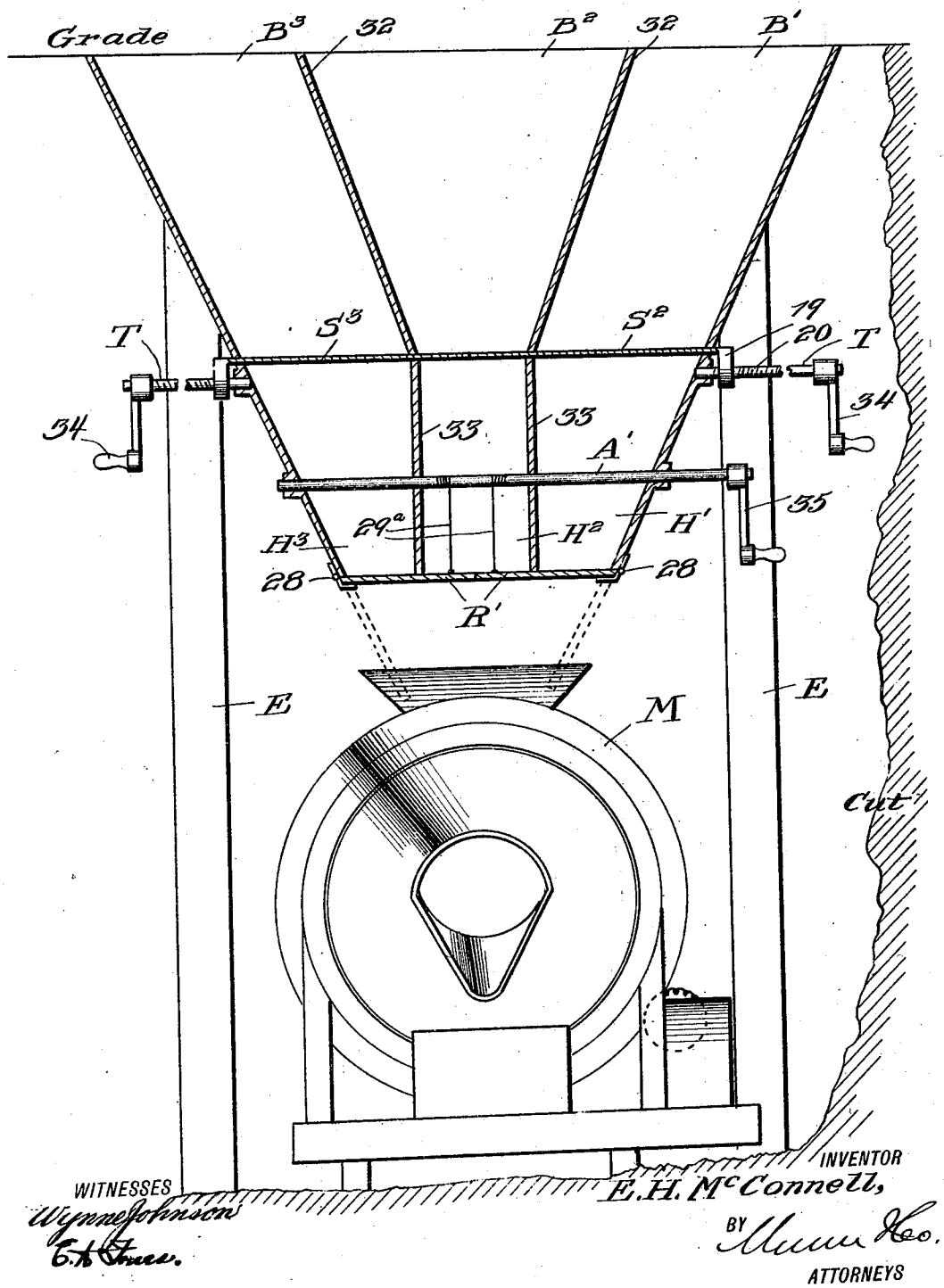
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3 SHEETS—SHEET 3.

Fig. 4.



WITNESSES

Wynne Johnson

E. A. Grace.

INVENTOR

E. H. McConnell,

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD HERBERT McCONNELL, OF ROANOKE, VIRGINIA.

APPARATUS FOR HANDLING MATERIALS.

1,407,333. Specification of Letters Patent. Patented Feb. 21, 1922.

Application filed June 9, 1920. Serial No. 387,731.

To all whom it may concern:

Be it known that I, EDWARD HERBERT McCONNELL, a citizen of the United States, and a resident of Roanoke, in the county of Roanoke and State of Virginia, have invented certain new and useful Improvements in Apparatus for Handling Materials, of which the following is a specification.

My invention relates to apparatus for handling materials of various characters, and particularly, although not necessarily, to the handling of sand, cement, stone and like materials used in the making of concrete.

A purpose of my invention is the provision of an apparatus of the above described character which facilitates the handling of materials in large quantities, it being operable to discharge predetermined quantities of material from a bin at a plurality of points to allow of the simultaneous filling of a plurality of receptacles.

It is also a purpose of my invention to provide a material handling apparatus which effects the simultaneous discharge, in predetermined quantities, of a plurality of materials of different characters from a plurality of bins into a mixing device, whereby, the several steps and hands usually necessary in the handling and measuring of materials in the making of concrete or the like is eliminated.

I will describe two forms of material handling apparatus embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings:

Figure 1 is a view showing in vertical section and partly in elevation one form of apparatus embodying my invention.

Figure 2 is a longitudinal sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a view showing in end elevation a conventional form of mixing device having associated therewith another form of material handling apparatus embodying my invention, with the apparatus shown in vertical section.

Similar reference characters refer to similar parts in each of the several views.

Referring specifically to the drawings and particularly to Figure 1, B designates a bin formed at intervals at its bottom side with discharge openings 15, the walls of which are formed with depending flanges 16. As clearly shown in Figure 3, a hopper H is secured by means of bolts 17 at its upper end to the flanges 16 in such manner as to effect communication between the upper or filling end of the hopper with one of the discharge openings 15. As shown in Figures 1 and 2, each hopper H is associated with a discharge opening 15 in this manner, although it is to be understood that any number of discharge openings and hoppers may be provided without departing from the spirit of the invention. Interposed between a portion of the flanges 16 and the upper end of a corresponding hopper H are angle bars 18 upon which are supported for sliding movement a pair of shutters S and S′, each of which is adapted to move through suitable openings provided between the flanges 16 and the hopper H as shown in Figures 1 and 3.

The shutters S and S′ of any one hopper H are capable of being moved outwardly in opposite directions to occupy an open position, and inwardly toward each other to occupy a closed position. In the present instance, the moving of the shutters of all of the hoppers H to open and closed position is effected simultaneously, and to this end I provide the following mechanism: Secured to the under sides of each pair of shutters S and S′ are ears or sleeves 19 and 19^a, respectively, which are screw threaded interiorly with the screw threads of one ear being reversely disposed with respect to the threads of the other ear. Extending through and engaging the sleeves 19 and 19^a are worms 20 and 20^a which are formed on the confronting ends of a pair of shafts T. As shown in Figures 1 and 2, the worms 20 and 20^a of any one shaft T engage the sleeves 19 and 19^a of adjacent shutters S and S′ so that any one shaft is capable of simultaneously operating the shutter S of one pair and the shutter S′ of an adjacent pair. As shown in Figure 1, all of the shafts T are disposed in longitudinal alinement, each shaft being journaled in suitable

bearings formed on the lower ends of standards 21 secured to and depending from the lower side of the bin B. All of the shafts T are adapted to operate simultaneously to one direction or the other by means of a driving shaft D journaled in bearings 22 and operatively connected to each of the shafts T by means of sprockets 23 and 24 fixed to the shafts T and D respectively and about which are trained chains 25. The shaft D in turn is adapted to be rotated in either direction by a train of gearing G which as shown in Figure 1 is supported beneath the hoppers and bin and operatively connected to the shaft by a chain and sprocket connection generally indicated at 26. In the present instance I have shown the gearing G operated by a crank 27, it is to be understood, however, that motor operated means may be employed for actuating the same.

As shown in Figure 1, the discharge ends of the hoppers H are controlled by doors R, two for each of the hoppers. Each pair of doors R are hingedly supported at their outer edges upon the corresponding hopper as indicated at 28 and in such manner as to permit the downward swinging movement to the position shown in dash lines in Figure 1. The doors R when in closed position are adapted to completely span the lower end or discharge end of the hopper H so as to prevent the discharge of material therefrom. The doors are normally held in closed position by means of cables 29 secured to the upper sides of the doors and trained about a shaft A which extends through all of the several hoppers H in the manner shown. As a result of this arrangement, it will be clear that the shaft A serves to maintain the doors of all of the hoppers in closed position, it being understood that when the shaft A is released the doors will gravitate to open position. To lock the shaft A against rotation in such direction as to permit the unwinding of the cables 29, I provide a pawl and ratchet means generally indicated at 30 and 31 designates a crank for actuating the shaft A, although it is to be understood that motor operated means may be provided.

In the operation of the apparatus the bin B and the hoppers H are adapted to be supported in elevated position so as to permit the passage of cars beneath the discharge end of the hoppers as indicated in dash lines in Figure 1 and to thus dispose the car bodies or batch boxes directly beneath the hoppers. With the cars disposed in this position, the shutters S and the doors R are operated in the following manner to effect the filling of the cars with a predetermined quantity of material from the bin B. In the closed position of the shutters S as shown in Figures 1 and 2, material within the bin B is of course checked against discharging into the hopper. However, when the shutters are moved to open position the material is then free to gravitate into and to completely fill the hoppers. The movement of the shutters S to open position is secured in the following manner: Upon rotation of the crank 27 in the proper direction, rotation of all of the shafts T is simultaneously effected to cause the worms 20 and 20^a to feed the sleeves 19 and 19^a toward each other thereby drawing the shutters S and S′ of an adjacent pair of shutters toward each other so that they no longer occupy spanning positions with relation to the filling end of the hoppers.

The hoppers having been filled with material from the bin B, the shutters S are now returned to closed position, this movement being effected by rotating the crank 27 in a direction opposite to the direction in which it is rotated when opening the shutters S whereby, a rotation of all of the shafts T is effected and in such direction as to cause adjacent sleeves 19 and 19^a to move outwardly in opposite directions, thus moving the shutters to closed position. It will be understood that when the shutters S are moving to closed position they penetrate the material within the discharge openings 15 of the bin so that when they have finally reached the completely closed position the passage of the material from the mouths into the hopper is discontinued. With all of the hoppers now completely filled with material, it will be clear that by releasing the pawl of the pawl and ratchet mechanism 30 the weight of the material within the hoppers will cause the doors R to gravitate to open position thereby allowing a discharge of the material from the hoppers and into the cars arranged therebeneath.

As will be understood, a second filling of the hoppers with material and a discharging of the same therefrom can be effected by a repetition of the operation just described, wherefor, it will be seen that each time the doors are opened a predetermined quantity of material is discharged from the bin B. This result is of a special advantage when it is desired to fill cars or other receptacles with materials of predetermined quantities to secure the proper proportions of any one material or a plurality of materials in the making of concrete and the like.

Referring now to Figure 4, I have here shown a material handling apparatus which is particularly designed for the handling of the necessary materials in the making of concrete. As here shown, I provide three bins designated at B′, B^2 and B^3. These bins are formed from a single receptacle which is divided into three compartments by means of partitions 32, the partitions 32 and the walls of the receptacle being inclined

toward a common point to effect the gravitation of the materials contained within the bins to the lower ends thereof. Communicating with the discharge ends of the bins B′, B² and B³ are hoppers H′, H² and H³, respectively, such hoppers being formed by extending the walls of the receptacle and inserting partitions 33 at suitable points within the bins. The passage of the materials from all of the bins into all of the hoppers is simultaneously controlled by a pair of shutters S² and S³ which are interposed between the hoppers and bins in the manner shown and are moved to open or closed positions by worms 20 engaging sleeves 19 in a manner similar to the worms and sleeves for actuating the shutters S and S′. In the present instance, I have shown the shafts T upon which the worms are formed actuated by cranks 34, it being understood, however, that mechanism similar to the mechanism employed in the first form of apparatus can be equally well adapted to the present apparatus.

The passage of material from the several hoppers H′, H² and H³ is controlled by a pair of doors R′ which are hingedly supported as at 28 to swing downwardly in a manner identical to the doors R. Similarly, the doors R′ are held in closed position by means of a shaft A′ about which is trained cables 29ª connected to the doors adjacent their confronting edges. The shaft A′ is actuated by a crank 35.

In the present instance, I have shown the second form of apparatus supported in elevated position within an excavation by means of pillars E, the position of the apparatus being such that the upper ends of the bins are disposed on the level of a street so that the several materials necessary in making the concrete can be readily deposited within their respective bins, and ultimately deposited into the concrete mixer M disposed below the hoppers. It will be understood that after a mixing of the material has been effected by the mixer M, the concrete as discharged from the mixer can be elevated by other mechanism (not shown) to the desired point.

Although I have herein shown and described only two forms of material handling apparatus embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention and the spirit and scope of the appended claims.

What I claim is:

1. An apparatus of the character described comprising, a bin, a plurality of hoppers depending from and communicating with the bin, a pair of shutters in each of the hoppers adapted when closed to span the hopper at the filling end thereof, doors controlling the discharge end of each hopper, means for simultaneously actuating the shutters for all of the hoppers, and means for simultaneously actuating the doors for all of the hoppers.

2. An apparatus of the character described comprising, a bin, a plurality of hoppers depending from and communicating at different points with the bin, a pair of slidable shutters interposed between each hopper and the bin, screw threaded sleeves formed on each of the shutters with the threads of one sleeve being reversely disposed with respect to the threads of the other sleeve, a shaft between adjacent hoppers connecting the sleeve of one pair of shutters with the adjacent sleeve of an adjacent pair of shutters, reversely threaded worms formed on said shaft and engageable with said sleeves, and means for simultaneously rotating all of said shafts in one direction or the other.

3. An apparatus of the character described comprising, a bin, a plurality of hoppers depending from and communicating with the bin, a pair of shutters for each of the hoppers adapted to span the filling end of the hoppers, a pair of doors controlling the discharge end of each hopper, said doors being hingedly supported so as to normally occupy open positions, means for holding the doors of all of said hoppers in closed position comprising, a shaft, cables trained about said shaft and connected to said doors, means for locking said shaft against rotation in such direction as to allow the unwinding of said cables, and means for simultaneously actuating the shutters for all of the hoppers.

4. In an apparatus of the character described, a hopper, a pair of slidable shutters controlling the upper end of said hopper, screw threaded means for moving said shutters to open and closed position, doors hingedly supported upon the lower end of said hopper and controlling the lower end thereof, and means for holding said doors in closed position.

5. An apparatus of the character described comprising, a bin, a plurality of hoppers depending from and communicating at different points with the bin, a pair of slidable shutters interposed between each hopper and the bin, screw threaded sleeves formed on each of the shutters with the threads of one sleeve being reversely disposed with respect to the threads of the other sleeve, a shaft between adjacent hoppers connecting the sleeve of one pair of shutters with the adjacent sleeve of an adjacent pair of shutters, reversely threaded worms formed on said shaft, and means for simultaneously rotating all of said shafts in one direction or the other comprising, a main shaft, chain and sprocket connections between said shafts and the main shaft, a train of gearing operatively connected to said main shaft, and means for actuating said gearing.

6. An apparatus of the character described comprising, a plurality of bins having the walls therein inclined to effect the gravitation of a material within the bins to the lower ends thereof, a plurality of hoppers one for each of the bins communicating with the discharge ends of said bins, a pair of slidable shutters interposed between said hoppers and bins, screw threaded means for actuating said shutters to open and closed positions, and a pair of doors controlling the discharge ends of said hoppers and supported to normally occupy open positions.

EDWARD HERBERT McCONNELL.