

No. 836,392.

PATENTED NOV. 20. 1906.

J. S. METCALF.
GRAIN ELEVATOR.

APPLICATION FILED JUNE 29, 1906.

6 SHEETS—SHEET 1.

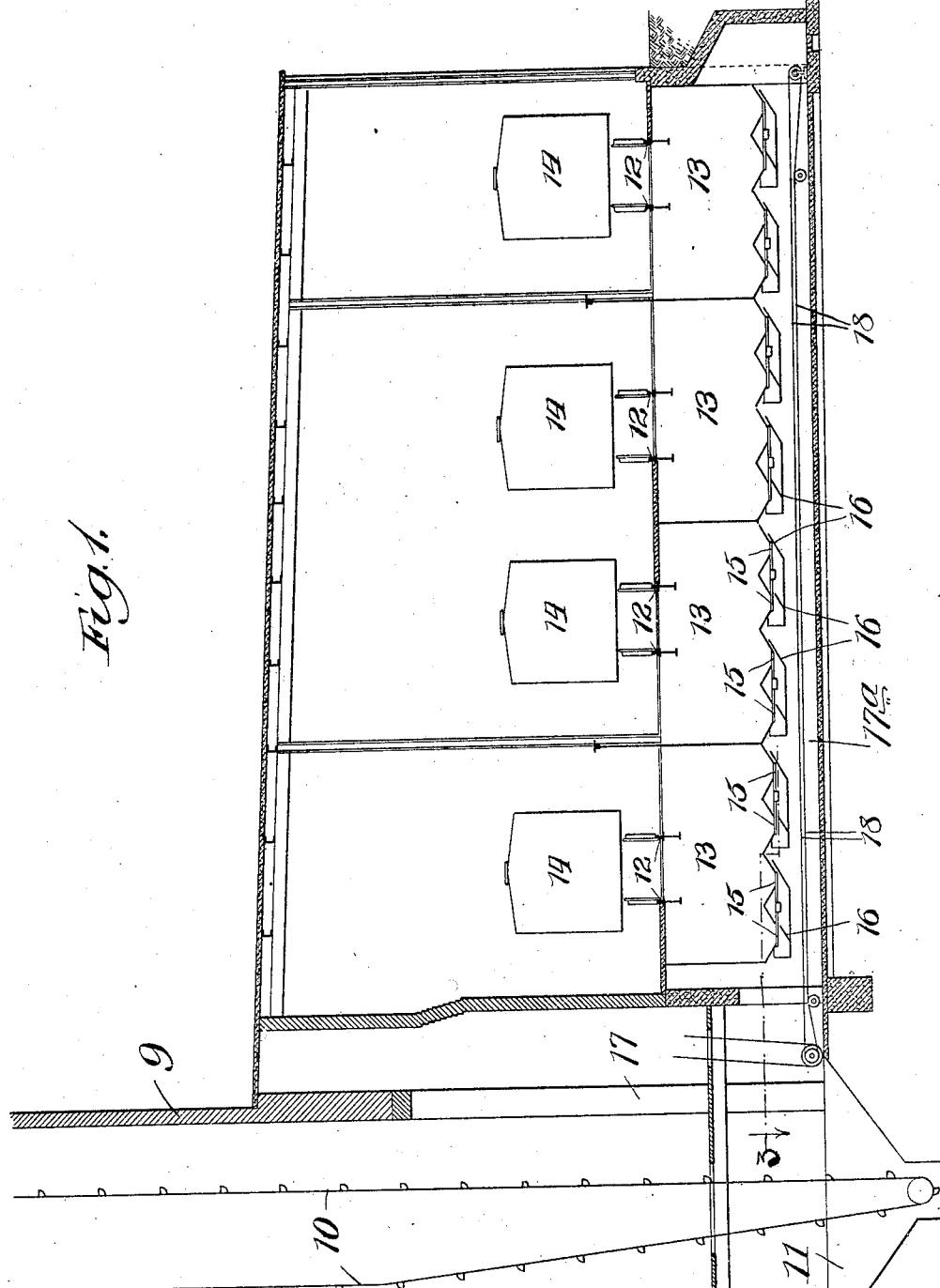


Fig. 1.

Witnesses:
Ed. Chayford,
John Enders.

Inventor:
John S. Metcalf,
By Dyprenforth, Dyprenforth, Lee & Mills,
Attys.

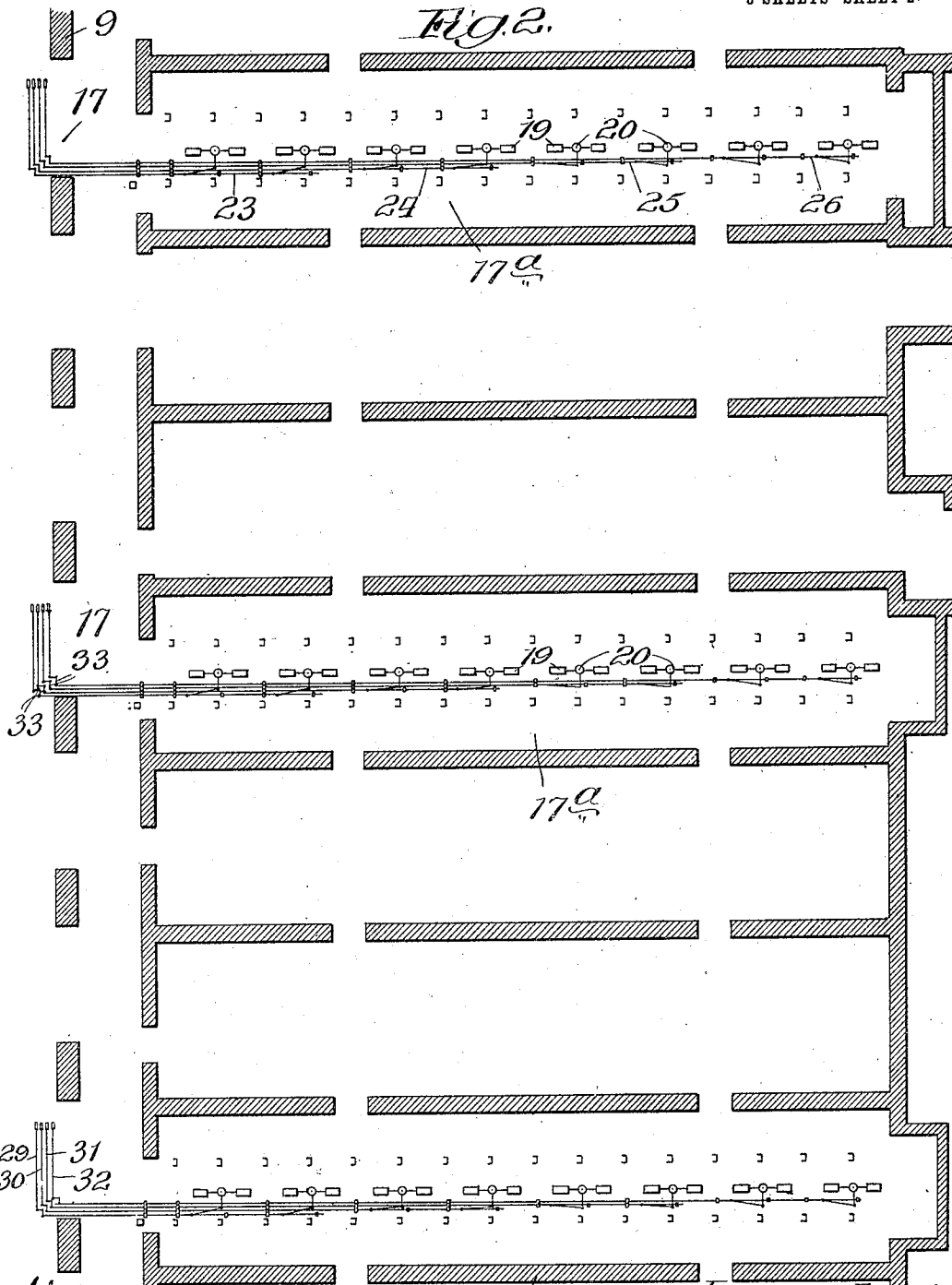
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5 SHEETS—SHEET 2.



Witnesses:
Ed. Oylford,
John Enders

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Inventor:
John S. Metcalf,
By Depenbath, Depenbath, Sec & Wiles,
Attys at l.

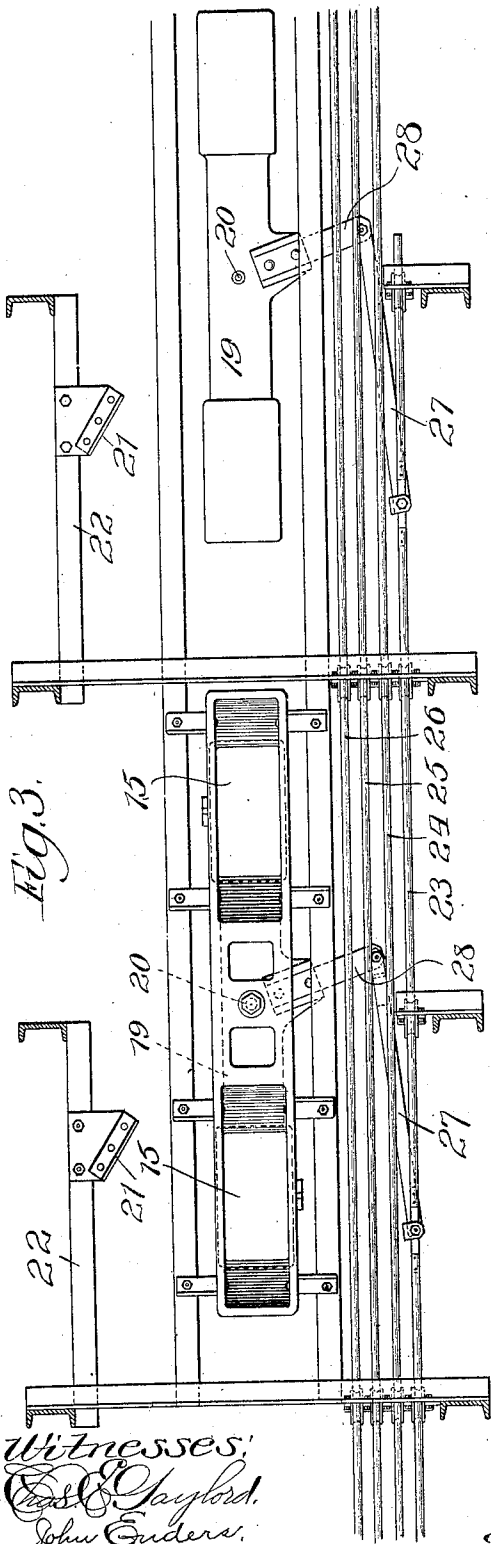
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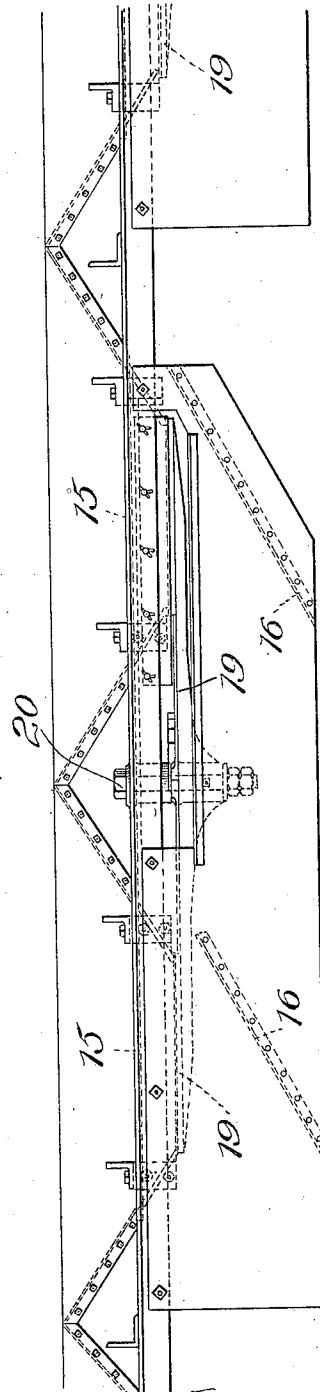
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6 SHEETS—SHEET 3.



Witnesses:
E. S. Gaylord.
John Enders.

Fig. 4.



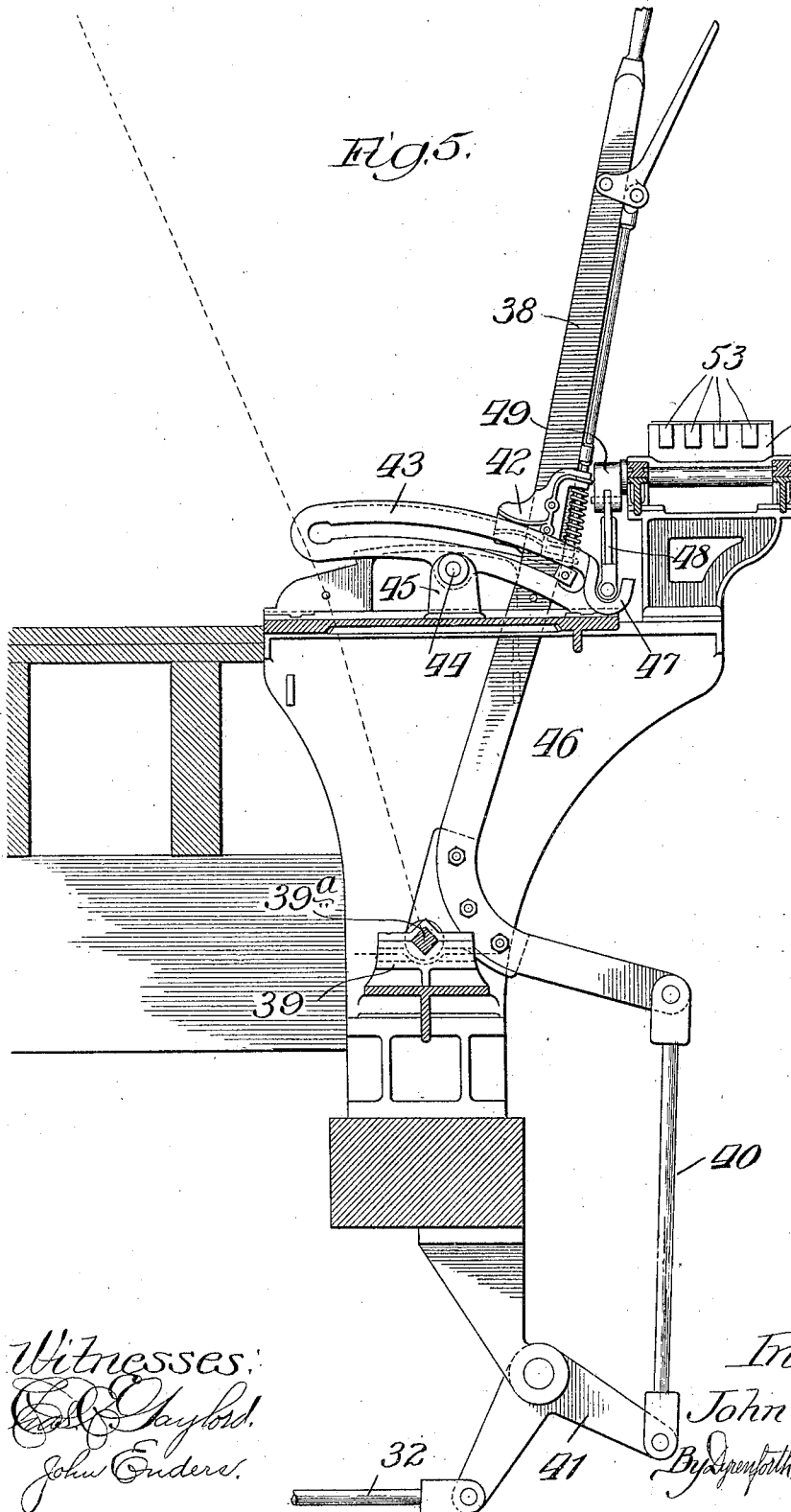
Inventor:
John S. Metcalf,
By Deprenforth, Deprenforth, Sec & Miles,
Attys

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5 SHEETS—SHEET 4.



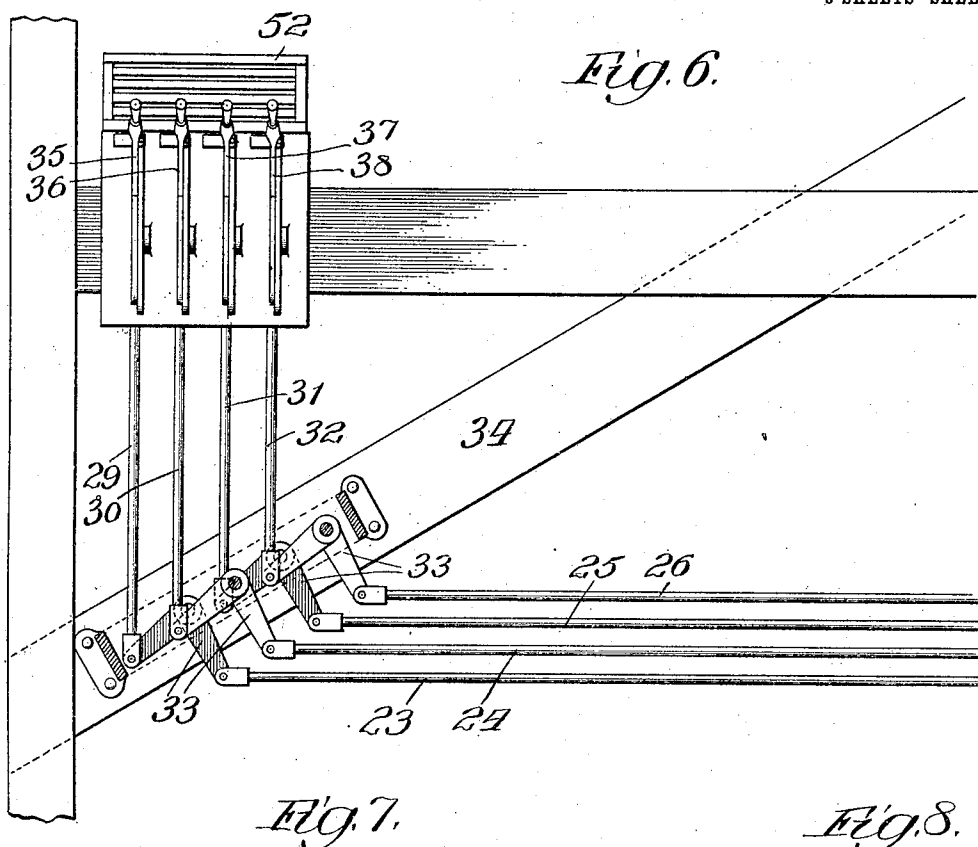
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6 SHEETS—SHEET 5.



Witnesses:
E. S. Chyler.
John Enders.

Inventor:
John S. Metcalf,
By Deprenforth, Deprenforth, Lee and Wiles,
Attys.

UNITED STATES PATENT OFFICE.

JOHN S. METCALF, OF CHICAGO, ILLINOIS, ASSIGNOR TO JOHN S. METCALF COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

GRAIN-ELEVATOR.

No. 836,392.

Specification of Letters Patent.

Patented Nov. 20, 1906.

Application filed June 29, 1906. Serial No. 323,994.

To all whom it may concern:

Be it known that I, JOHN S. METCALF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Grain-Elevator Equipments, of which the following is a specification.

My invention relates to an improvement in the apparatus with which a grain-elevator is commonly equipped for unloading the grain from the cars into the elevator proper, wherein it is delivered to the elevator-legs for the ordinary or any desired disposition inside the building.

In the more modern practice of unloading grain from railway-cars into an elevator it is common to provide a plurality of railway-tracks extending parallel with each other along one side of the elevator-building, each track, which may be elevated or not, according to local conditions or requirements, running over a longitudinal series of bins at intervals apart corresponding with the inletways to the building. Thus a series of these bins extending transversely of the several tracks is provided coincident with each inletway, and each member of a transverse series of the bins has a valve-equipped hopper-bottom, the bins discharging upon a traveling carrier or endless conveyer which transfers the grain unloaded from cars on the tracks into the bins to the elevator leg or legs. In order that there shall be no mixing of the grain from one bin with that from any of the other bins in a transverse series thereof, it is the duty of the operator to entirely discharge the contents of one bin upon the traveling conveyer before he opens another bin in the series to empty it of its contents. Experience shows, however, that it is not practically possible to observe this practice, since mistakes frequently occur in opening one bin before the contents of another have been fully discharged, and, moreover, the valves become defective in operation with use, thus causing the bins to leak, with the highly objectionable result of mixing grain of different kinds or grades from different bins.

The object of my invention is to overcome the difficulty referred to, and this I accomplish, generally stated, by so interlocking the valves in each transverse series of the bins below the tracks that only one bin at a time

can possibly be opened and when opened prevents any other bin in a series from being opened until the one previously opened has been closed.

As the preferred means for practically embodying my invention I employ for the valve interlocking medium a well-known form of railway-switch interlocking mechanism somewhat modified to adapt it to my particular purpose, and my said embodiment is illustrated in the accompanying drawings, in which—

Figure 1 is a broken view in cross-sectional elevation of a grain-elevator equipped with my improvements; Fig. 2, a diagrammatic plan sectional view illustrating my improved system for controlling the discharge of grain from the bins to the conveyers; Fig. 3, an enlarged plan section taken at the line 3 on Fig. 1 through one of the bins and viewed in the direction of the arrow, the left-hand side of the view being taken through one end of the hoppers bottom and showing the valve in dotted lines, the right-hand side of the view showing the companion valve for controlling the discharge from the opposite end of the hoppers bottom in full lines, this end of the hoppers bottom being removed; Fig. 4, an enlarged broken view in side elevation, partly dotted, of the hopper-equipped valved bottom of a bin; Fig. 5, a view in sectional elevation of details of the interlocking mechanism employed for controlling the discharge of the contents of bins; Fig. 6, a plan view of further details of the interlocking mechanism; Fig. 7, a detail plan section of the locking-bar members for the interlocking mechanism, and Fig. 8 a broken perspective view of the bar members shown in Fig. 7 and their actuating means.

One of the side walls of an elevator building is represented at 9, and closely adjacent thereto and within the building is an elevator-leg 10, which rises from a hopper 11 for carrying the grain conveyed to it from the cars to the top of the building. Extending along the outside of the wall 9 and parallel with it are a series of railway-tracks 12, which are shown in Fig. 1 to be laid on the ground-level. Below each set of tracks and extending transversely thereof are a number of series of bins 13, each series being preferably provided in position to register with a transverse row of

cars 14 of trains upon the several tracks. The bins may be constructed of sheet metal, each being provided with a laterally-constricted bottom portion having four hopper-shaped discharge-openings 15. Below the 5 discharge-openings 15 are shown deflector-plates 16, and supported below the latter in a trench 17^a, extending underneath the bins to an inlet-way 17 in the wall of the elevator-building, is a conveyer-belt 18 for carrying 10 the grain discharged onto it from the bins 13 to the hopper 11.

For controlling the discharge of the bin contents upon the conveyer I preferably provide two sets of valves or two double valves 15 for each bin. The valve mechanism comprises a horizontal shutter 19 in the form of a plate journaled on a vertical pivot 20 to extend at its outer expanded ends when in normal position over the bottoms of two adjacent 20 discharge-openings to close them. Each shutter is adapted to be swung horizontally to uncover the discharge-openings 15, a stop 21 being provided on one of the bin-supports 22 for limiting the horizontal movement of the valve device.

The valves are operated through the medium of a series of parallel rods 23, 24, 25, and 26, the two valves of each bin being connected 30 with a different one of these rods, whereby for the four bins in each transverse series thereof four longitudinally-reciprocable rods are provided, each serving to operate the two valves of a different bin. To this 35 end each of the four rods is operatively connected with the two valves controlling a bin by means of two links 27 27, carried on the rod and each pivotally connected with a rigid arm 28, extending at an angle from the 40 respective shutter 19. Thus the rod 23 is connected with the valves of the bin nearest to the elevator-building, the rod 24 with the valves of the next bin in a transverse series, the rod 25 with the third bin from the building, 45 and the rod 26 with the valves of the bin farthest from the building, whereby when any one of the rods is operated the two valves it controls are caused to open and close the discharge-openings of the respective bin, depending on the direction of moving the rod. 50 The rods 23 to 26, inclusive, are respectively connected at their ends nearest the building with rods 29, 30, 31, and 32 through the medium of horizontally-disposed bell-crank levers 33, fulcrumed at their angles on a support 34, as represented in Fig. 6.

In Figs. 5 to 8, inclusive, are shown means for operating the rod-and-lever mechanism described and also interlocking mechanism 60 for preventing the opening of the valves of any bins in a transverse series thereof, while the valves of one bin in a series are open. These mechanisms are substantially identical with the switch-operating and interlocking 65 mechanism in common use, known as the

"Saxby" and "Farmer," comprising mechanism of the following-described construction: A series of hand-operated levers 35, 36, 37, and 38, with bell-crank-shaped lower ends, are fulcrumed, as shown at 39^a in Fig. 5, on a 70 support 39. These levers are connected, by means of rods, each like the rod 40, with bell-crank levers like that shown at 41, and these last-named bell-cranks are respectively connected with the rods 29, 30, 31, and 32, thereby 75 providing a separate primary operating-lever for each valve-operating rod 23, 24, 25, and 26. Each primary lever 35, 36, 37, and 38 carries a shoe 42, which engages a slotted segment 43 in a well-known manner, the segments being pivoted near their centers on a 80 shaft 44, journaled in ears 45, rising from the top of the adjacent supporting structure 46. Each segment is provided near one end with an upwardly-opening socket 47, in which the 85 rounded end of a vertical link 48 is confinedly seated, each link 48 being connected at its upper end to a crank-arm 49, rigidly fastened to a different shaft, like that represented at 50 in Fig. 8, carrying an upwardly-extending 90 finger 51 for engagement with the interlocking bars, as indicated.

The interlocking bar mechanism comprises a casing 52, in which parallel bars 53 of a number equal to the number of hand-actuated 95 levers are slidably confined. Each bar 53 is provided with a series of slots 54, in which cross-bars 55 are slidably confined. As represented in Fig. 7, each bar 53 has 100 tongues 56 extending into three of its slots 54, and each cross-bar 55 has three recesses 57 in one side registering with the adjacent tongues on the bars 53. In each of the bars 53 the fourth slot 54 is provided with double 105 cam-surfaces 58, which are adapted to engage with similar registering cam-surfaces 59 on the bars 55 when the bars 53 are moved in their guides through the medium of the 110 fingers 51, as hereinafter described. Each bar 53 is further provided on its under side with a socket 60, into which the corresponding 115 finger 51 protrudes to move the respective bar 53 back and forth in its guides when one of the hand-levers is operated. Thus when one of the bars 53 is moved through 120 the medium of its engaging finger 51 its cam-surfaces move against the adjacent cam-surfaces on one of the bars 55, thereby moving the bar 55 transversely of the bars 53. Shifting any one of the bars 55 causes its 125 recesses 57 to move out of registration with the adjacent tongues 56 in the bars 53, in which condition the remaining bars 53, and consequently the hand-operated levers connected therewith, are locked against movement 130 until the lever first operated has been thrown to normal position.

The foregoing detailed description, so far as it goes, of the valve-operating mechanism is sufficient to enable it to be understood by 130

reason of the well-known construction and operation thereof as applied to railway-switches.

The operation is as follows: With the bins 5 13 filled with grain unloaded into them from cars 14 the operator, desiring to open the hoppers in any one of the bins of a transverse series thereof, pushes the hand-operated lever connected through the intermediate 10 mechanism with the valves of that particular bin. Thus operating that lever causes the two sets of valves connected with it to turn on their pivots, thereby uncovering the hopper-discharge openings of the respective bin 15 and discharging the contents of the bin upon the traveling conveyer below. Throwing the lever causes the segment to rock upon its pivot in a well-known manner to effect thereby raising of the link confined in its 20 socket end. Thus raising the link causes the turning of the respective shaft 50 connected therewith, and consequently oscillation of the finger 51 thereon, the latter impinging against the side of the socket 60, into which 25 it protrudes and causing its coacting bar 53 to be shifted, with the result of interlocking the other bars 53, as heretofore described. Thus when one of the primary operating-levers is thrown to open the discharge from one bin and the grain is flowing 30 from that bin to the conveyer it is impossible to operate any of the other levers to release the contents of another bin over the same conveyer.

35 What I claim as new, and desire to secure by Letters Patent, is—

1. In a grain-elevator equipment of the character described, the combination of a series of bins provided with discharge-openings, 40 valves for opening and closing said discharge-openings, interlocking mechanism operatively connected with the several valves for opening and closing them, and a conveyer supported to travel across the series of bin-discharge openings and leading to an inlet-way of the elevator-building, for the purpose 45 set forth.

2. In a grain-elevator equipment of the character described, the combination of a series of bins provided with discharge-openings, 50 horizontally-swinging valves for opening and closing said discharge-openings, interlocking mechanism operatively connected with the several valves for swinging them to open and close said bin-openings, and a conveyer 55 supported to travel across the series of bin-discharge openings and leading to an inlet-way of the elevator-building, for the purpose set forth.

60 3. In a grain-elevator equipment of the character described, the combination of a series of bins provided with discharge-openings, horizontally-swinging double valves for opening and closing said discharge-openings, 65 stops for limiting the movement of said

valves, interlocking lever-actuated mechanism operatively connected with the several valves for swinging them to open and close said bin-openings, and a conveyer supported to travel across the series of bin-discharge 70 openings and leading to an inlet-way of the elevator-building, for the purpose set forth.

4. In a grain-elevator equipment of the character described, the combination of a series of bins, each provided with discharge- 75 openings, horizontally-swinging valves for opening and closing said discharge-openings, each comprising a shutter pivotally supported near its center between adjacent discharge-openings, interlocking lever-actuated mechanism 80 operatively connected with the several valves, for swinging them to open and close said bin-openings, and a conveyer supported to travel across the series of bin-discharge openings, and leading to an inlet-way of the 85 elevator-building, for the purpose set forth.

5. In a grain-elevator equipment of the character described, the combination of a series of bins each provided with a plurality of 90 hoppers in its bottom having discharge-openings, horizontally-swinging valves for opening and closing said discharge-openings, each comprising a shutter pivotally supported between its ends between adjacent discharge- 95 openings, interlocking lever-actuated mechanism operatively connected with the several shutters for swinging them to open and close said hopper-openings, and including horizontally-movable rods each connected with all the valves of a different bin, and a conveyer 100 supported to travel across the series of bin-discharge openings and leading to an inlet-way of the elevator-building, for the purpose set forth.

6. In a grain-elevator equipment of the 105 character described, the combination with a plurality of railway-tracks extending along one side of the elevator-building, of bins provided at intervals along and beneath each track and forming series of bins extending 110 across the tracks, said bins being provided with discharge-openings, valves for opening and closing said discharge-openings, interlocking mechanism operatively connected with the several valves of each transverse series of bins for opening and closing them, and 115 conveyers supported to travel across the discharge-openings of said series of bins and leading to inlet-ways of the elevator-building, for the purpose set forth. 120

7. In a grain-elevator equipment of the character described, the combination with a plurality of railway-tracks extending along one side of the elevator-building, of a series of bins provided with discharge-openings, 125 horizontally-swinging double valves for opening and closing said discharge-openings, stops for limiting the movement of said valves, interlocking lever-actuated mechanism operatively connected with the several valves for 130

5 swinging them to open and close said bin-openings, and a conveyer supported to travel across the series of bin-discharge openings and leading to an inlet-way of the elevator-building, for the purpose set forth.

8. In a grain-elevator equipment of the character described, the combination with a plurality of railway-tracks extending along one side of the elevator-building, of a series
10 of bins each provided with a plurality of hoppers in its bottom having discharge-openings, horizontally-swinging valves for opening and closing said discharge-openings, each comprising a shutter pivotally supported be-
15 tween its ends between adjacent discharge-

openings, interlocking lever-actuated mechanism operatively connected with the several shutters for swinging them to open and close said hopper-openings, and including longitudinally-movable rods each connected with
20 the valves of a different bin, and a conveyer supported to travel across the series of bin-discharge openings, and leading to an inlet-way of the elevator-building, for the purpose set forth.

JOHN S. METCALF.

In presence of—
L. HEISLAR,
J. H. LANDES.