(No Model.) 6 Sheets—Sheet 1.

F. H. RICHARDS.

TRANSFERRING APPARATUS.

No. 572,070. Patented Nov. 24, 1896.

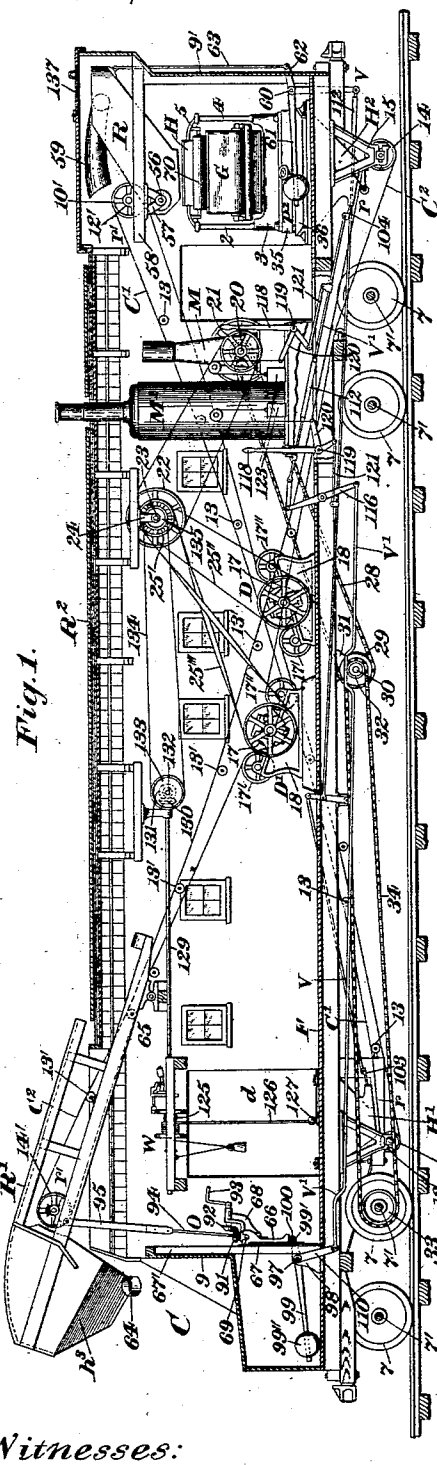


Fig. 1.

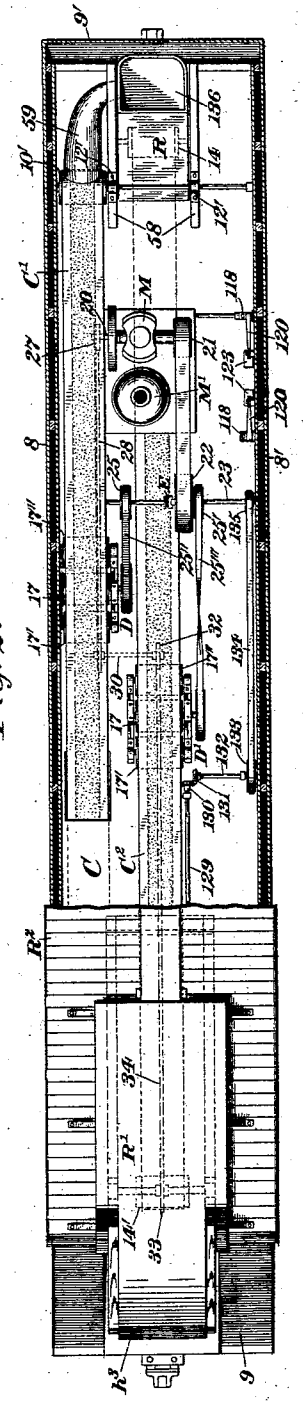


Fig. 2.

Witnesses:
F. L. Edwards Jr.
Emory C. Whitney.

Inventor:
F. H. Richards.

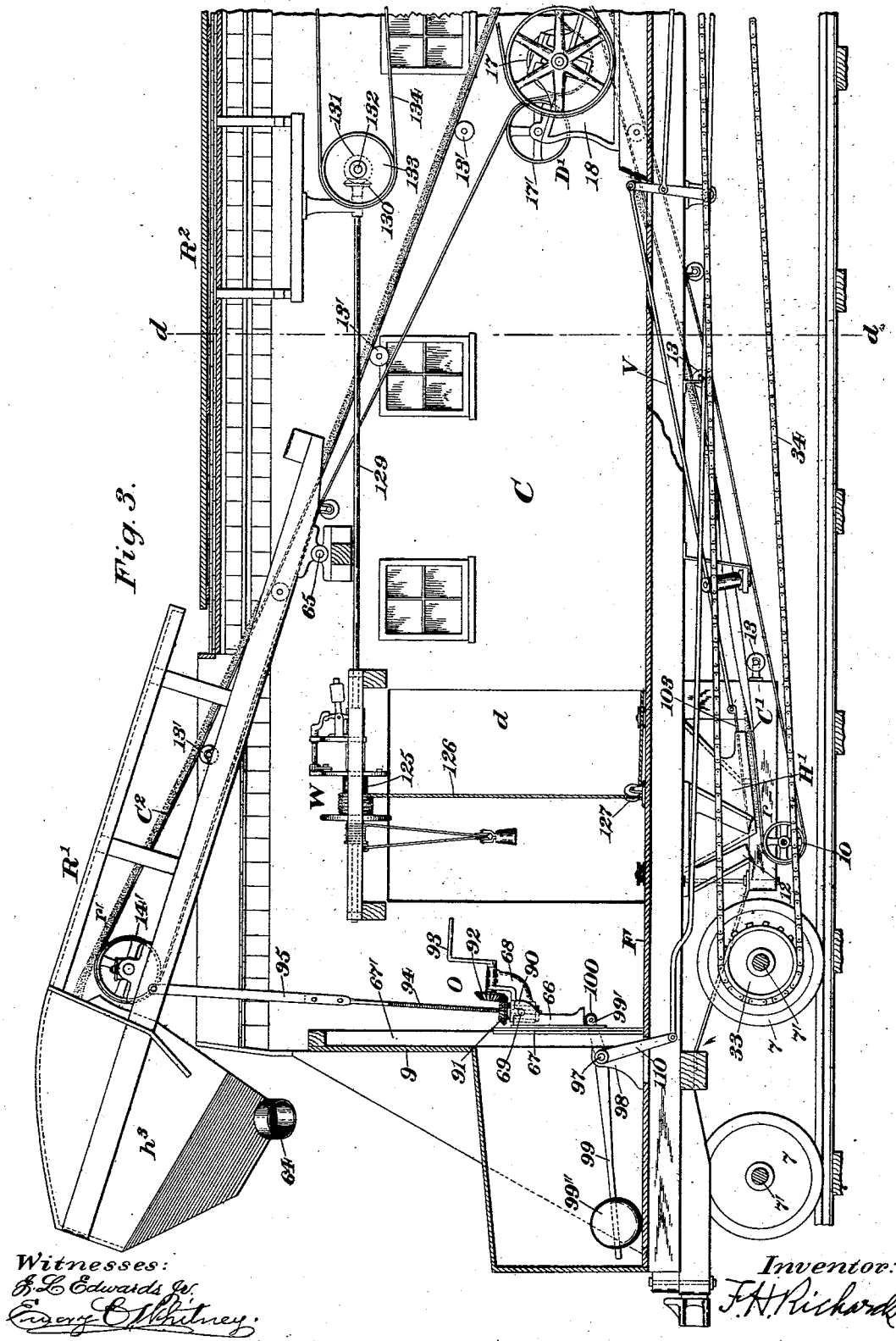
(No Model.) 6 Sheets—Sheet 2.

F. H. RICHARDS.

TRANSFERRING APPARATUS.

No. 572,070. Patented Nov. 24, 1896.

Fig. 3.



Witnesses:
F. L. Edwards Jr.
Emery C. Whitney.

Inventor:
F. H. Richards.

(No Model.) 6 Sheets—Sheet 3.

F. H. RICHARDS.

TRANSFERRING APPARATUS.

No. 572,070. Patented Nov. 24, 1896.

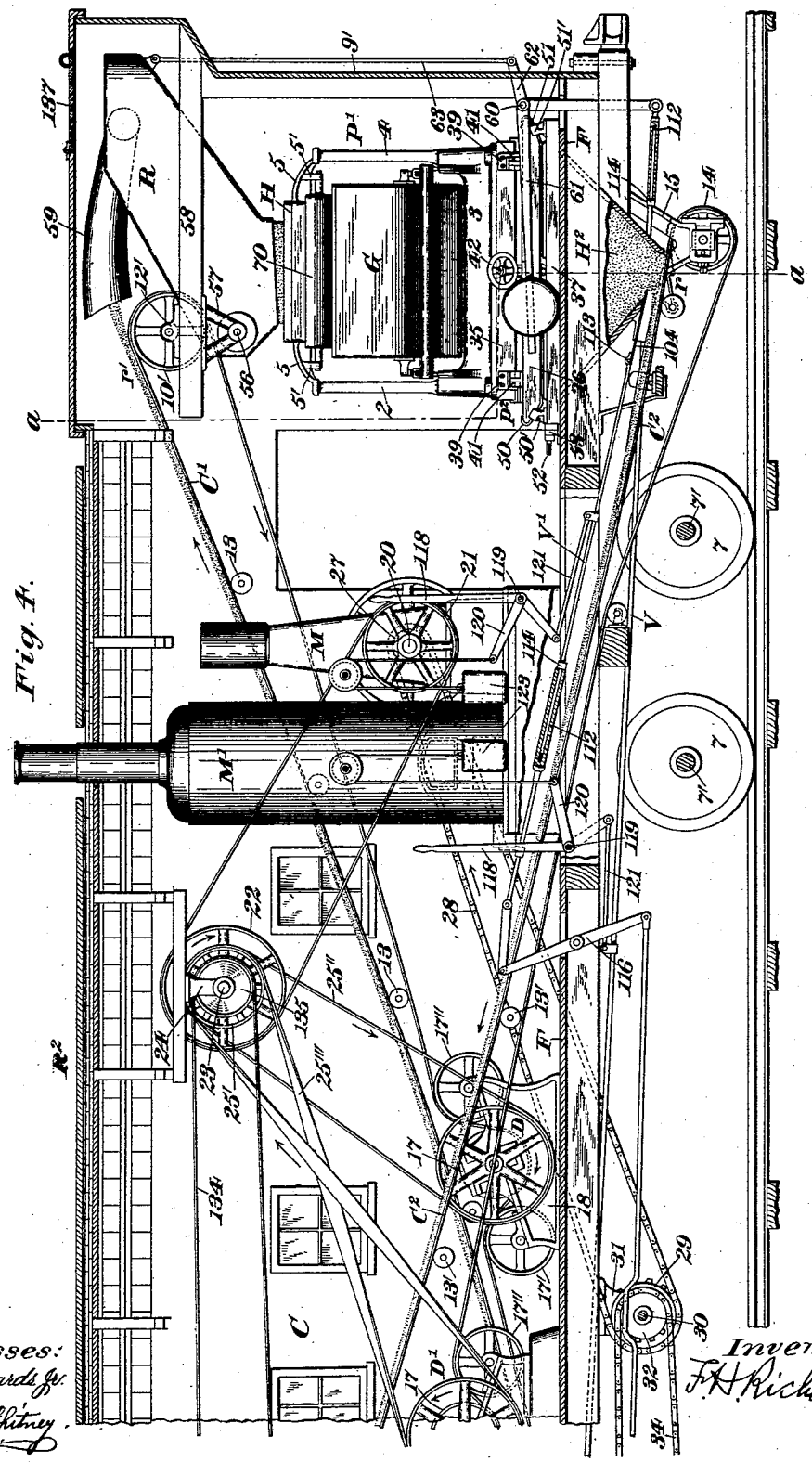


Fig. 4.

Witnesses:
F. L. Edwards Jr.
Evgeny C. Whitney.

Inventor:
F. H. Richards.

(No Model.) 6 Sheets—Sheet 4.

F. H. RICHARDS.

TRANSFERRING APPARATUS.

No. 572,070. Patented Nov. 24, 1896.

Fig. 6.

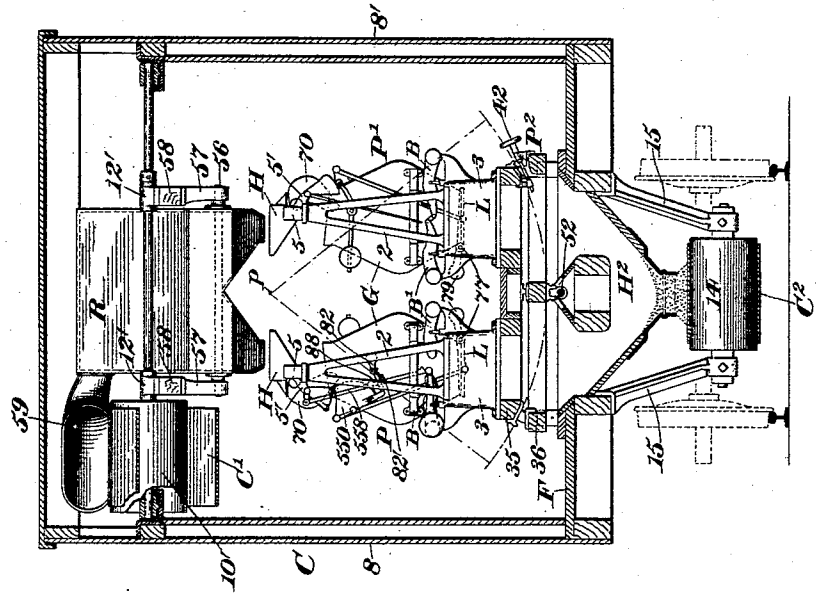
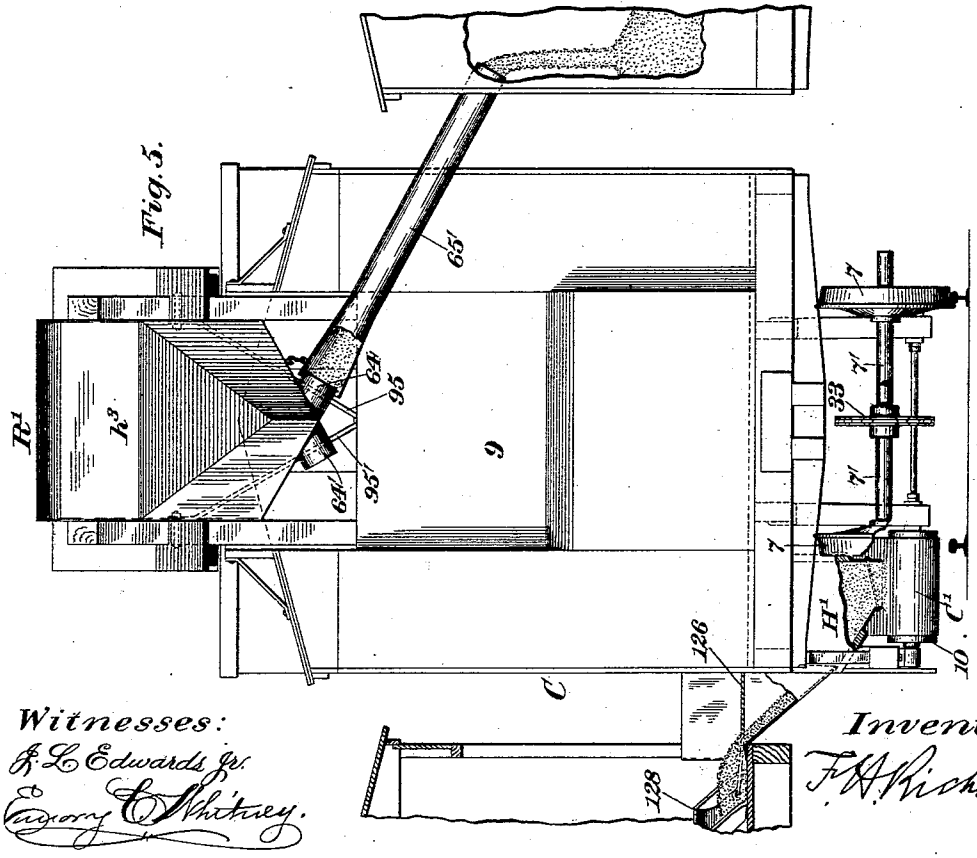


Fig. 5.



Witnesses:
F. L. Edwards Jr.
Emory C. Whitney.

Inventor:
F. H. Richards.

(No Model.) 6 Sheets—Sheet 5.

F. H. RICHARDS.

TRANSFERRING APPARATUS.

No. 572,070. Patented Nov. 24, 1896.

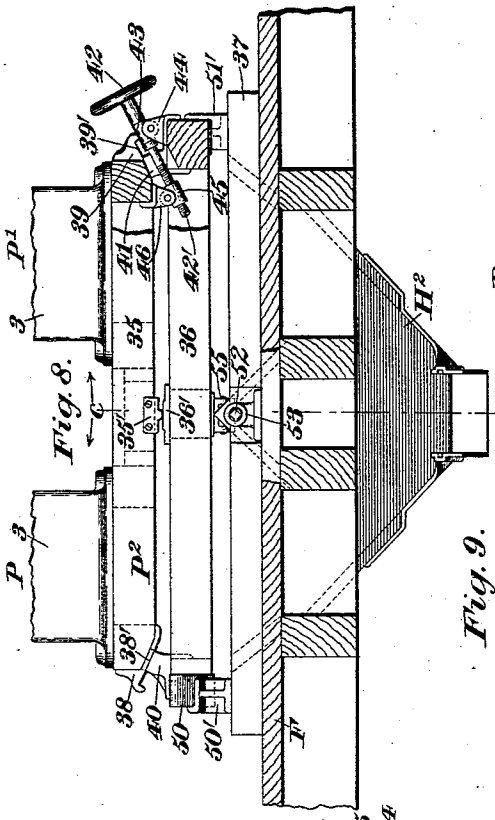


Fig. 8.

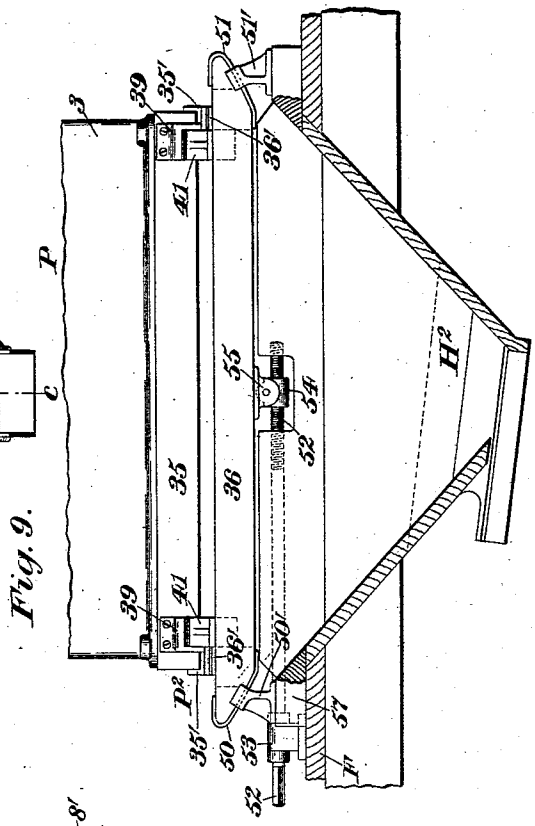


Fig. 9.

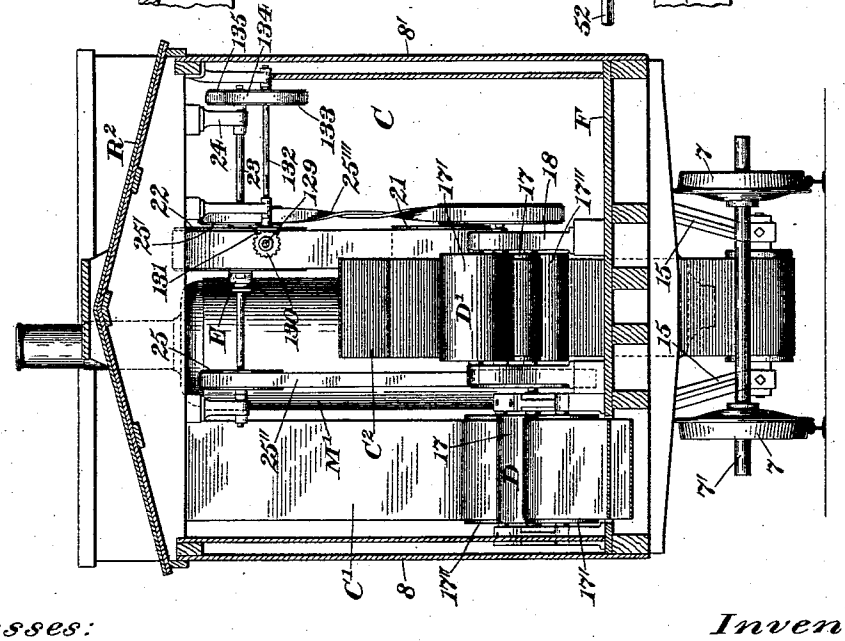


Fig. 7.

Witnesses:
F. L. Edwards Jr.
Emory C. Whitney.

Inventor:
F. H. Richards.

(No Model.) 6 Sheets—Sheet 6.

F. H. RICHARDS.

TRANSFERRING APPARATUS.

No. 572,070. Patented Nov. 24, 1896.

Fig. 11.

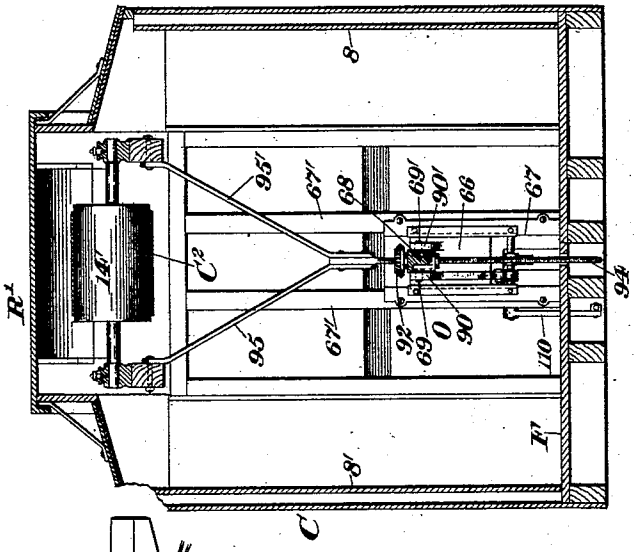


Fig. 10.

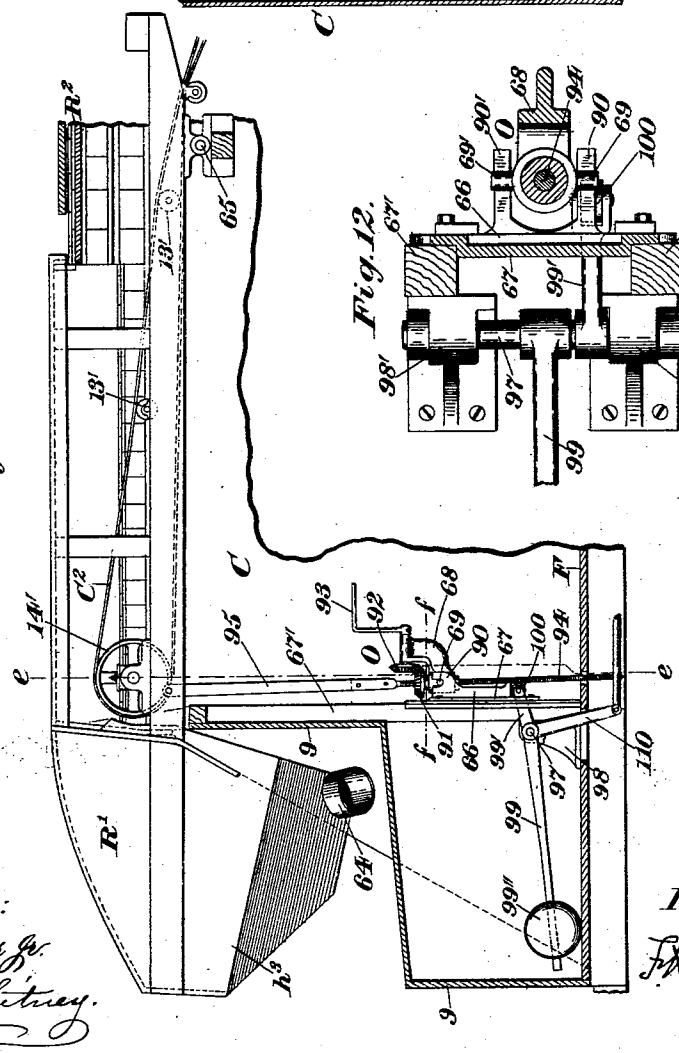


Fig. 12.

Witnesses:
F. L. Edwards Jr.
Geo. C. Whitney.

Inventor:
F. H. Richards.

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

TRANSFERRING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 572,070, dated November 24, 1896.

Application filed August 11, 1896. Serial No. 602,422. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Transferring Apparatus, of which the following is a specification.

This invention relates to a transferring apparatus of the class employed for transferring grain from one car to another car or to a warehouse, and which apparatus is generally known as and is termed a "grain-transferring car."

One object of my present invention is to furnish an improved transferring apparatus of the class specified embodying improved coöperative instrumentalities, the constructions, organizations, and coöperations of which are such that grain or analogous material may readily be transferred from a source of supply—as one car—to a remote place of deposit—as another car—in a progressively-advancing stream of uniform preregulated thickness and may be weighed *in transitu* without retarding the progressive movement of said stream, and to accomplish this with rapidity and economy.

A further object of the invention is to provide, in connection with the supplying and weighing apparatuses in a transferring apparatus of the class specified, movably-supported receivers, traveling conveyers between the supply apparatuses and receivers, and valve mechanisms operable by a movement of said receivers for automatically controlling the supply to the conveyers, thereby facilitating a uniform operation in the coöperating mechanisms and obviating the clogging or overloading of the weighing mechanism usually accruing from an oversupply of material, and, furthermore, rendering the transferring apparatus automatically governable.

In the drawings accompanying and forming part of this specification, Figure 1 is a sectional side elevation of a transferring apparatus of the class specified embodying my invention, said figure showing the adjustable receiver or discharge-chute of the discharge-conveyer in an elevated position and in position occupied when the apparatus is in operation and is conveying grain from one car to another. Fig. 2 is a sectional plan view of the transferring apparatus as seen from above in Fig. 1, the speckle-work representing the two streams of material in their passage to and from the weighing-machine. Fig. 3 is a sectional side view similar to Fig. 1, on a relatively large scale, showing the left-hand end portion of the transferring car or apparatus and more clearly illustrating the construction and organization of the different mechanisms. Fig. 4 is a sectional side view similar to Fig. 3, on the same scale, showing the right-hand end portion of the transferring car or apparatus. Fig. 5 is a front end elevation of the transferring-car on the same scale as Fig. 4, parts thereof being broken away, and said figure also showing at the left and right hand, respectively, portions of a supplying and a receiving car and showing the connections—to wit, a flexible chute—between the transferring and receiving car. Fig. 6 is a cross-sectional view of the transferring-car, taken in dotted lines *a a*, Fig. 4, looking toward the right hand in said figure. Fig. 7 is a cross-sectional view of the transferring-car, taken on a line corresponding to the dotted line *d d*, Fig. 3, looking toward the right hand in said figure, parts of the mechanism being removed. Fig. 8 is a cross-sectional view, on a relatively large scale, of a portion of the framework or floor of the transferring-car, showing the supporting-platform for the weighing-machines and the instrumentalities in connection therewith for adjusting the weighing-machines and platform relatively to the floor-line of the transferring-car to bring the parts to the required level. Fig. 9 is a sectional side view of the parts illustrated in Fig. 8 as seen at the left of the dotted line *c c* in said Fig. 8. Fig. 10 is a sectional side elevation of a portion of the left-hand end of the transfer-car, showing the adjustable receiver or transferring-chute in its depressed or lowered position or in the position it occupies when the transferring-car is not in operation. Fig. 11 is a cross-sectional view taken in dotted line *e e*, Fig. 10, showing the same parts as seen from the right hand of said dotted lines; and Fig. 12 is a horizontal cross-section, on a relatively large scale, taken in dotted line *f f*, Fig. 10, showing the instrumentalities for adjusting the

receiver or transfer-chute of the discharge-conveyer.

Similar characters designate like parts in all the figures of the drawings.

As a preliminary to the general description of the constructions, organizations, and operations of the several coöperating mechanisms which comprise the transferring apparatus or transfer-car, it is desired to state that to avoid confusion in reading the drawings and more clearly to illustrate those features which are essential to the invention certain non-essential parts of the transferring-car—such as the trucks, brakes, and other elements common to ordinary cars—have been either wholly omitted or but partially illustrated in the drawings, and it will be understood that the car-body will be supported on the said trucks in any usual or suitable manner.

In the preferred form thereof herein shown and described the transferring apparatus, or "transferring-car," as it may be hereinafter termed, comprises a transportable carrier or frame, herein shown in the nature of a box-car body; propelling mechanism for said carrier; a main-supply apparatus or hopper located near the delivery end of the transfer-car with its receiving end in juxtaposition to the floor-line of the car; a so-called "intermediate-supply apparatus or hopper" located near the opposite end of the car with its receiving end in juxtaposition to the floor-line of said car; a so-called "transferring receiver or chute" movably supported above the main-supply apparatus in juxtaposition to the roof of the car; a so-called "intermediate receiver or chute" movably supported above the intermediate-supply apparatus with its discharge end preferably in close proximity to the roof-line of the car; a supply-conveyer, herein shown as the conveyer-belt, supported upon suitable rollers and extending, with relation to the floor-line of the car, from the main-supply hopper to the intermediate receiving-chute; a discharge or delivery conveyer, herein shown as a conveyer-belt, supported upon suitable rolls and extending from the intermediate-supply hopper to the transferring-receiver and having its receiving and discharging ends located below and above the discharging and receiving ends of the supply-conveyer; actuating mechanism for the two conveyers; a valve or cut-off in shiftable connection with each of the supply-hoppers; a valve-actuating mechanism operatively connecting the valve of the main-supply hopper and the intermediate receiving-chute and operable by a movement of said chute for actuating the valve to cut off or govern the main supply to the supply-conveyer; a valve-actuating mechanism operatively connecting the valve of the intermediate-supply hopper and the movable transferring-receiver and operable by a movement of said receiver for actuating the valve to cut off the intermediate supply to the discharge-conveyer; weighing mechanism located between the discharge end of the supply-conveyer and the receiving end of the discharge-conveyer and having its receiving and discharging ends in juxtaposition to the discharge end of the intermediate receiving-chute and the receiving end of the intermediate-supply hopper, respectively; adjustable supporting instrumentalities for the weighing-machine; adjusting mechanism in operative connection with and effective for adjusting the transferring-receiver vertically with relation to the roof-line, and hand instrumentalities for operating the two valve mechanisms.

The transportable carrier for the coöperative mechanisms of the transferring apparatus, which is designated in a general way by C, is shown somewhat similar to a box-car of ordinary construction, said carrier comprising a box-like framework or housing in which is located certain of the transferring apparati, and which box-like framework will in practice be carried in a manner similar to the body portions of cars of ordinary construction upon suitable trucks, of which the wheels 7 and axles 7′ are shown in the drawings.

The carrier-frame or body portion of the transferring-car comprises in the preferred form thereof herein shown a suitable floor F, embodying the usual floor-supporting sills, the side walls 8 and 8′, the end walls 9 and 9′, and a suitable roof, which may be supported upon the side and end walls of the car-body in any suitable manner.

While it will be noticed that the floor and the side and end walls of the car-body are somewhat similar in a general way to like parts of cars of ordinary construction it will further be noticed by reference to the drawings that the construction of the roof of the car-body in the present instance is a radical departure from the construction of ordinary car-roofs. This roof, in the preferred form thereof herein shown, comprises two roof-sections (designated in a general way by R′ and R^2, respectively,) and one of which sections, as R^2, constitutes an immovable part of the car-body, and the other of which sections, as R′, is movably supported with relation to the roof-section R^2 and is constructed to constitute a transferring receiver or hopper, as will be hereinafter more fully described.

Located at opposite ends of the floor F are two supply apparatuses, one of which is designated by H′ and will be hereinafter referred to as the "main-supply apparatus or hopper," and the other of which is designated by H^2 and will be hereinafter referred to as the "intermediate-supply apparatus or hopper," said hoppers being open at their receiving ends to the interior of the car-body.

Movably supported above the intermediate-supply hopper H^2, with its receiving end in juxtaposition to the roof of the car, is an intermediate receiver or chute, which is designated in a general way by R.

As a convenient means for transferring grain or other analogous material from the main-supply hopper H′ to the intermediate receiver R, I have provided a traveling supply-conveyer C, which in the preferred form thereof herein shown is in the nature of a conveyer-belt, carried at its opposite end upon suitable pulleys 10 and 10′, whose shafts are supported in suitable bearings, as 12 and 12′, secured to the framework of the carrier. This conveyer-belt is supported at an inclination to the plane of the floor of the car-body with its receiving end located below and in juxtaposition to the discharge end of the main-supply hopper H′ and with its discharge end in juxtaposition to and preferably slightly in advance of the receiving end of the intermediate receiver or chute R, and the material-carrying run of said belt is shown supported at suitable points in the length thereof by supporting-rolls or idle-wheels 13, mounted on carriers or shafts, which may be journaled in bearings (not shown) on the side walls or other suitable parts of the car-body.

For the purpose of weighing the material as it is discharged from the chute or receiver R, I have shown located between the receiver or chute R and the intermediate-supply hopper H′ a pair of weighing-machines (designated in a general way by P and P′, respectively,) having, preferably, a combined weighing capacity slightly in excess of the supplying capacity of the supply-conveyer C′. It will be obvious, however, that one weighing-machine might be employed in lieu of two weighing-machines, providing the weighing capacity of said machine is sufficient to weigh the material as fast as it is supplied to the machine by the supply-conveyer.

Inasmuch as any suitable weighing mechanism capable of automatically weighing and discharging material as it is supplied thereto may be employed in connection with the conveyer, I have, for convenience, shown in connection with the conveying mechanism of the transferring-car weighing-machines such as shown and described in Letters Patent of the United States No. 548,840, granted to me October 29, 1895, to which reference may be had for a more complete description of the construction and operation of this class of weighing-machines, and as both weighing-machines P and P′ shown in the drawings are substantially the same in construction, organization, and operation a brief description of one of said machines will suffice for an undestanding of its operation.

The framework for carrying the operative parts of the weighing-machine may be of any suitable construction, and is shown comprising two side frames or uprights 2 and 4, mounted upon a chambered supporting-base 3 and connected by a top plate 5, to which a suitable hopper—such as H—is secured by some suitable means. The base 3 carries suitable beam-supports for supporting the beam mechanism, which latter is shown consisting of a pair of oppositely-disposed counterweighted scale-beams B and B′. The beam mechanism carries at proper points thereon suitable supports for the bucket, which latter is shown at G and is of the well-known "single-chambered" type. The bucket G will be so disposed as to receive the mass of material conducted thereto in the form of a supply-stream from the hopper H.

The bucket-closer is designated in a general way by L and is shown pivoted at 77 to the lower side of the bucket and adjacent to one side of the discharge-opening thereof, and having a counterweighted arm 79, preferably formed integral therewith for returning the closer to its closed position.

As a means for supporting the bucket-closer L an inverted toggle connection is shown connecting the closer and the bucket. In the form shown this toggle connection comprises the rocker 550, pivoted adjacent to the upper rearward side of the bucket, and a connecting-rod pivoted to said rocker and also to the closer in such manner that when the closer is in its normal closed position the two pivots of said connecting-rod or toggle member will be nearly in a line with and the uppermost pivot will be above the rocker-pivot.

A bucket-closer latch is shown at 82, pivoted to the bucket G in such manner as to engage the rocker 550 when the parts are in the closed position previously described. In the embodiment shown the closer-latch 82 swings upwardly to engage the rocker 550, and it will be apparent that said latch is released from engagement therewith by a downward movement.

As a means for releasing the latch 82 said latch is shown provided with a stop-pin 82′, located in position to be engaged by a suitable actuator operable for depressing said latch. When the latch 82 is thus depressed and disengaged from the rocker 550, the bucket-closer L will be free of restraint and the mass of material resting on the bucket-closer will force the same open for discharging the bucket-load.

As a means for controlling the supply-stream which flows into the weighing-machine I have, for convenience, shown said machine furnished with a valve that is similar to the valve described and claimed in Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had. This valve 70 is shown pivoted for oscillatory movement on bracket 5′, depending from the top plate of the machine.

As a means for actuating the valve for opening and closing the same any suitable valve-actuating mechanism may be employed—preferably the valve-actuating mechanism described in Letters Patent No. 548,840, hereinbefore referred to.

It will be remembered that the closer-latch 82 has been described as released from engagement with the rocker 550 to thereby release the bucket-closer L by a downward

pressure or movement, and as a means for effecting this operation a valve-operated actuator will preferably be employed.

The valve 70 is shown carrying at the rear end thereof a relatively long connecting-rod 558, which has formed thereon at a suitable point the actuator 88, which, on the closure of the valve, will have a descending movement.

At the proper point in the operation of the machine the actuator 88 will be thrust downward into engagement with the stop-pin 82', carried by the latch 82, and succeeding the cut-off of the stream said latch will be depressed, this action freeing the bucket-closer L in a manner previously described.

The particular construction and organization of the weighing-machines constitute no essential part of my present invention, as these may be materially modified or weighing-machines of other types be substituted.

As a convenient means for conveying the material from the intermediate hopper H^2, into which it is discharged from the weighing-machines P and P', I have provided a traveling discharge-conveyer C^2, which in the preferred form thereof herein shown is in the nature of a conveyer-belt carried at its opposite ends upon pulleys 14 and 14', the one, 14, of which is carried on a bracket 15, secured to the under side of the floor F below the intermediate-supply hopper H^2, and the one, 14', of which has its shaft journaled in bearings on the transferring receiver or chute R', which constitutes the adjustable roof-section, the upper run of said conveyer-belt being supported at suitable points in the length thereof on idle-wheels 13', whose carriers are supported in bearings (not shown) on suitable parts of the car-body.

The two traveling conveyers are shown disposed in relatively oblique transverse planes, with the receiving end r and discharging end r' of one conveyer located below and above the discharging end r' and receiving end r, respectively, of the other conveyer, each conveyer extending practically in an oblique plane from end to end of the car-body, as will be readily understood by reference to Figs. 1 to 4, inclusive, of the drawings.

In contradistinction to the usual method of imparting traveling movement to endless conveyers as heretofore practiced, the conveyers C' and C^2, herein described, are driven independently at points substantially midway of their lengths and in close proximity to the point at which the planes of said conveyers intersect each other. This is of considerable importance in the present instance, as it leaves the receiving and discharging ends of said conveyers entirely free of actuating mechanism and unobstructed, and, furthermore, secures an application of power at that point in the length of the conveyer where it is most needed and relieves the conveyer from the excessive strain inherent to conveyers of this class which are driven at the extreme ends of the runs.

As a convenient means for imparting a traveling movement to the conveyers C' and C^2, I have provided, in connection with the two conveyer-belts, driving devices, (designated in a general way by D and D', respectively.) Each driving device, in the preferred form thereof, comprises three friction-wheels 17, 17', and 17'', which are supported for rotative movement side by side upon a suitable framework, as 18, with their axes preferably in oblique alinement with and in a plane parallel to the plane of movement of the upper run of the conveyer, the lower run of said conveyer being shown extended around the under face of the center wheel 17, which constitutes the driving-wheel for the conveyer-belt, and around a portion of the upper faces of the two wheels 17' and 17'', which are located at each side of the wheel 17 and constitute frictional idle-wheels for retaining the bight of the lower run of the conveyer-belt in contact with the driving-wheel 17 under proper tension.

Inasmuch as the driving devices D and D' for the two conveyers C' and C^2, respectively, are shown substantially the same in construction and are both operated from the same source of power and in the same manner, the description of one driving device, as set forth in the preceding paragraph, is deemed sufficient for an understanding of the construction of both driving devices, the only difference between said two driving devices being that they are set so that the outer faces of the wheels 17, 17', and 17'' of one driving device are at opposing angles parallel to and corresponding with the angular planes of the upper runs of the two conveyers.

As a convenient means for rotating the two driving-wheels of the two driving devices in relatively opposite directions to impart a traveling movement to the conveyer-belts C' and C^2 a suitable motor (designated in a general way by M) is provided, which has a power-shaft 20, on which is mounted a driving-pulley 21, which is belted to an intermediate driving-pulley 22 in normal fixed engagement with a counter-shaft 23, supported in bearings in a hanger 24, preferably secured to the roof-section R^2. This counter-shaft is furnished with two pulleys 25 and 25', the one, 25, of which is connected by a straight belt 25'' to a driving-pulley fixed to the shaft on which the driving-wheel 17 of the driving device D is mounted, and the one, 25', of which is connected by a crossed belt 25''' to a similar driving-pulley fixed to the shaft of the driving-wheel 17 of the other driving device D'.

The two conveyer-belts will preferably have a traveling movement of corresponding velocity, and a suitable clutch device E (see Fig. 2) will be provided in connection with the counter-shaft 23 for releasing the driving-

pulley 22 from engagement with the countershaft 23 for the purpose of stopping when desired the operations of the two conveyers.

It will be understood that any suitable motor may be employed for actuating the two conveyers, and also that any suitable clutch mechanism may be used for stopping the operation of one or the other or both of said conveyers.

In the drawings (see Figs. 1, 2, and 4) the motor is shown as an upright engine, which may be supplied with steam from the boiler M', the connections between the boiler and engine and other details being omitted as not being essential to an understanding of this invention.

As a convenient means for propelling the transfer-car the power-shaft 20 of the motor is shown in dotted lines furnished with a sprocket-wheel 27, from which a sprocket-chain 28 extends to an intermediate sprocket-wheel 29 on a counter-shaft 30, supported in suitable bearings of a bracket 31, preferably secured to the under side of the floor F of the car, said counter-shaft 30 being also provided with another sprocket-wheel 32, which is connected to a sprocket-wheel 33, secured to an axle 7' of one of the traction-wheels 7 of the car by means of a sprocket-chain 34.

If desired, a suitable clutch device (not shown) may be provided in connection with the power-shaft 20 for establishing and disestablishing the operative relation between the sprocket-wheel 27 and the power-shaft.

For the purpose of facilitating the adjustments of the weighing-machines with relation to the car-body to bring them to the proper level for successful operation and to secure a leveling adjustment of said weighing-machines without disturbing the coöperative relation between the hoppers of the weighing-machines and the receiving-chute R of the supply-conveyer C', which is a matter of utmost importance in grain-transferring cars, I have shown said machines supported upon a so-called "platform," (designated in a general way by P^2,) which comprises, essentially, two frames or supporting members 35 and 36, one of which, as 35, constitutes the immediate support for weighing-machines and is shiftably supported by the other member, as 36, for adjustment in an arc of a circle, concentric to a point p (see Fig. 6) between and adjacent to the receiving ends of the weighing-machines P and P', and the other member, as 36, of which is shiftably supported upon a suitable base, as 37, for adjustment in the arc of a circle concentric to said point p and transversely of the path of adjustment of the other member 35.

To facilitate the adjustment of the two carriers or supporting members 35 and 36, which constitute the platform for the weighing-machines, in relatively opposite directions and in the arc of a circle which is concentric to a point in the immediate vicinity of the receiving ends of the weighing-machine, the member 35 is furnished at opposite ends thereof with slides 38 and 39, respectively, whose working or bearing faces 38' and 39' are concentric to the axis of adjustment, or point p, of the weighing-machines, and the member 36 is provided at opposite ends thereof with guide blocks or supports 40 and 41, whose bearing-faces correspond in curvature with the curvature of the bearing-faces of the slides 38 and 39 and coöperate with said slides for supporting and guiding the member 35 during the adjustment thereof; and as a convenient means for effecting this adjustment of the member 35 with relation to the member 36 I have provided an adjusting-screw 42, which is rotatably seated and held as against longitudinal movement in an oscillatory bearing 43, pivotally supported on a bracket 44, fixed to one end of the member 36, the inner screw-threaded end 42' of said screw having a screw-threaded bearing in an oscillatory bearing 45, pivotally secured to a bracket 46, fixed to the adjacent end of the member 35. This constitutes a simple and convenient means whereby the member 35, together with the weighing-machine, may have an adjustment in the arc of a circle in the direction of the double-headed arrow, or toward the right and left hand, as illustrated in Fig. 8 of the drawings, and as a convenient means for facilitating the adjustment of the member 36, together with the member 35, in the arc of a circle transverse to the direction of the adjustment described of said member 35 this member 36 is provided at opposite ends thereof, as shown most clearly in Figs. 8 and 9 of the drawings, with slides 50 and 51, the working or bearing faces of which are in planes concentric to the common axis of adjustment p described, and the adjacent ends of the base 37 are provided with slideways or guide-blocks 50' and 51', which coact with and support the slides 50 and 51. The adjusting device for this member 36 is shown comprising an elongated adjusting-screw 52, which is journaled for rotative movement and held as against longitudinal movement in a bearing 53, fixed to the base 37, the opposite or inner end of said screw being seated in a screw-threaded oscillatory bearing 54, pivotally secured to a bracket 55, fixed to the member 36 near the middle portion thereof.

In practice the member 35 will be provided, as shown in Fig. 8, with a bearing-plate 35', which is supported upon another bearing-plate 36', secured to the member 36, this constituting a simple means for supporting the member 35 at the middle portion thereof.

It will be obvious that if one weighing-machine only is employed the axis of adjustment p will be located near the upper end of said machine and in alinement with the center of the hopper H of said machine.

By the provision of means such as described for supporting and adjusting the weighing machine or machines I am enabled to secure a practically universal adjustment, which en-

ables me quickly to bring the machine or machines to the proper level, irrespective of the unevenness of said floor of the car caused by track or road depressions. For instance, if the floor-line of the car is out of true and the line of deviation is oblique to the longitudinal line of the car, this would necessarily result in the deflection of the weighing-machines in a corresponding direction, and under these circumstances it would be necessary to adjust both supporting members 35 and 36 more or less in opposite directions to bring the weighing-machines to a proper level.

Thus it will be seen that to secure accurate adjustment of the machine and bring the same to a proper level said machine must necessarily be supported for adjustment in diversified directions, and this is what is accurately accomplished by my improved adjusting mechanism; and inasmuch as this is an important requirement in the art to which this invention appertains said adjusting mechanism constitutes an essential factor of my present invention.

The receiver R, through which the material passes from the supply-conveyer C′ to the hopper H of the weighing-machine, is shown pivotally supported near the lower end thereof at 56 between the arms of a bracket 57, secured to a beam 58, which extends over the weighing-machine and constitutes a portion of the framework of the carrier C, said receiver R being in the nature of a trough having a conduit or pipe 59 at the upper end thereof, the receiving end of which conduit is shown located slightly in advance of the discharge ends of the supply-conveyer C′ and the discharge end of which extends into the receiver or chute R, as shown most clearly in Figs. 1, 2, and 4 of the drawings.

As a convenient means for normally holding the receiver R in the operative positions shown in Fig. 1, and at the same time providing for the gravitation of said receiver on the overloading thereof, I have employed with said receiver a counterweighted device which in the form thereof herein shown comprises a rock-shaft 60, journaled in suitable bearings on the framework of the carrier; a counterweighted arm 61, secured to said rock-shaft extending outward from one side thereof; an oppositely-disposed arm 62, extending outward from the opposite side of said rock-shaft, and an operating-rod 63, connecting this arm 62 and the upper end of the receiver R. The construction and organization of this counterweighting device may of course be modified without departure from my present invention.

The transferring-receiver R^7—which, when in its depressed position, as shown in Fig. 10, constitutes a portion of the roof of the car—is pivotally supported upon the interior of the car, as shown at 65, at a considerable distance in the rear of the chute h^3, which constitutes a part of said receiver, said chute being in the nature of a box inclined toward the lower discharge end thereof, as shown in Figs. 1, 3, 5, and 10, and being provided with spouts or conduits 64 and 64′, located at opposite sides thereof and adapted to be connected by a flexible conduit, as 65, with an adjacent receiving-car, as shown most clearly in Fig. 5.

As a means for elevating and lowering the adjustably-supported transferring-receiver R′ to accommodate the receiver to receiving-cars of different heights, and at the same time provide for the automatic gravitation of said receiver in case the same should from any cause become overloaded, I have provided, in connection with said receiver, an elevating or adjusting device, (designated in a general way by O,) and have provided, in connection with said elevating device, a counterweighted-elevating-device carrier adapted for normally supporting the carrier in an elevated position and at the same time facilitating the gravitation of the carrier in case the receiver R′ becomes overloaded. The elevating or adjusting device O comprises, in the preferred form thereof herein shown, a slide 66, supported for vertical movement in a slideway 67, secured to uprights 67′ at the forward end of the car, a bracket 68, having trunnions 69 and 69′, supported in horizontal seats formed in the upper face of the two ears 90 and 90′ of the slide 66, two intermeshing bevel-gears 91 and 92, supported for rotative movement on the bracket 68 with their axes at right angles to one another, the gear 91 of which is internally screw-threaded and the other of which bevel-gears is shown provided with a crank 93 for turning the same, and a lifting-rod 94, which is screw-threaded at the lower end thereof and has a screw-threaded bearing in the internally-screw-threaded bevel-gear 91 and is pivotally connected at its upper end by means of diverging straps 95 and 95′ with the receiver R′, as shown most clearly in Figs. 10 and 11 of the drawings.

The counterweighted carrier for the adjusting device O comprises, in the preferred form thereof herein shown, the rock-shaft 97, journaled in suitable bearings 98 and 98′, shown fixed to the floor of the car, and two oppositely-disposed arms 99 and 99′, fixed at their inner ends to the rock-shaft, and the one, 99, of which is provided with a counterweight 99″ at the outer end thereof, and the one, 99′, of which is preferably provided with an anti-friction-roll 100 at the outer end thereof, which is held by the counterweight 99″ in bearing engagement with the under side of the slide 66 of the adjusting device O, the counterweighted arm 99 normally holding the arms 99′, the slide 66, supported thereon, in an elevated position.

The pulley 14′, which supports the discharge end of the discharge-conveyer, is, as before stated, carried on the transferring conveyer R′ in close proximity to and slightly in the rear of the receiving end of the conduit or hopper h^3. Thus it will be seen that when the receiver R′ is elevated or depressed through

the medium of the adjusting mechanism O the discharge end of the conveyer C^2 is carried with and always maintains the same position with relation to the hopper h^3 of said receiver, as will be understood by a comparison of Figs. 3 and 10 of the drawings.

The main and intermediate supply-hoppers H′ and H^2 are shown provided with gate-valves 103 and 104, respectively, which are supported for sliding movement in suitable slideways formed in the side walls of the discharge ends of said hoppers, as will be understood by reference to Figs. 3, 4, 5, 8, and 9 of the drawings, which valves constitute elements of the valve mechanism hereinafter more fully described.

As a convenient means for automatically regulating or cutting off the supply of material to the receiving end of the two conveyers C′ and C^2, in case either one of the two receivers R or R′ should from any cause become overloaded, and as a convenient means for effecting this end, as occasion may require, I have provided, in connection with the valve of the supply-hopper and with the receiver of each conveyer, valve-actuating mechanism, as hereinafter more fully described, of a construction and organization whereby a valve-closing movement will be automatically imparted thereto by a movement of the receiver and whereby a valve-closing or valve-opening movement may be imparted thereto independent of the movement of said receiver.

Preparatory to a description of the construction, organization, and operation of the valve-actuating mechanism it is desired to state that the two receivers R and R′, which control by their movements the valve-closing operation of the valve-actuating devices, are, as before described, counterweighted so as to sustain a predetermined weight of material and to have a gravitating movement when the load exceeds the weight-limit.

Each valve-actuating device is shown operatively connected with a receiver through the medium of the counterweighting device of said receiver and is operatively connected with a valve, and each valve-actuating device comprises in the preferred form thereof herein shown and described two valve-actuators (designated in a general way by V and V′, respectively) shiftably connected together in such manner that the two actuators may have a unitary valve-closing movement, or one of said actuators may have a valve-closing movement independent of the movement of the other.

Inasmuch as the two valve-actuating devices are in a general way similar to one another, a description of one of said devices will suffice for both, and as a preliminary to such description it is desired to state that one of the actuating devices is shown suitably connected at one end to the valve 103 of the hopper H′ and is pivotally secured at the opposite end thereof to an arm fixed to the rock-shaft 60, and the other actuating device is shown pivotally connected at one end to the valve 104 of the hopper H^2 and is pivotally connected at its operative end to an arm fixed to the rock-shaft 97.

Each valve-actuating device comprises, as before stated, two relatively-shiftable valve-actuators V and V′, one of which valve-actuators, as V, is pivotally connected at the outer end thereof with an arm 110, fixed to the rock-shaft of the counterweighting device, and is furnished at the opposite inner end thereof with an elongated bearing or slideway 112, and the other valve-actuator, as V′, is pivotally connected at its outer end, as shown at 113, to the valve to be actuated thereby and has the opposite inner end thereof shiftably seated in the elongated bearing or slideway 112, this valve-actuator being one having a collar or abutment 114 a short distance from the extreme inner end thereof, which normally bears against the outer end of the elongated bearing 112 and constitutes a stop-abutment against which the actuator V abuts during the valve-closing movement thereof to effect a valve-closing movement of the actuator V′ in unison with the actuator V.

By reference to Figs. 1, 3, and 4 of the drawings it will be seen that the actuator V of one actuating device is slightly different in construction and organization from the actuator V of the other actuating device, although the functions performed by both are the same. The actuator V of one valve-actuating device, as shown, comprises two principal members pivotally connected together by an intermediate lever, as 116, so as to have a movement in the opposite direction, as required in the present instance, and the actuator V of the other valve-actuating device is shown comprising one member which is pivoted direct to the valve actuated by said device, and the construction and organization of the valve-actuator V′ of the last-mentioned valve-actuating device is similar in a general way to the construction and organization of the first-mentioned valve-actuating device, the only difference being that the two principal members of this valve-actuator are pivotally connected to the lever in such manner as to move in the same direction.

It will be understood that the construction and organization of the valve-actuators of the two actuating devices may be materially modified without departure from this invention.

By the provision of valve-actuating mechanism such as herein shown and described it will be seen that when the load in the receiver exceeds the weight-limit determined by the counterweighting mechanism said receiver will descend and actuate the rock-shaft of the counterweighting device, which will automatically impart a unitary valve-closing movement to the actuators V and V′ of the valve-actuating device, causing said actuators to close the valve of the supply-hopper.

As a convenient means for normally retaining the two valve-actuators of each actuating device in such coöperative relation that a valve-closing movement of one actuator will normally operate the other and as a means for facilitating the operation of one actuator independently of the other I have provided, in connection with one valve-actuator of each actuating device, counterweighted or reactionary hand-operable instrumentalities, which instrumentalities, in the preferred form thereof herein shown, comprise a hand-lever 118, fixed to a rock-shaft 119, and a bell-crank 120, fixed to said rock-shaft and having one arm thereof pivotally connected by a suitable connecting-rod 121 to the valve-actuator and having the other arm thereof connected to a retracting device, such as the weight 123. These instrumentalities constitute a simple and convenient means whereby the two actuators will be normally held in engagement for unitary operation, and whereby one or both of the valve-actuators may be arbitrarily operated irrespective of the position of the receiver. These operating instrumentalities for the valve-actuator may be variously modified within the scope of my invention, and therefore I do not desire to restrict this invention to any particular construction and organization of mechanism for accomplishing this end.

As a simple and convenient means for supplying material to the main supply apparatus H′ from an adjacent car, I have shown, in cooperative connection with the actuating mechanism for the two conveyers C′ and C^2, a power grain-shovel apparatus of the well-known Coker and Metcalf type, the construction and organization of which is so well known in the art that a detail description thereof is deemed unnecessary for the purposes of my present invention, especially as this feature specifically constitutes no part of my present invention.

The grain-shovel apparatus, which is designated in a general way by W, is shown comprising a winding-drum 125, supported in suitable bearings above and substantially midway between the side frames of the door *d* of the car; a rope 126, carried on said drum extending over a pulley 127, journaled on a bracket secured to the floor F of the car; a scoop or shovel 128, secured to the outer end of the rope 126; and a shaft 129 for driving said drum, which shaft is journaled in suitable bearings on the framework of the car and has a bevel-gear 130 in mesh with another bevel-gear 131. (Shown in dotted lines in Fig. 1 and in full lines in Fig. 2.) Said last-mentioned bevel-gear is fixed to a shaft 132, journaled in suitable bearings on the framework and having a driven pulley 133, which is connected by a belt 134 to a driving-pulley 135 on the counter-shaft 23, which is rotated, as hereinbefore described, from the power-shaft 20 of the motor M.

The drum 125 of the shovel mechanism will in practice be furnished with the usual mechanisms for establishing and disestablishing the effective relation between said drum and the driving-shaft 129, so as to facilitate the operation of the shovel 128.

In the operation of the transferring mechanism grain is conveyed by the power-shovel from an adjacent car to the main supply apparatus H′ of the transferring-car, is thence conducted by the supply-conveyer C′ to the receiver R, the momentum acquired by the grain in passing from the lower to the upper end of said conveyer causing the grain to be projected through the chute or conduit 59 into the receiver R, from whence it is delivered to the hopper H of the weighing-machine, where it is weighed and then delivered through the intermediate supply apparatus to the receiving end of the discharge-conveyer and is progressively advanced and delivered into the hopper h^3 of the receiver R′, where it is conducted by means of the conduit or transfer part 65′ to the receiving-car at the opposite side of the transfer-car, as will be readily understood by a comparison of Figs. 1, 2, and 5 of the drawings. The supply to the two conveyers is automatically controlled by the supply regulating or controlling mechanisms comprised in the valves and valve-actuating devices.

As a convenient means for facilitating the delivery of grain or other analogous material directly to the weighing-machine, to be conveyed therefrom to another place of deposit, as is sometimes advantageous when transferring grain from a warehouse to a car, the upper end of the receiver R is shown open at 136 and the roof of the car has a covered opening 137, through which a conduit (not shown) may be extended direct from a warehouse. This will obviate the necessity for conveying the grain from the main supply-hopper H′ to the receiver R, and consequently effects a saving of time required for transferring the grain.

As clearly illustrated in the drawings, the upper part of the receiver R constitutes, when said receiver is in the position shown in Fig. 10, a roof-section of the car, the upper face thereof coming approximately in alinement with the upper face of the running-board of the main portion of the car-roof, and by the construction and organization thereof hereinbefore described the receiver may be elevated by means of the elevating or adjusting mechanism O, as before stated, to a suitable height to facilitate the transfer of grain by gravity from said receiver to any car of ordinary height and also permit the receiver to be lowered sufficiently to readily pass under any bridge that the main portion of the car can pass under.

Having described my invention, I claim—

1. The combination with a regulable supply device and a movably-supported receiving device, of a traveling conveyer between said two devices; driving mechanism for the

conveyer; and means controlled by a movement of the receiving device, for automatically regulating the supply to the conveyer.

2. The combination with a regulable supply device, of a movably-supported receiving device located at one side of, and remote from, the supply device; a conveyer between said two devices; driving mechanism for said conveyer; and means actuated by a movement of the receiving device, for cutting off the supply to the conveyer.

3. The combination with two independent hoppers, one of which is movably supported; of a traveling conveyer located between and effective for transferring material in a continuous stream from one to the other hopper; and valve mechanism operable by a movement of the movable hopper, for cutting off the supply of material from the other hopper.

4. The combination with a supply device and with a traveling conveyer located with its receiving end below the supply device and with its discharging end at one side of and above said supply device, of a receiving device movably supported in juxtaposition to the discharge end of the conveyer and above the horizontal plane of the supply device; and supply-regulating mechanism connecting the supply and receiving devices and operable by a movement of the receiving device, for automatically cutting off the supply.

5. The combination with a regulable supply apparatus and with a movably-supported receiver, of a traveling conveyer located between the supply apparatus and the receiver and effective for carrying material in a continuous stream from the supply apparatus to the receiver; actuating mechanism for the carrier; and means controlled by a movement of the receiver, for automatically regulating the supply between the supply apparatus and carrier.

6. The combination with a regulable supply-hopper and with a movably-supported receiving-hopper, of an endless conveyer located between the two hoppers and effective for carrying material in a continuous stream from the supply to the receiving hopper; actuating mechanism for said conveyer; valve mechanism connecting the two hoppers and automatically operable by a movement of the receiving-hopper, for cutting off the supply from the supply-hopper.

7. The combination with a supply-hopper and a gravitative receiver, of a conveyer located between and effective for conveying material in a continuous stream from the supply-hopper to the receiver; actuating mechanism for the conveyer; a cut-off in operative connection with the supply-hopper; and means controlled by the movement of the receiver, for actuating the cut-off.

8. The combination with a supply-hopper; a cut-off shiftably supported on, and operable for closing the outlet of, the supply-hopper; a counterweighted, gravitative receiver; a traveling carrier having receiving and discharging ends in coöperative relation with the outlet of the supply-hopper and the inlet of the receiver, respectively; actuating mechanism for the carrier; and cut-off-actuating instrumentalities operatively connecting said cut-off and receiver and automatically operable on a movement of said receiver.

9. The combination with a regulable supply device and a movably-supported receiving device, of a traveling conveyer between said two devices; driving mechanism for the conveyer; and supply-regulating mechanism controlled by a movement of the receiving device, for automatically regulating the supply from the supply device and embodying hand-operable instrumentalities whereby said supply may be regulated independently of the movement of said receiving device.

10. The combination with a supply-hopper and a valve therefor and with a movably-supported receiver, of valve-actuating mechanism in operative connection with the valve and receiver and comprising two coöperative valve-actuating devices, both of which are simultaneously and automatically effective for imparting a closing movement to the valve on a movement of the receiver, and one of which is operable for imparting a closing movement to the valve independently of the movement of the receiver.

11. The combination with a supply-hopper and a valve therefor, of valve-actuating mechanism in operative connection with said valve and comprising two coöperative valve-actuators so organized and connected that one actuator will normally be operated by, and have a valve-closing movement with, the other actuator, and may also have a valve-closing movement independently of said other actuator.

12. The combination with a supply-hopper and a valve therefor, of valve-actuating mechanism in operative connection with said valve and comprising two valve-actuators shiftably connected together to have valve-closing movements in synchronism, or one independently of the other; means organized and connected to effect valve-closing movement of the two actuators in synchronism; and means organized and connected to effect a valve-closing movement of one of said actuators independently of the other.

13. The combination with a supply-hopper and a valve therefor, of valve-actuating mechanism in operative connection with said valve and comprising two coöperative valve-actuators so organized and connected that one actuator may have a valve-closing movement with, or independently of, the other actuator; automatically-operable instrumentalities for imparting a valve-closing movement to the two valve-actuators in synchronism; and hand-operable instrumentalities for imparting a valve-closing movement to one of said valve-actuators, independently.

14. The combination with a supply-hopper and a valve therefor, of valve-actuating mech-

anism in operative connection with said valve and comprising two valve-actuators shiftably connected together to have a unitary valve-closing movement, or one independently of the other; automatically-operable instrumentalities for imparting a valve-closing movement to the two valve-actuators in unison; hand-operable instrumentalities for imparting a valve-closing movement to one of said valve-actuators, independently; and means for normally retaining the two actuators in position for coöperative, unitary action.

15. A transferring apparatus comprising two oppositely-inclined traveling conveyers, one of which has its receiving and discharging ends located below and above the discharging and receiving ends, respectively, of the other conveyer; a regulable supply apparatus located above the receiving end of each conveyer; a receiver movably supported below the discharging ends of each conveyer; driving mechanism organized and connected to impart traveling movements to said two conveyers in relatively opposite directions; and independent means controlled by the movements of the two receivers for automatically regulating the supply to the two conveyers.

16. A transferring apparatus comprising two oppositely-inclined traveling conveyers set side by side in intersecting relation with the receiving and discharging ends of one conveyer located below and above the discharging and receiving ends, respectively, of the other conveyer; actuating mechanism for said conveyers; a regulable supply-hopper located above the receiving end of each conveyer; a receiver movably supported in operative relation with the discharge end of each conveyer; and two independently-operable mechanisms controlled by the movements of the two receivers for automatically cutting off the supply of material from the two hoppers to the two conveyers.

17. In a transferring apparatus, the combination with an automatic weighing-machine having a suitable receiver and a discharger, of a traveling supply-conveyer having a receiving end located below and a discharging end located above the receiver and discharger, respectively, of the weighing-machine; a supply apparatus in operative relation with the receiving end of the conveyer; a receiving conduit or hopper movably supported between the discharge end of the conveyer and the receiver of the weighing-machine; and valve mechanism operatively connecting the movable receiving-conduit and the supply apparatus and controlled by a movement of the conduit, for cutting off the supply to the receiving end of the conveyer; a traveling delivery-conveyer set in obliquely-transverse relation to the supply-conveyer and having a receiving end located below and in juxtaposition to the discharger of the weighing-machine and having a discharging end located above the receiving end of the supply-conveyer; and means for imparting a traveling movement to said two conveyers in relatively opposite directions.

18. The combination, in a transferring apparatus, of two independently-actuated endless conveyers disposed in relatively oblique, transverse planes, side by side, and having their discharging ends located above the receiving ends of one another; a regulable supply-hopper located above the receiving ends of each conveyer and between the adjacent ends of the two conveyers; a chute or receiver movably supported in juxtaposition to the discharge end of each conveyer; valve mechanism operatively connecting the movable chute and the supply-hopper of each conveyer and operable by a movement of said chute for cutting off the supply from each supply-hopper; a weighing-machine located between and having a receiver and a discharger in juxtaposition to the movable chute of one conveyer and the receiver of the other conveyer, respectively; and actuating mechanism for imparting traveling movements to the two conveyers, whereby one of said conveyers will constitute a supply-conveyer for the weighing-machine, and whereby the other conveyer will constitute a discharge-conveyer for said weighing-machine.

19. In a transferring apparatus, the combination of an endless conveyer; driving mechanism for said conveyer; a supply-hopper located above the receiving end of said conveyer and having a valve; a receiver in operative relation with the discharge end of said conveyer and movably supported; a counterweighting device in operative connection with, and effective for normally holding, the receiver in operative relation with the conveyer; and valve-actuating mechanism operatively connecting the valve of the supply-hopper and a shiftable member of the counterweighting device.

20. In a transferring apparatus, the combination with an endless conveyer and driving instrumentalities therefor, and with a supply-hopper and a movably-supported receiver in operative relation with the receiving and discharging ends of said conveyer; of a counterweighted device in connection with the movable receiver; a valve shiftably connected with the supply-hopper; and a valve-actuating device operatively connecting the valve and the counterweighting mechanism and operable by a movement of the receiver and said counterweighting mechanism for automatically closing the valve; and hand-operable means in connection with the valve-actuating device and effective for closing the valve independent of a movement of the receiver.

21. In a transferring apparatus, a box-like transportable carrier; driving mechanism supported on said carrier for propelling the same; a supply apparatus located at one end of said carrier and having a valve; a receiver movably supported at the opposite end of the

carrier; an inclined, endless conveyer supported with its receiving and discharging ends in juxtaposition to the supply apparatus and the receiver, respectively; a driving-wheel engaging the conveyer substantially midway between the receiving and discharging ends thereof; means for actuating the driving-gear, to impart a traveling movement to the conveyer; and valve mechanism connecting the supply apparatus and movable receiver and automatically operable on the movement of said receiver, for cutting off the supply to the conveyer.

22. The combination with a supply-hopper having a valve and with a conveyer supported with its receiving end below said hopper, of a receiver movably supported in juxtaposition to the discharge end of said conveyer; a counterweighting device in operative connection with, and effective for normally holding, the receiver in one position; a compound valve-actuating device comprising two shiftable valve-actuators, one of which has an elongated bearing at the inner end thereof for supporting the inner end of the other actuator, and the other actuator of which has its inner end shiftably supported in said bearing and has a stop-abutment in normal engagement with the end of said bearing, and one of which actuators is pivotally connected with the valve, and the other of which actuators is pivotally connected to a member of the counterweighting device and is operable on a movement of said counterweighting device for effecting a valve-closing movement of the other actuator; means for retaining the two valve-actuators in coöperative relation; and hand-operable instrumentalities connected to effect a valve-closing movement of one actuator independently of the other.

23. The combination with a car-body, of a roof having a pivotally-supported section at one end thereof; a transferring conduit or hopper carried on said roof-section; an adjusting device in operative connection with and effective for raising and lowering the conduit end of the roof-section; and a counterweighting device supporting said adjusting device.

24. In a transferring-car, the combination with a car-body, of a supply-hopper located at one end of the car-body near the floor-line thereof; a pivotally-supported roof-section located at the opposite end of the car-body and having a transferring-conduit; counterweighted, adjusting and supporting devices in operative connection with the free end of the roof-section; a traveling conveyer carried at its discharge end on the pivotally-supported roof-section; valve mechanism operatively connecting the supply-hopper and the counterweighted adjusting device and operable by a movement of the roof-section for automatically cutting off the supply to the conveyer; and means for actuating the conveyer.

25. The combination with a car-body, of two obliquely-disposed, inclined, endless conveyers supported for traveling movement with the receiving and discharging ends of each conveyer located at opposite ends of the car and with the receiving and discharging ends of one conveyer located below and above the discharging and receiving ends, respectively, of the other conveyer; driving mechanism constructed, organized, and connected to apply power to said conveyers at a point substantially midway between the receiving and discharging ends thereof; and an automatic weighing-machine adjustably supported between the discharge end of one conveyer and the receiving end of the other conveyer.

26. The combination with a weighing-machine, of an adjustable support therefor comprising a suitable base and two independently-adjustable supporting members; and means for adjusting said two supporting members in relatively transverse directions.

27. The combination with a weighing-machine, of an adjustable support therefor comprising a suitable base and two independently-adjustable supporting members; and means for adjusting said two supporting members in relatively transverse directions in planes concentric to a point in juxtaposition to the upper end of the weighing-machine.

28. In a transferring-car, the combination with two oppositely-inclined conveyers; of a weighing-machine located between the discharging end of one conveyer and the receiving end of the other conveyer; and supporting means for said weighing-machine, embodying instrumentalities whereby the supported end of said weighing-machine may be adjusted in two directions without changing the vertical alinement of the receiver of the said weighing-machine with relation to the discharge end of the conveyer.

29. A universally-adjustable support for weighing-machines, it comprising two supporting members constructed and supported for adjustment in relatively transverse directions and in the arc of a circle; and two adjusting devices organized and connected to effect independent adjustments of the two members in relatively transverse directions.

30. The combination with a traveling conveyer and with a gravitating receiver in connection with said conveyer, of a supporting and adjusting device comprising a counterweighted lever; a slide supported on said lever for shifting movement therewith; a bracket movably supported on said slide and having two intermeshing gears, one of which is internally screw-threaded; and a lifting-rod having a screw-threaded bearing at its lower end in the internally-screw-threaded gear and connected at its upper end with the receiver; and means for actuating the gear to raise and lower said receiver.

FRANCIS H. RICHARDS.

Witnesses:
FRED. J. DOLE,
F. N. CHASE.