

W. H. EARL.
PNEUMATIC CARRIER SYSTEM.
APPLICATION FILED SEPT. 24, 1907.

904,414.

Patented Nov. 17, 1908.

3 SHEETS—SHEET 1.

Fig. 1.

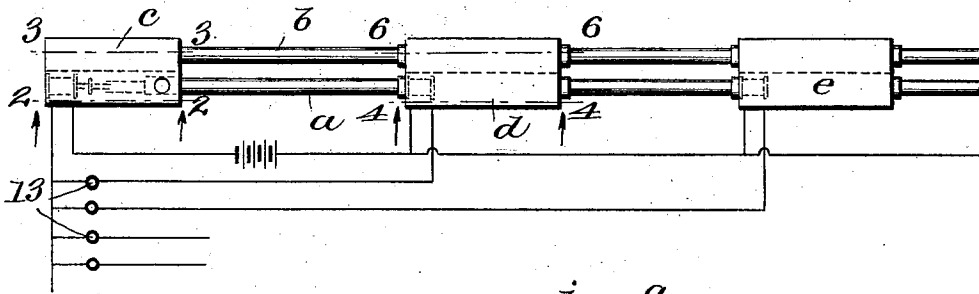


Fig. 2.

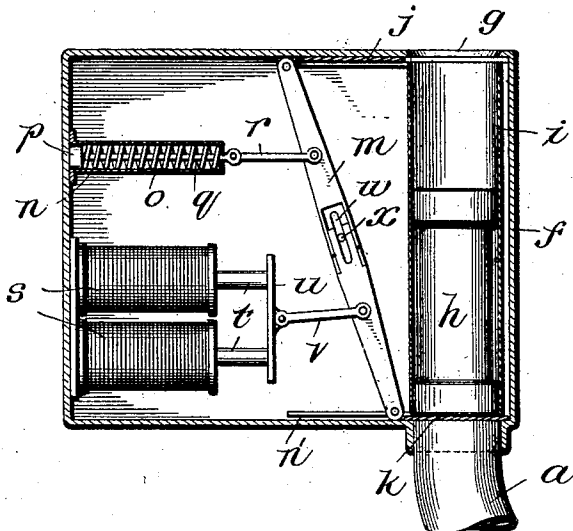
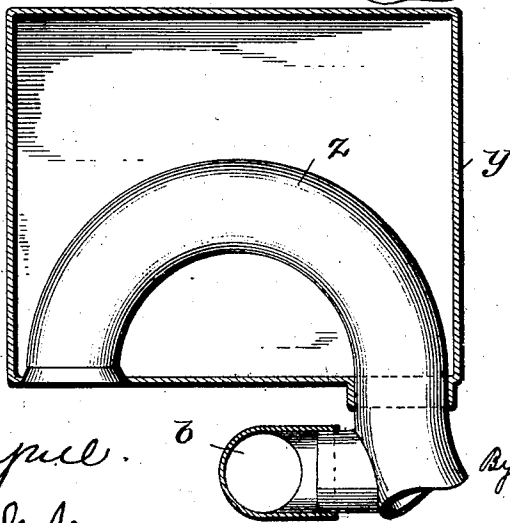


Fig. 3.



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8 SHEETS—SHEET 2.

Fig. 4.

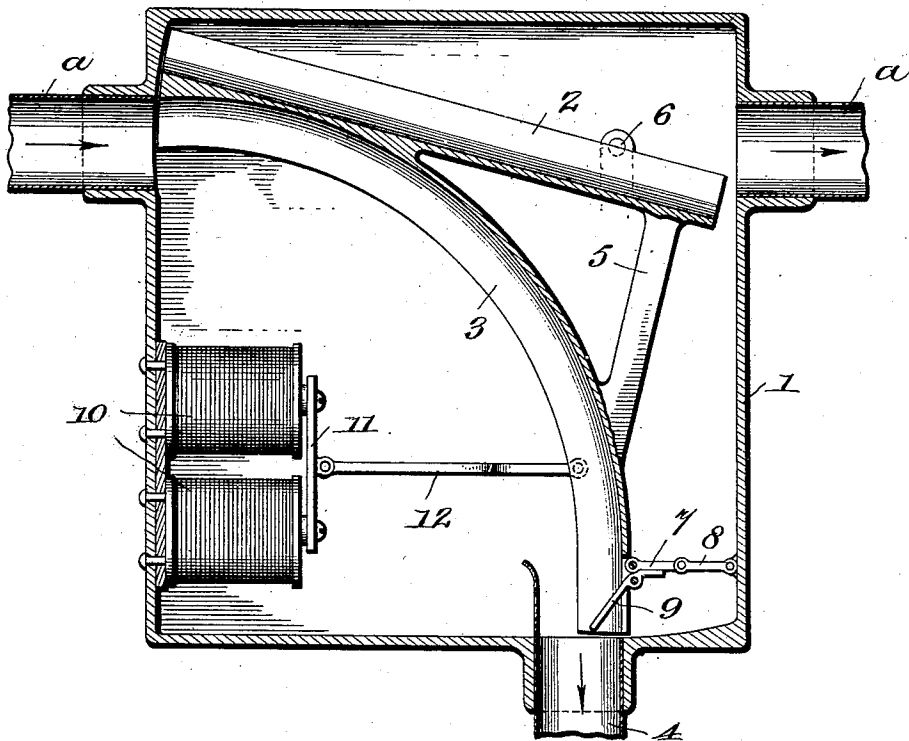
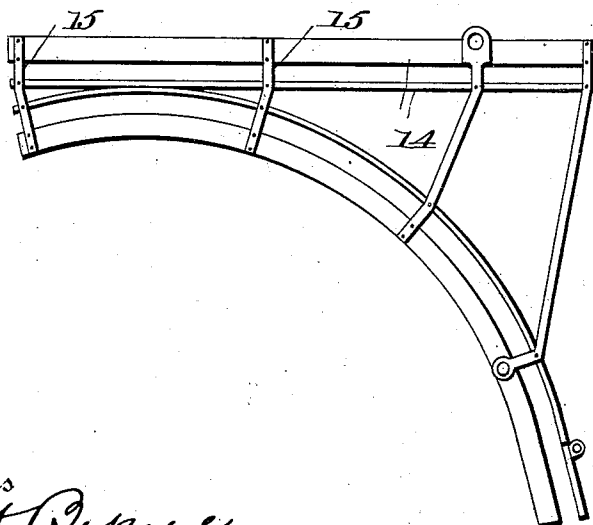


Fig. 5.



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8 SHEETS—SHEET 3.

Fig. 6.

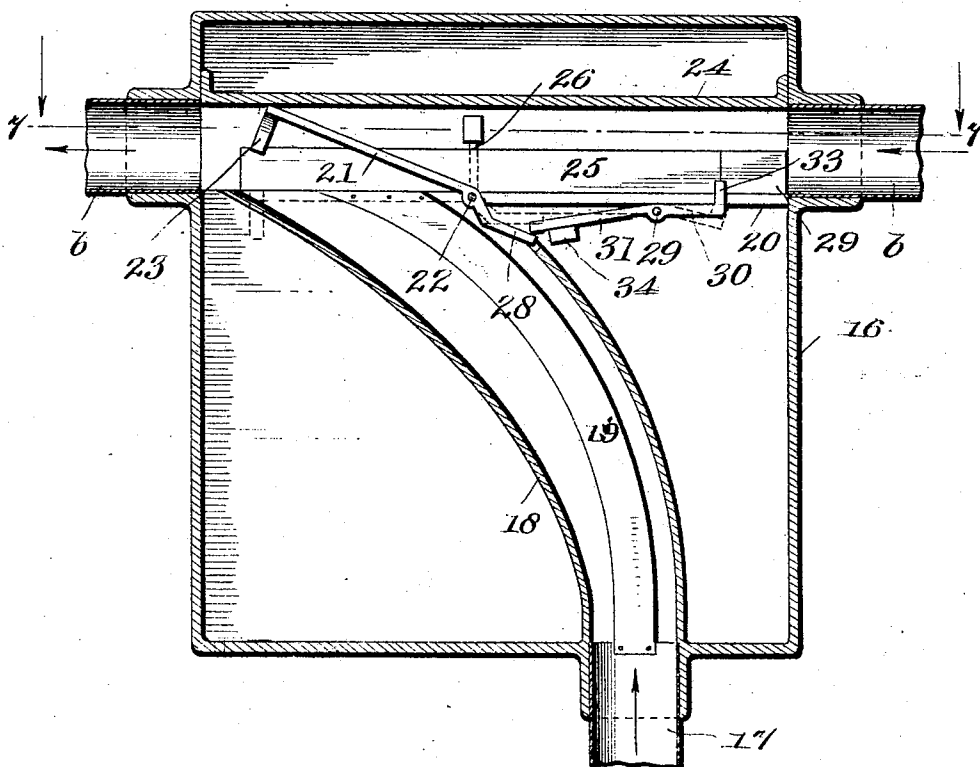
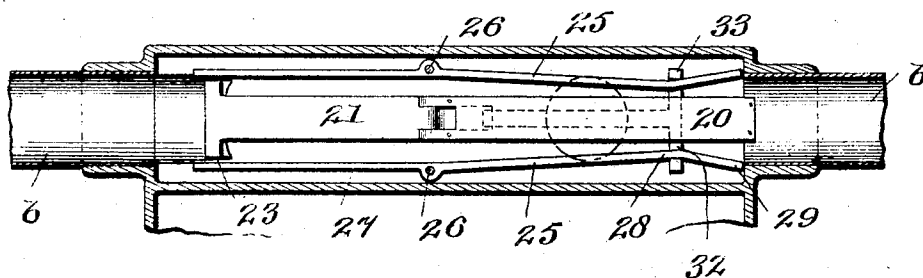


Fig. 7.



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PNEUMATIC-CARRIER SYSTEM.

No. 904,414.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM H. EARL, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Pneumatic-Carrier Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in pneumatic carrier systems, and is intended primarily for use as a cash carrier in stores, but may be adapted to other uses such as parcel or mail delivery. It covers the use of a carrier in a pneumatic tube system, the carrier being driven by a vacuum, or with slight changes the system may be worked by direct pressure.

The system involves one main tube for sending with as many branch switches inserted in the main tube as there are stations desired. There is one return carrier tube with as many automatic non-interfering switches therein as there are deflecting switches in the main tube.

The object of my invention is to produce a simple and easily operated system of this character, in which the receiving switches are operated by electric circuits closed by a push button at the sending station.

With this object in view, my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings:—Figure 1 represents diagrammatically a top plan view of part of the complete system. Fig. 2 is a section on a larger scale, taken on the line 2—2 of Fig. 1, and looking in the direction of the arrows. Fig. 3 is a cross section on the line 3—3 of Fig. 1, on an enlarged scale, and looking in the direction of the arrows. Fig. 4 is a cross section on the line 4—4 of Fig. 1, on an enlarged scale, and looking in the direction of the arrows. Fig. 5 is a modified form of the switch shown in Fig. 4. Fig. 6 is a cross section on an enlarged scale on the line 6—6 of Fig. 1, looking in the direction of the arrows, and Fig. 7 is a horizontal section taken on the line 7—7 of Fig. 6, and looking downwardly in the direction of the arrows.

a represents the sending tube leading from a central station, as, for example, the cash-

ier's desk to the various stations, and *b* represents the return tube leading from the clerks' stations to the central station.

c represents the double box at the central station, and at intervals in the tubes *a* and *b* are double boxes extending through both tubes, such as *d* and *e*, containing the sending and receiving switches as hereinafter described.

Referring now to Fig. 2, the cashier's sending box is shown in section therein, this box being one-half of the box *c*. This half box *f* is made airtight, except for the entrance opening *g* through which the carrier *h*, of the ordinary type, is slipped into the box and into the tube *i* contained therein, this tube being substantially a continuation of the sending tube *a*. Of course, as a vacuum is continuously maintained in the tube *a*, it is necessary that the end thereof where it enters the bottom of the half box *f* should ordinarily be closed, and for this purpose I have arranged the double valve shown in Fig. 2, consisting of two valves *j* and *k* pivotally attached at the upper and lower ends of a cross bar or lever *m*. These valves are guided by strips *n'*, two for each valve, one on each side thereof, and are so arranged that when the opening *g* is unobstructed, as shown in Fig. 2, the opening from the box into the tube *a* is closed by the valve *k*.

n represents a spiral spring within the cylinder *o*, fastened on the inside of the half box *f*. This spring bears against the plunger *p*, secured to the rod *q*, which is connected by means of a link *r* to the bar *m*. The spring *o*, therefore, always tends to hold the parts in the position shown in Fig. 2 with the opening *g* unobstructed.

s represents the magnets of a double solenoid, the cores *t* of which are fastened to a plate *u*, which is pivotally attached by means of a link *v* to the bar *m*. The bar *m* is made in two pieces, dovetailing into each other, as shown in Fig. 2, and is provided with a central slot *w*, through which passes a pivot pin *x* secured in the side of the box.

When the magnets *s* are energized, the plate *u* is drawn down towards the magnets, carrying with it the bar *m*, which revolves about the pivot, the two parts of the bar telescoping upon each other, causing the valve *j* to close the aperture *g*, and withdrawing the valve *k* from over the top of the tube *a*, and allowing the carrier *h* to drop into the tube *a*.

In Fig. 3, *y* represents the half box at the central station for receiving the carrier. It consists merely of an air-tight box in which is located the delivery tube *z*, which communicates with the return tube *b*, the carrier dropping out of the open end of the tube *z* into a basket in the usual manner. Any desired means (not shown) for closing the end of the tube *z* may be employed.

In Fig. 4 is shown the half box 1, containing the diverting switch, which consists of two raceways 2 and 3, each made in the form of a half tube, one of said raceways being straight and practically forming a continuation of the bottom of the tube *a* when the raceway 2 is in its horizontal position, and the other of said raceways being curved and adapted when swung into the position shown in Fig. 4 to deflect the carrier into the delivery tube 4 from whence the carrier drops into a basket at the clerk's station, suitable means (not shown) being employed to close the end of the tube 4. A brace 5 connects the two raceways, and the whole switch is suspended upon pivots 6 let into the side of the box. Under ordinary conditions, the weight of the switch will bring it into a horizontal position, but when once brought into the position shown in Fig. 4, it will be held there, until released, by the two links 7 and 8 pivoted to each other and to the switch and half box 1, respectively. Beneath the link 7 is a bent metal guiding strip 9 pivoted to the switch, and having one arm extending under said link 7, and the other arm extending out into the raceway 3, so that when a carrier comes along, (the parts being in the position shown in Fig. 4,) it strikes one end of the guide piece 9, and throws the other end up against the link 7, thereby releasing the switch and allowing it to fall back to its horizontal position. The means for deflecting the switch are as follows: 10 represents the magnets of a double solenoid, the cores of which are connected to a plate 11, which plate is connected by a bent pivoted link 12 with the lower part of the switch. When the magnets are not energized the weight of the switch will cause it to fall until the raceway 2 is horizontal. When, however, these magnets are energized, they will pull in the cores, and with them the plate 11, swinging the switch into the position shown in Fig. 4, and it will stay in this position until the carrier comes along and strikes one arm of the guide 9.

As shown in Fig. 1, there is one complete circuit for each half box containing a deflecting switch, and in this circuit are included the magnets 10 in the half box 1, and the magnets *s* in the half box *f*. In each of the circuits, there is a push button, such as 13. When the operator wishes to return a carrier, said carrier is dropped into the tube *z*, through the opening *g*, and the operator

then pushes the button corresponding to the station where the carrier is to be delivered. For example, if the operator pushes the upper button 13 in Fig. 1, the magnets 10 and *s* will be energized, the switch will be thrown into the position shown in Fig. 4, and the bar *m* will be shifted from the position shown in Fig. 2 to the position with the valve *j* closing the opening *g*, and the carrier will be delivered to the operating station. After the carrier has been delivered, and when the operator releases the push button 13, the spring *o* will return the parts in Fig. 2 to the position shown in that figure, and the weight of the switch will bring the raceway 2 into a horizontal position, as already described, leaving the apparatus ready to send another carrier. All the circuits are arranged in substantially the same way as shown in Fig. 1.

In Fig. 5 a modified form of the diverting switch is shown. In this form, the raceways, instead of being half tubes, are built of a number of strips 14, preferably arranged so as to form curved raceways, which strips are united together by braces 15 riveted thereto.

The means for returning a carrier from the clerks' stations to the central stations will next be described. 16 represents a half box, which together with the box 1 forms the box *d*, the other boxes, excepting the box *c*, being made in the same way. This box is provided with an entrance tube 17, into which the clerk slips the carrier to be sent to the cashier's desk, suitable means, not shown, being provided to normally keep the end of the tube 17 closed. The carrier is drawn up through a tube into the return tube *b*, through a tube 18, which may have solid walls, or may be made of strips, such as 19, if desired.

It is necessary that means should be provided so that a carrier coming up the tube 19 should not strike another carrier coming straight along through the tube *b*, and this means is shown in Figs. 6 and 7.

Within the box 16 are mounted guiding strips. The lower horizontal strip 20 is made in two parts hinged together. 21 represents the movable part of the raceway adapted to freely rise and fall on the pivot pin 22. It is provided on one end with a head or extension 23 for a purpose hereinafter explained. 24 represents a strip running the whole length of the box 16 and parallel to the strip 20. Between the strips 20 and 24 are the side guide strips 25, pivotally mounted near their centers on the pivot pins 26. About one-half of these guide strips are parallel to the walls of the tube *b*, as shown at 27, and each of these guide strips is provided with a bent-in portion 28 and a flaring mouth 29. The guide strip 21 is under ordinary conditions adapted to be

horizontal, as shown in dotted lines in Fig. 6, the head 23 passing through a hole in the part 18. It always assumes this position unless a carrier comes up from one of the branch stations. On the end of the part 21 next to the pivot is a downwardly-extending finger 28 which also extends to one side of the pivot. Pivoted on a pin 29 underneath the strip 20 is a movable arm 30, provided with a finger 31, with which the finger 28 is adapted to engage. On the end of the arm 30 is a head 32 having one horizontal piece and two vertical upwardly-projecting end pieces 33, the head forming in cross section three sides of a rectangle. The end pieces 33 are adapted to fit around and engage the reduced portions 28 of the swinging side strips 25 when the parts are in the position shown in Fig. 6.

The operation of this non-interfering switch is as follows:—The parts being in the position shown in dotted lines in Fig. 6, the tube *b* is open for the passage of carriers straight on through the half box 16. If a clerk puts a carrier into the tube 17, this carrier is drawn up in its passage, striking the movable part 21 of the bottom strip. This throws the part 21 into the position shown in full lines in Fig. 6 with the head 23 between the ends 27 of the side strips and preventing the inward movement of these ends. At the same time the finger 31 brings the head 32 from the position shown in dotted lines in Fig. 6 to that shown in full lines, by means of its own weight, and if necessary, an extra weight, such as 34, may be added to the finger. The ends 33 grip the reduced portions 28 of the side strips, firmly holding them in the position shown in Fig. 7, so that it is impossible for a carrier to pass between these side strips while they are in the position shown in the said figure. This construction prevents the carriers from striking each other.

While I have thus described my invention in general terms, I wish it to be distinctly understood that I do not limit myself to the exact constructions shown and described, as these might be varied considerably without departing from the spirit of my invention.

Having thus described my invention, I claim:—

1. In a pneumatic carrier system, the combination of sending and return tubes, double compartment boxes inserted at intervals in said tubes wherever a station is desired, each of said boxes having in one compartment

thereof means for sending a carrier without interference from carriers passing through the return tube, and in the other compartment having a deflecting switch to deflect a carrier from the sending tube, substantially as described.

2. In a pneumatic carrier system, the combination of sending means consisting of the main tube, a box connected thereto and provided with two valves, a lever of variable length connected to said valves, an electro magnet for operating said valves in one direction, and a spring for normally retaining said valves in their original position, substantially as described.

3. In a pneumatic carrier system, the combination of the sending tube, a box into which said tube enters, the interior of the box being substantially unobstructed, a pivoted switch mounted in said box and provided with two race-ways, one straight and one curved, and means for operating said switch from the central station, substantially as described.

4. In a pneumatic carrier system, the combination of the sending tube, a box into which said tube enters, the interior of the box being substantially unobstructed, and a pivoted switch mounted in said box and provided with two race-ways made in skeleton form, substantially as described.

5. In a pneumatic carrier system, the combination of a return tube, boxes placed at intervals therein, a skeleton raceway connecting the ends of the return tube sections as they enter said box, the side strips of said raceway being centrally pivoted, said side strips being provided with a narrow portion which will prevent the passage of a carrier unless said strips are allowed to vibrate on their pivots, and means operated by the passage of a carrier from an intermediate station into the return tube to prevent said side strips from moving, said means including a swinging strip provided with a head adapted to enter between said side strips at one end, and a pivoted member provided with upwardly-extending arms adapted to grip said side strips near the other end, thereby preventing said side strips from swinging on their pivots, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

WILLIAM H. EARL.

Witnesses:

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