Feb. 21, 1928. 1,660,293

J. T. COWLEY

STATION FOR PNEUMATIC DISPATCH SYSTEMS

Filed June 2, 1926 7 Sheets-Sheet 1

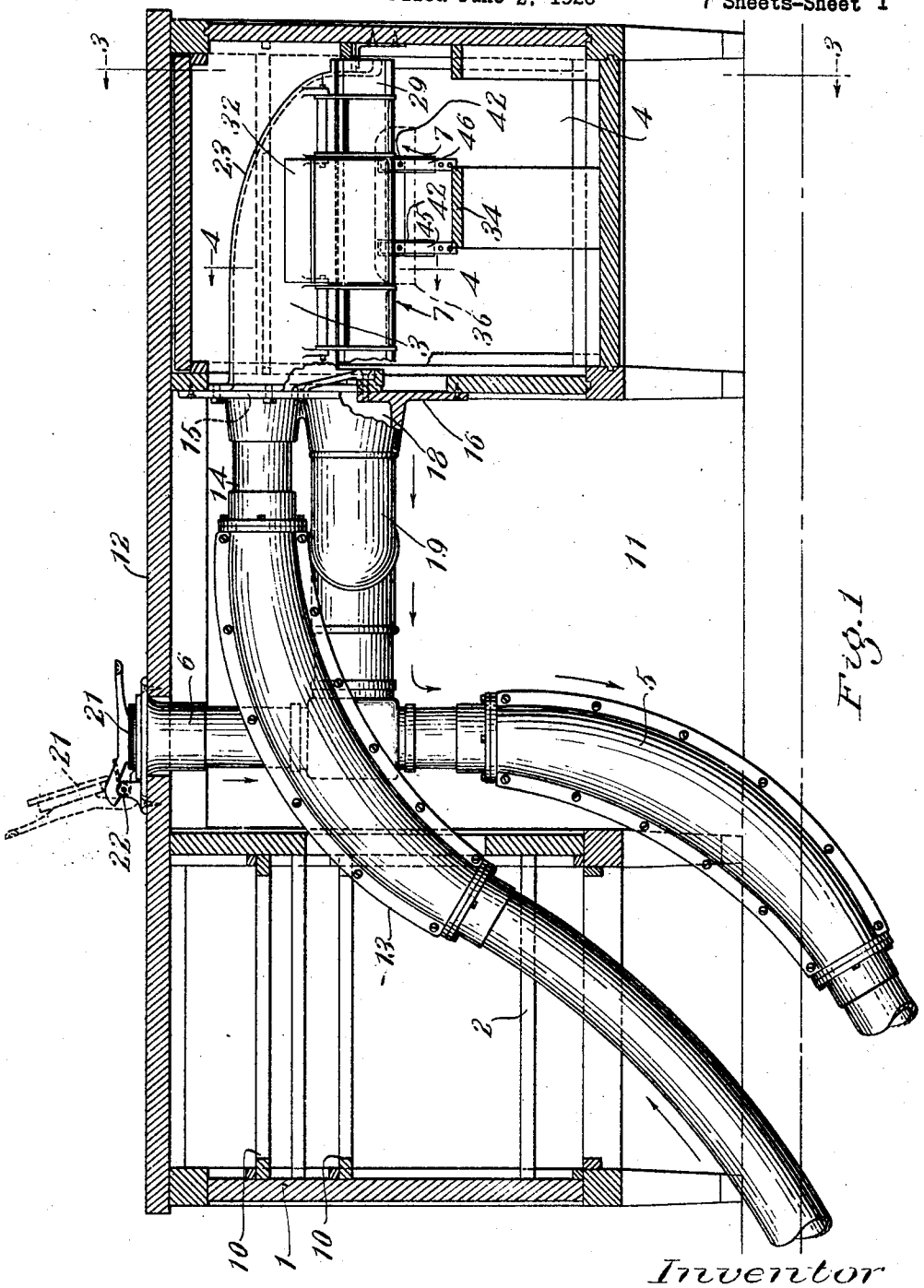

Fig. 1

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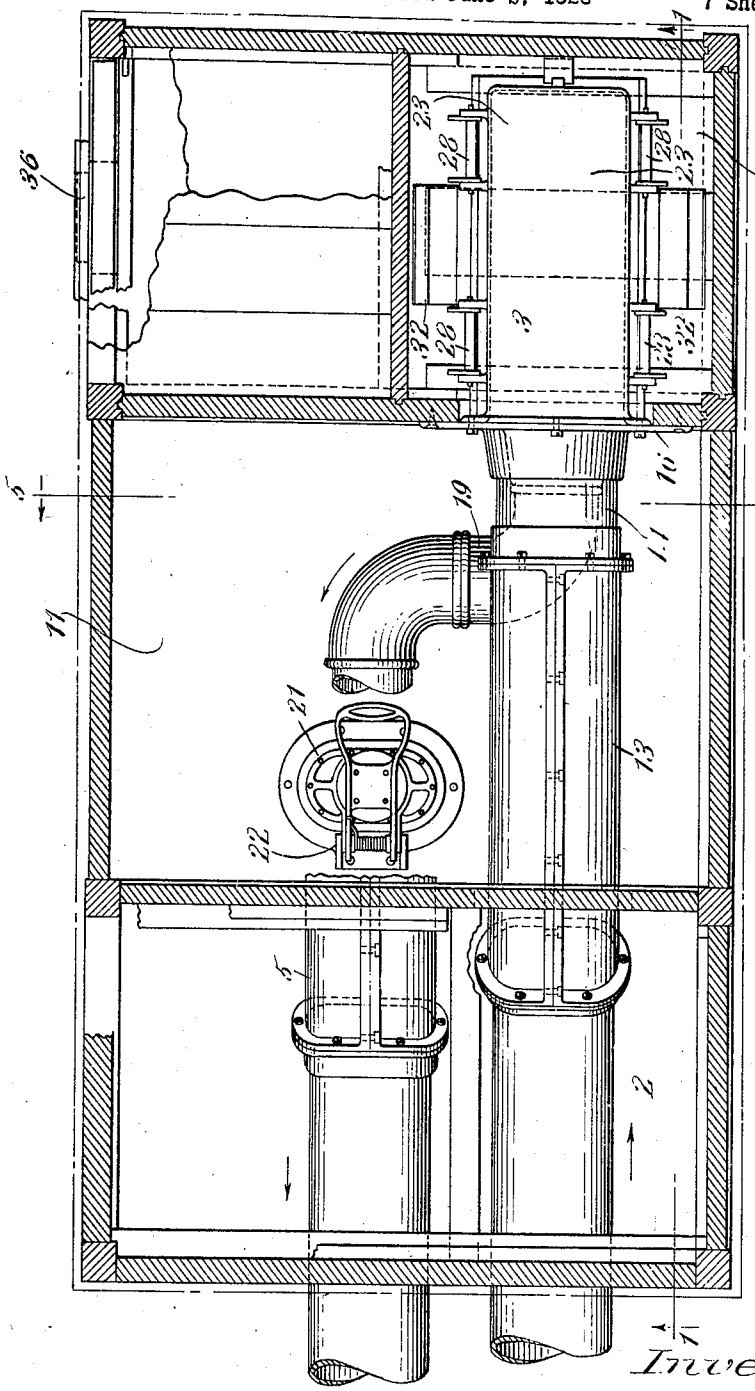

Fig. 2.

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STATION FOR PNEUMATIC DISPATCH SYSTEMS

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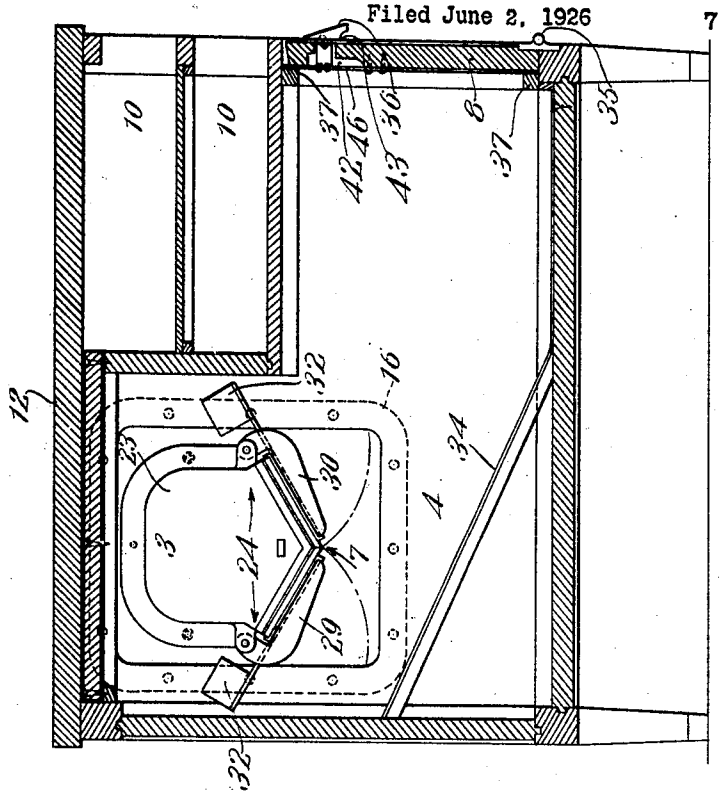

Fig. 3

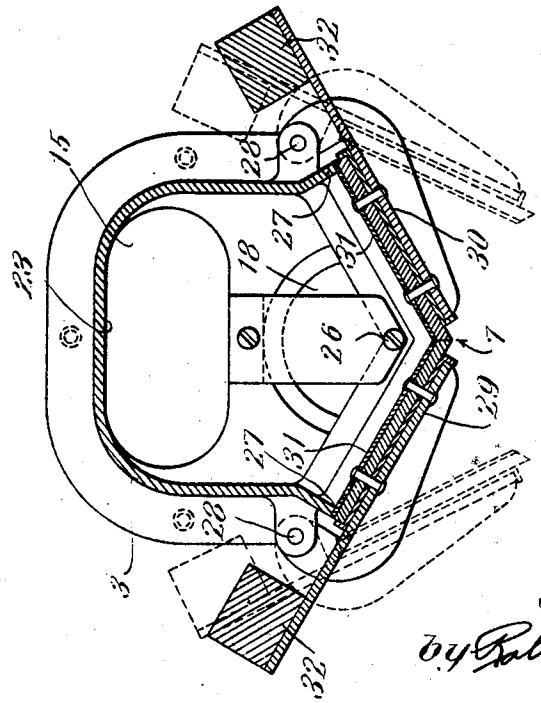

Fig. 4

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STATION FOR PNEUMATIC DISPATCH SYSTEMS

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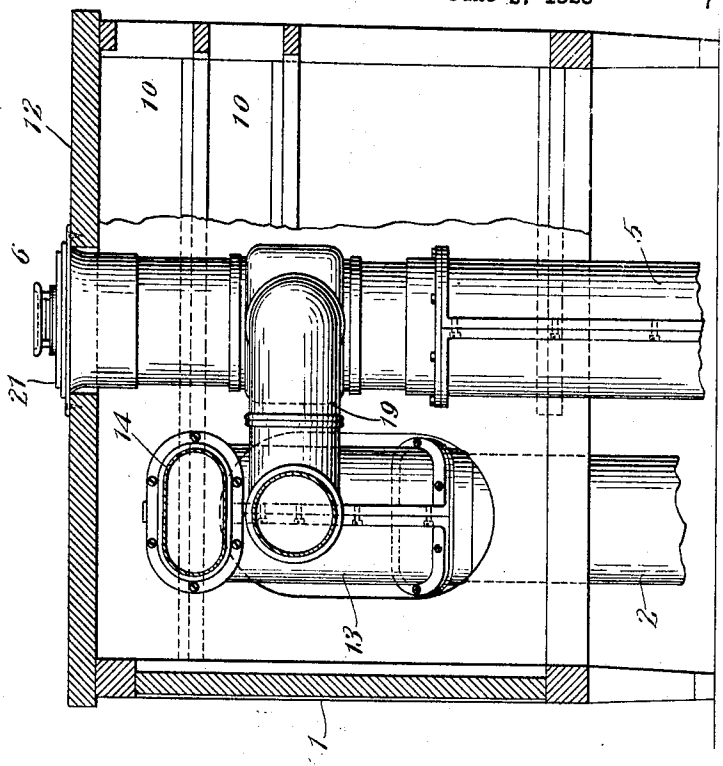

Fig. 5

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STATION FOR PNEUMATIC DISPATCH SYSTEMS

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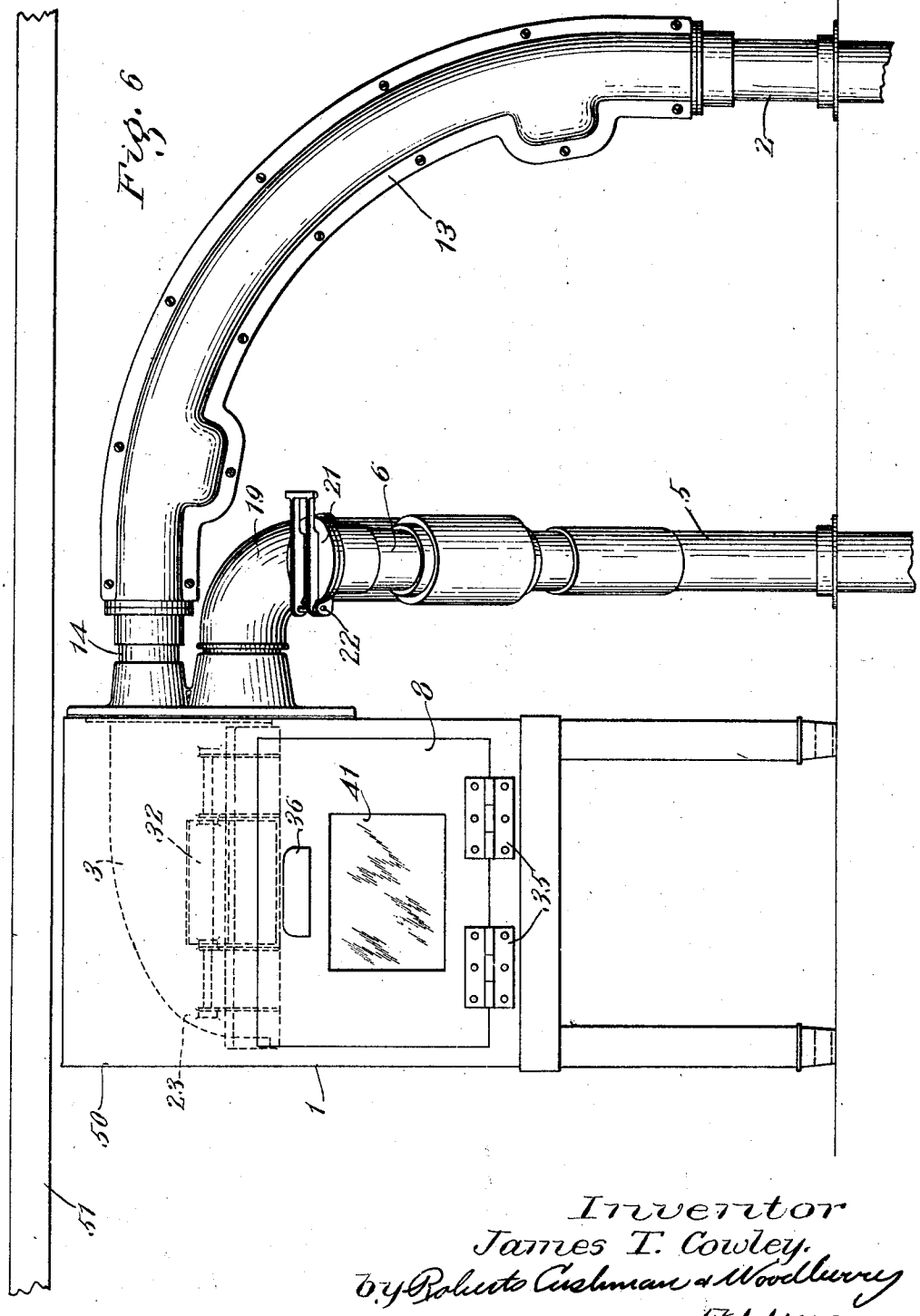
Fig. 6



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STATION FOR PNEUMATIC DISPATCH SYSTEMS

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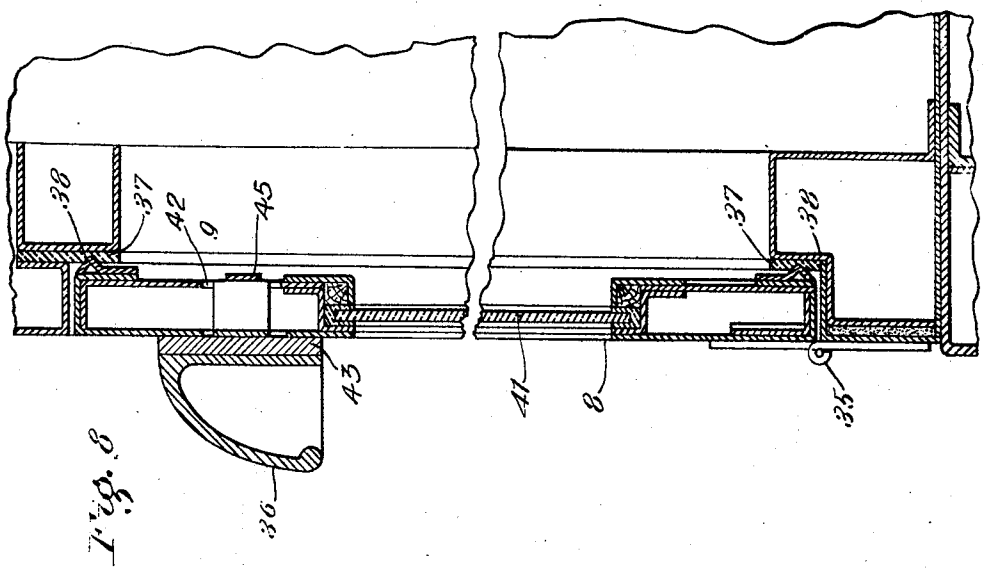

Fig. 6

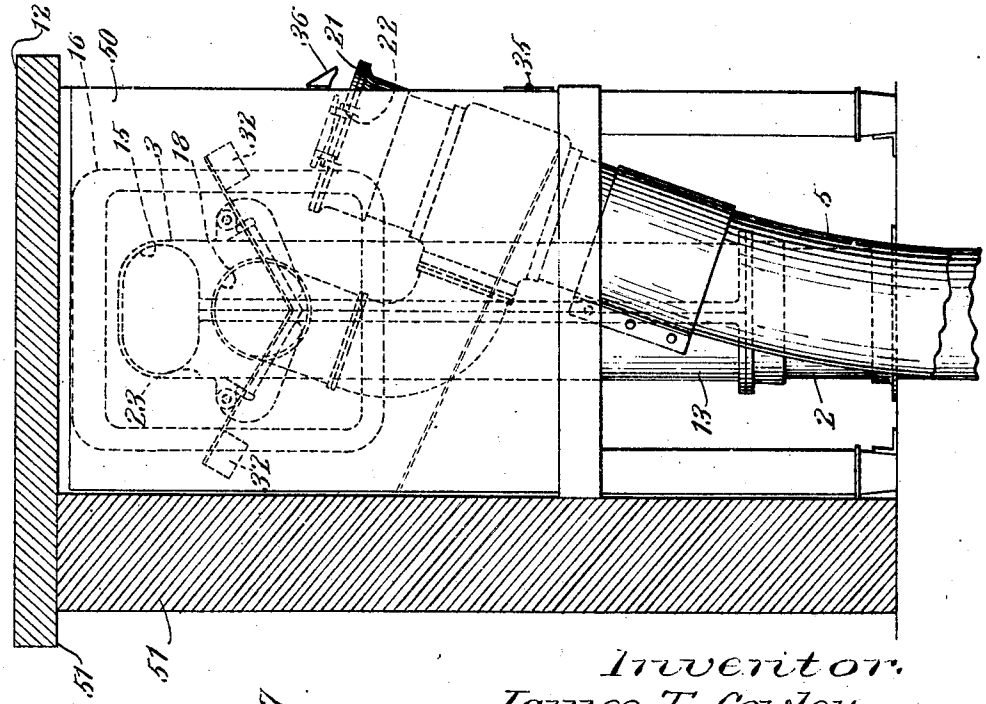

Fig. 7

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STATION FOR PNEUMATIC DISPATCH SYSTEMS

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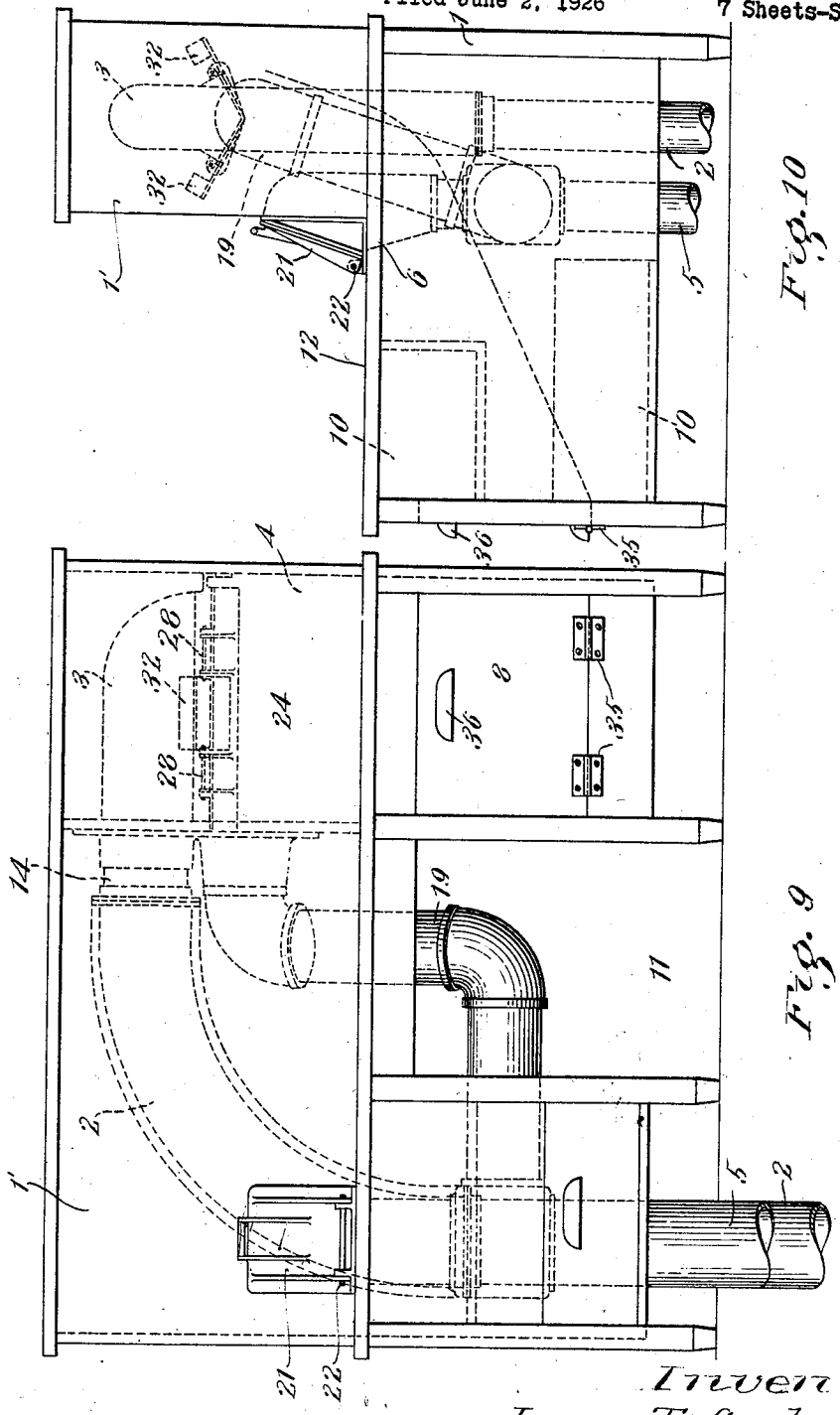

Fig. 10

Fig. 9

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UNITED STATES PATENT OFFICE.

JAMES T. COWLEY, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE LAMSON COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF MASSACHUSETTS.

STATION FOR PNEUMATIC-DISPATCH SYSTEMS.

Application filed June 2, 1926. Serial No. 113,194.

This invention relates to carrier dispatch systems and more particularly provides a convenient receiving and sending station for the same.

In conveyors or conveying apparatus of the prior art, it is customary to employ closed tubes through which carriers are impelled by differential air pressure. Such constructions as have been heretofore employed for this purpose usually involve special apparatus and require a special location and considerable space for the sending and receiving stations.

It is an object of the present invention so to combine the sending and receiving apparatus, that a single station may comprise both units and be installed in a piece of usual office furniture. It is a further object to provide a delivery station or carrier outlet which shall be adapted automatically to receive one or more carriers without requiring the attention of an operator and without conflicting with or interrupting the continued operation of the system as a whole. Other objects of the invention will appear from the following disclosure.

Generically, the invention includes means for conveying carriers and the like, as for example through a predetermined path or system defined by closed tubes, provided with suitably disposed outlet means for the delivery of a carrier or carriers from the path of the conveyor and further provides means for enclosing the outlet from the conveyor and means permitting the withdrawal of the carrier from the enclosing means, characterized by preserving the continued operation of the conveying apparatus during and after the ejection and removal of a carrier, substantially without interruption.

More specifically the herein disclosed embodiments of the invention each includes a closed pneumatic dispatch system through which carriers may be impelled by a positive air pressure or drawn forward by suction (or both) and an outlet for such carriers suitably positioned and arranged to permit or cause the ejection of a carrier at a desired point and means such as an air-tight carrier receptacle or chamber enclosing the outlet and which prevents loss of air pressure or suction in the carrier tube, after the ejection of a carrier from the latter, thereby to maintain continued operation of the system. Means also are provided for releasing the differential pressure between the interior of the air tight receptacle or chamber and the atmosphere to facilitate opening a door or other closure through which the carrier may be removed.

Usually systems of this type are operated by suction (i. e. a column of air under a differential of pressure on either side of the carrier, both pressures being less than atmospheric) although it is conceivable that a compressed air column could be used. In either event,—with suitable modifications accordingly,—the present invention may be applicable for the purposes indicated with satisfactory results.

The section of the system in which the station is installed, may be conveniently (though not necessarily) arranged in a horizontal position, with the carrier outlet normally closed but adapted to be opened by the carrier and to eject the same, as for example by gravity, and may or may not be self-closing, as later to be explained. The outer air-tight receptacle or chamber may advantageously be provided with means for breaking the suction and/or equalizing the differential air pressure therein, thus permitting the door to be opened and the carrier removed. The return end of the carrier tube may be additionally equipped with a sending station, thus making a complete apparatus for receiving and sending carriers which may be fitted into small compass, such as the ordinary flat top desk, or under a counter or table, and thus inconspicuous but convenient for ready use.

A typical and representative embodiment of the invention in a desk structure is shown in the accompanying drawings, in which:

Fig. 1 is a longitudinal elevation and section (on line 1—1 of Fig. 2) of a flat top desk with a receiving and sending apparatus installed therein;

Fig. 2 is a plan view, partly in horizontal section, of Fig. 1;

Fig. 3 is a cross-section along line 3—3 of Fig. 1;

Fig. 4 is a detail cross-section along line 4—4 of Fig. 1;

Fig. 5 is a vertical cross-section along line 5—5 of Fig. 2;

Fig. 6 is an elevation of a modified form of the apparatus installed under a counter;

Fig. 7 is an end view of Fig. 6,

Fig. 8 is a detail cross-section of the door shown in Figs. 3 or 7;

Fig. 9 is a longitudinal elevation of a further modification of the apparatus as installed in a cabinet above the desk top; and

Fig. 10 is an end view of the same.

Referring to the drawings, the desk 1 is fitted with the inlet tube 2 of a pneumatic dispatch system of which a substantially horizontal section 3 leads into and through a closed compartment 4 of the desk and connects therein with the exit or return tube 5 of the system which may be provided with a sending station or opening 6. The section 3 is provided at 7 in the instant case with a gravity operated outlet for the carriers, said outlet being arranged in the closed compartment 4 which has a door 8 (Fig. 3) provided with means for releasing differential pressure between the compartment and the outside atmosphere.

Various drawers or compartments 10 may be provided for the normal use of the construction as a desk, and also a central space 11, permitting the user to sit up closely against it in the ordinary manner, while the top 12 is free and clear.

The inlet tube 2 is of the ordinary construction of conveyor systems of the type described and has a curve or elbow 13 connected by a neck 14 to the opening 15 in a header plate 16. The latter also has a second opening 18 to which is connected outlet tube 19 making a T-connection with return tube 5 and the sending or dispatch terminal 6. The latter is closed by a tight fitting cover 21 pivoted at 22. Header plate 16 fits over and is hermetically joined to the end of the receiving chamber 23 which comprises the section 3 of the tube, and in the under side of which is the outlet 7 consisting of a wide opening 24 defined by V-shaped ends 26 and horizontal margins 27. Above the latter, at 28, are pivotally suspended the coacting gates or doors 29, 30 having counterweights 32 (or other means tending to close the gates) and adapted to swing upwardly against said margins 27 and the V-shaped ends 26, to close the opening 24 and thus substantially to seal the same by means of a soft packing or gasket 31 on the contacting surfaces. Below the opening 24 an inclined slide 34 slopes downward to the door 8 which is pivoted at 35 to be swung downwardly by the handle 36. The door 8 is rendered air-tight by means of a rubber lining or gaskets 37, which bear firmly against the projecting frames 38. The rest of chamber 4 may also be rendered substantially air-tight by suitable joining of the walls or other well known means such as packing and the like.

In the apparatus as thus constructed and assembled, a suction or reduced pressure is set up throughout the entire system, being impressed for example upon the return tube 5, the direction of the current of air thus induced through the tubes being indicated by arrows. Under normal conditions of operation, gates 29, 30 are closed tightly over the opening 24 and the sending opening 6 is also closed by the cover 21. The door 8 of compartment 4 is likewise closed. A carrier introduced into the system at a distant point (not shown) obviously tends to travel in substantially the same direction as the air current therethrough. Accordingly, a carrier coming to the station shown enters in the direction of the arrow, passes through inlet tube 2 and thence through opening 15 into the receiving chamber 23. Here it falls upon the gates 29 and 30. Under the force of gravity the gates are caused to swing downwardly, thus separating and letting the carrier fall through the terminal outlet opening 24, striking upon the slide 34, and rolling down to the door 8. The door 8 may now be opened and the carrier removed. When this is done, air is allowed to rush in through the open doorway and thence through the opening 24 into the outlet or return tube 5. This current of air draws the gates 29, 30 back into closed position over the opening 24. The door 8 is then closed.

It is to be observed that, although the gates 29, 30 may be so counterpoised that even with the door 8 open and hence the total difference of pressure between the system and outer atmosphere being exerted thereon, the additional pressure of a carrier will be sufficient to open them,—such adjustment must be predicated upon a very low total pressure differential or an exceedingly nice adjustment of the gates 29, 30, unless independent and more or less complex mechanism is provided for this purpose. On the other hand, the enclosing chamber 4 is normally under an appreciably reduced pressure by leakage of air therefrom past the gates 29 and 30 into the system. As a result, the pressure differential between the system and chamber 4 is not so great as between the system and the outer atmosphere and hence the gates may be readily opened by the impact of a carrier thereon. Moreover, this result may be definitely obtained and relied upon regardless of how low a vacuum is employed in the system (i. e. high differential between pressure of the system and atmospheric pressure) because, with respect to the opening of gates 29, 30, it is the difference in pressure between the tube system and chamber 4 which tends to hold the gates in closed position and if this differential is appreciably reduced the gates are by so much, the more readily opened by the impact of a carrier. Again, under such

conditions the gates may remain open without affecting operation of the system since the chamber 4 becomes merely a part of the evacuated system and any further carriers coming to the station will fall through outlet 7 which is already open. The gates may, however, be counterbalanced in such manner that after the exit of a carrier they will tend to close and in this event, as such residual differential of pressure as may exist between the system and the chamber is equalized, the resulting rush of air will more tightly close the gates 29 and 30.

In cases where there is high vacuum and appreciable leakage of air into the dispatch tubes, or in case door 8 is not opened promptly after a carrier has opened the gates 29, 30, or there has been a considerable period between the arrival of two successive carriers, it may be extremely difficult to open the door 8. In this event, the atmospheric pressure against the relatively large area of the door 8 represents an ultimate load of considerable proportions. To overcome this difficulty means may be provided as shown in Fig. 8 in which the door is provided with a glass panel 41 through which the arrival of a carrier may be observed while above the panel there is an opening 42 passing completely through the door and covered by a soft rubber plate or gasket 43 to the outside of which a handle 36 is attached. This rubber plate is held in position by springs 45, 46, which are attached to its inner surface, extend across the opening 42 and bear against the inner side of door 8. By this device, when the chamber 4 is under reduced pressure (or vacuum) the suction upon the door is broken by grasping the handle 36 and pulling it forward. This draws the rubber gasket away from the opening 42 and permits air to enter and partially equalize pressure on both sides of the door, whereupon the door may be readily opened.

After a carrier has been received and until the door 8 is opened, the air current of the system passes through the inlet 2, receiving chamber 23, closed chamber 4 and thence to outlet 5 as a continuous closed circuit. Accordingly the system continues to function regularly regardless of whether an operator is present to remove the deposited carrier or not. As soon as the rubber plate 43 is released and door 8 is opened, the rush of air into the system immediately closes the gates 29 and 30 in readiness for further functioning in the manner described. When the carrier has been removed, door 8 is of course again closed by the operator and a reduced pressure is again induced in chamber 4 as before.

For sending carriers, the cover 21 may be raised and the carrier dropped into the sending tube 6 and the cover closed. Gravity will bring the carrier below the connection between the return tube 5 and outlet tube 19 before closing the cover 21, and it is then urged forward through the system in the usual manner.

A modified form of the apparatus is shown in Figs. 6 and 7. This arrangement includes a cabinet 50 which may be located under a counter or table 51, said cabinet having an inlet 2 and outlet 5, the outlet or return having an inclined sending opening 6 projecting laterally therefrom.

The further modification illustrated by Figs. 9 and 10 includes a cabinet 1′, standing above the top of the desk 1, in which the receiving and sending tubes are located, leaving the forward portion of the desk top 12 unobstructed and free for general use, and the front part of the desk free to receive drawers 10 or the like, therein.

It will be clear from the above disclosure and the representative construction described, that a construction is thus obtained whereby air tubes, conveyors, and the like may be connected with a suitable station or stations for the receiving and sending of carriers, in conjunction with the customary forms of office furniture without impairing the normal use of the latter,—and whereby the delivery of carriers at such stations may be effected without interrupting the continuous functioning of the conveyor system, and without requiring the attention of an operator.

It is to be understood that such stations may be terminal stations intended to receive all of the carriers directed thereto or they may be set up in conjunction with selective devices, known to the art, whereby certain carriers are delivered through the gates 29 and 30 while certain other carriers are permitted to pass on, without operating the gates or being deposited at the station, to another station at some later point in the system where it does open the gates and is deposited.

It is also to be understood that the invention is adaptable generally to the various methods and systems of conveyor apparatus,—though more especially those of the air tube type, and that numerous combinations with and substitutions of the operating parts employed may be made without departing from the scope of the invention herein described. Such adaptations and substitutions are to be considered as comprehended by the present specification and included by the following claims.

I claim:

1. Apparatus of the class described comprising a piece of usual office furniture provided with a compartment, a door normally closing an entrance to said compartment, a pneumatic tube delivery terminal arranged to deliver carriers into said compartment, said terminal being connected to a pneu-

matic transmission tube, and means within the compartment normally closing said terminal.

2. Apparatus of the class described comprising a piece of usual office furniture provided with a normally closed compartment, a pneumatic tube delivery terminal arranged to deliver carriers into said compartment, said terminal being connected to a pneumatic tube, and valve means normally closing said delivery terminal, said valve means opening automatically to permit a carrier to pass from the terminal into said compartment and closing automatically in response to differential pressure between the pneumatic tube and the compartment.

3. A station for a pneumatic carrier system comprising an office desk of substantially usual type having a normally closed compartment, a movable closure giving access to the compartment, a pneumatic tube delivery terminal arranged to deliver carriers into said compartment, said terminal being connected to the transmission tube of the system, and means normally closing said terminal, said means opening automatically in response to the weight of a carrier so as to permit the carrier to enter the compartment.

4. A station for a pneumatic carrier system comprising a piece of usual office furniture provided with a normally closed chamber of a size sufficient to hold a plurality of carriers, a pneumatic tube delivery terminal arranged to deliver carriers into said chamber, said terminal being connected to a transmission tube of the system, means normally closing the delivery terminal, and means permitting removal of carriers from the chamber.

5. A station for a pneumatic tube system comprising a delivery terminal having an outlet, gravity actuated means normally closing the outlet, means providing a chamber surrounding and enclosing said delivery terminal outlet, said chamber being of a size sufficient to hold a plurality of carriers, and a door opening from said chamber to the outer atmosphere, said door normally remaining closed to retain the carriers within the chamber.

6. Apparatus of the class described comprising a piece of usual office furniture provided with a substantially air-tight compartment, a door normally closing an entrance to said compartment, a pneumatic tube delivery terminal having an outlet arranged to deliver carriers into said compartment, said terminal being attached to a pneumatic transmission tube, and valve means normally closing the terminal outlet.

7. A station for a pneumatic tube system having a transmission tube, said station comprising a delivery terminal for the tube having a downwardly directed outlet, a pair of gates cooperating substantially to close the outlet, said gates normally being closed but opening in response to the weight of a carrier resting thereon, means providing an air-tight chamber enclosing the outlet to said terminal, said chamber being of a size sufficient to hold a plurality of carriers, a door in the wall of the chamber, said door normally being held closed by differential air pressures, and manually actuable means for equalizing the pressure at opposite sides of the door to permit it to open.

8. A station for a pneumatic tube system comprising a carrier delivery terminal having an outlet, means providing a chamber housing said outlet, the chamber being adapted to receive carriers from the outlet and being of a size to hold a plurality of carriers, said chamber being substantially air tight and normally sealed against the entrance of atmospheric pressure, and a manually actuable valve for breaking the seal to permit air at atmospheric pressure to enter the chamber.

9. A receiving station for pneumatic carrier systems, comprising a pneumatic tube, a carrier outlet in a section of the tube, a closed chamber surrounding and enclosing said outlet, a door in the chamber, means providing a hermetic seal to the chamber, a displaceable member in the door, and a handle attached thereto for displacing said member and for breaking the seal, in the act of opening the door.

10. Apparatus of the class described comprising a piece of furniture of substantially usual external appearance having a normally closed and substantially air-tight compartment therein, a movable closure giving access to such compartment, a pneumatic dispatch tube delivery terminal arranged to deliver carriers into the compartment, and a combined closure opener and relief valve for admitting atmospheric pressure to said compartment prior to opening the closure.

11. A station for a pneumatic tube system having a transmission tube and a delivery terminal provided with an outlet, said station having a gate counterpoised so as normally substantially to close said outlet, means providing a substantially air-tight chamber enclosing the outlet, a normally closed door giving access to the chamber from the exterior, a valve for equalizing the difference in pressure at the opposite sides of said door, and a handle for the door, said handle being connected to the valve for actuating the latter.

12. Apparatus of the class described comprising a desk having a top and a substantially air-tight compartment below said top, a door normally closing an entrance to said compartment, a cabinet mounted upon the desk, said cabinet having a chamber therein constituting a continuation of the compartment in the desk, a pneumatic tube delivery

terminal having its outlet disposed within said cabinet, said terminal being connected to a pneumatic transmission tube, and means normally closing the terminal outlet, said outlet closing means opening automatically to permit a carrier to pass from the transmission tube into said chamber.

13. A station for a pneumatic dispatch system having a transmission tube, said station comprising a piece of usual office furniture provided with a compartment, a movable closure normally closing an access opening in the wall of said compartment, and a pneumatic tube delivery terminal arranged to deliver carriers into said compartment, said terminal being connected with the transmission tube.

14. In combination with a piece of customary office furniture such as a desk, a portion of a pneumatic carrier system directed therethrough, a carrier outlet from the system, means comprising a compartment in said desk enclosing said outlet, and means normally closing the carrier outlet.

15. In combination with a piece of customary office furniture such as a desk, a portion of a pneumatic carrier system directed therethrough, a carrier outlet from the system, means comprising a compartment in said desk enclosing said outlet, and means normally closing the carrier outlet but opening under the impact of a carrier thereagainst.

16. In combination with a piece of customary office furniture such as a desk, a portion of a pneumatic carrier system directed therethrough, a carrier outlet from the system, means comprising an air-tight compartment in said desk enclosing said outlet, and means normally closing the carrier outlet but permitting a slight by-pass of air therethrough.

17. Apparatus of the class described comprising an office desk of substantially usual type, a pneumatic tube dispatch terminal supported by the desk, the desk having within it a chamber of a size sufficient to hold a plurality of pneumatic carriers, a pneumatic tube delivery terminal arranged to deliver carriers into said chamber, and a normally closed door giving access to said chamber.

18. Apparatus of the class described comprising an office desk having a top, drawers below the top, a compartment below the top, said compartment being of sufficient capacity to hold a plurality of carriers, a pneumatic tube dispatch terminal carried by the desk structure, the receiving end of said terminal being above the top of the desk and within convenient reach of a person seated at the desk, a pneumatic tube delivery terminal arranged to deliver carriers into said compartment, and a normally closed door giving access to the compartment.

19. Apparatus of the class described comprising an office desk having a top and a part provided with a substantially air tight compartment for receiving and temporarily retaining carriers, a pneumatic tube dispatch terminal built into the structure of the desk, said terminal projecting up through the desk top and having its receiving end disposed just above the level of the desk top, a cover normally closing the carrier-receiving opening at the upper end of said terminal, and a pneumatic tube delivery terminal arranged to deliver carriers into said compartment, said compartment having a normally closed door which may be opened for removal of carriers.

20. Apparatus of the class described comprising an office desk having a top, drawers at one side of the desk below the top, a compartment at the opposite side of the desk below the top, said compartment having a normally closed hinged door, and a pneumatic tube delivery terminal so arranged that carriers arriving therethrough discharge freely into said compartment.

21. Apparatus of the class described comprising an office desk having a top and a compartment at one side of the desk beneath the top, said compartment having a normally closed hinged door, and a pneumatic tube delivery terminal arranged to deliver carriers into the compartment, said terminal being provided with a normally closed gate at its delivery end, said gate opening when engaged by a carrier to permit the carrier to drop into said compartment.

22. Apparatus of the class described comprising an office desk having a top and a compartment provided with a normally closed hinged door, a pneumatic tube delivery terminal arranged to deliver carriers into the compartment, and a deflector within the compartment for directing carriers arriving through the terminal into the forward part of said compartment adjacent to the door, said door being within convenient reach of a person seated at the desk.

Signed by me at Syracuse, New York this twenty-first day of May 1926.

JAMES T. COWLEY.