No. 624,202.

Patented May 2, 1899.

# E. A. FORDYCE.

## PNEUMATIC CARRIER SYSTEM.

(Application filed Mar. 6, 1897.)

(No Model.)

9 Sheets—Sheet 1.

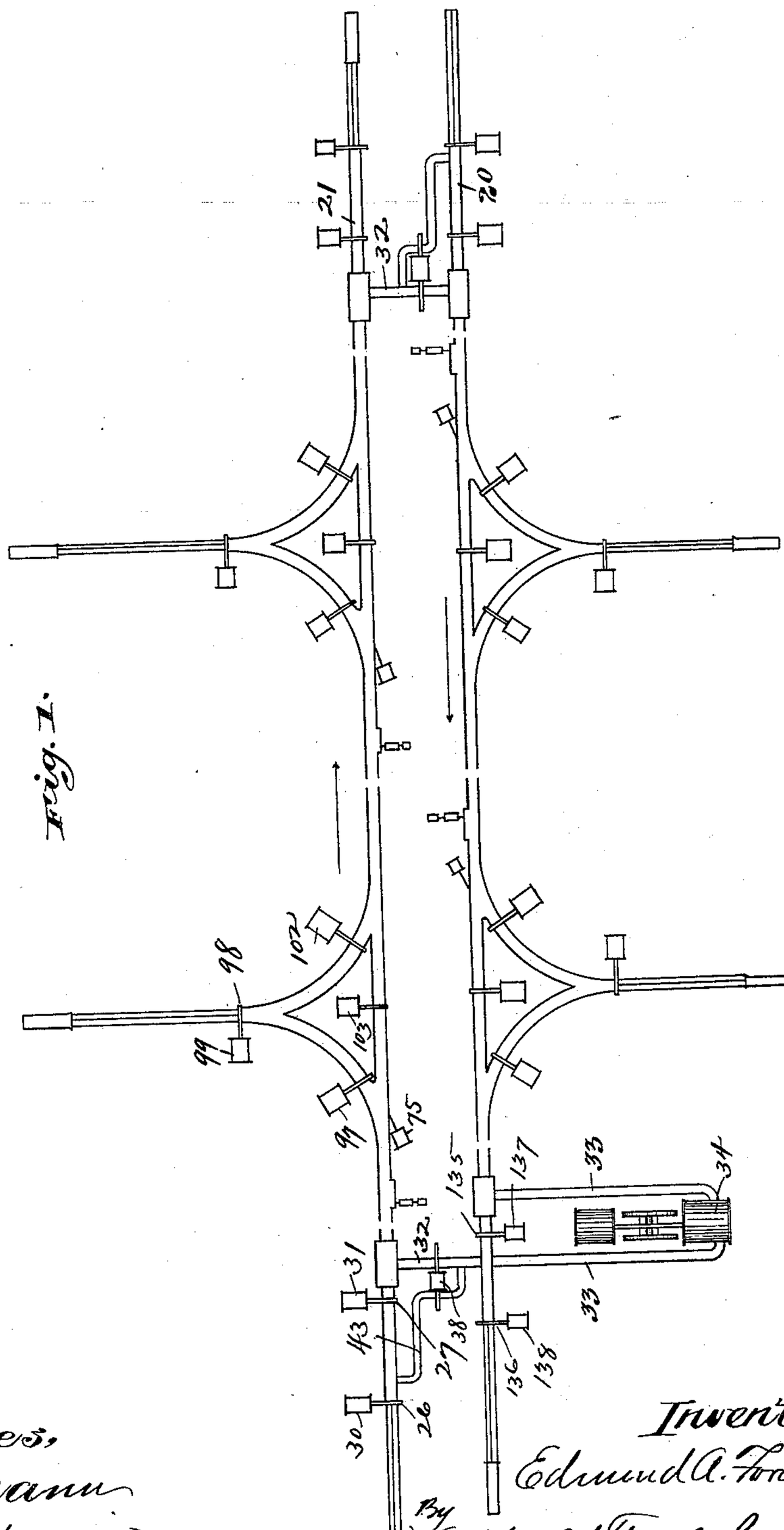


Fig. 1.

Witnesses,
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Frederick f. Goodwin

Inventor,
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Attys.

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## PNEUMATIC CARRIER SYSTEM.

(Application filed Mar. 6, 1897.)

(No Model.) 9 Sheets—Sheet 2.

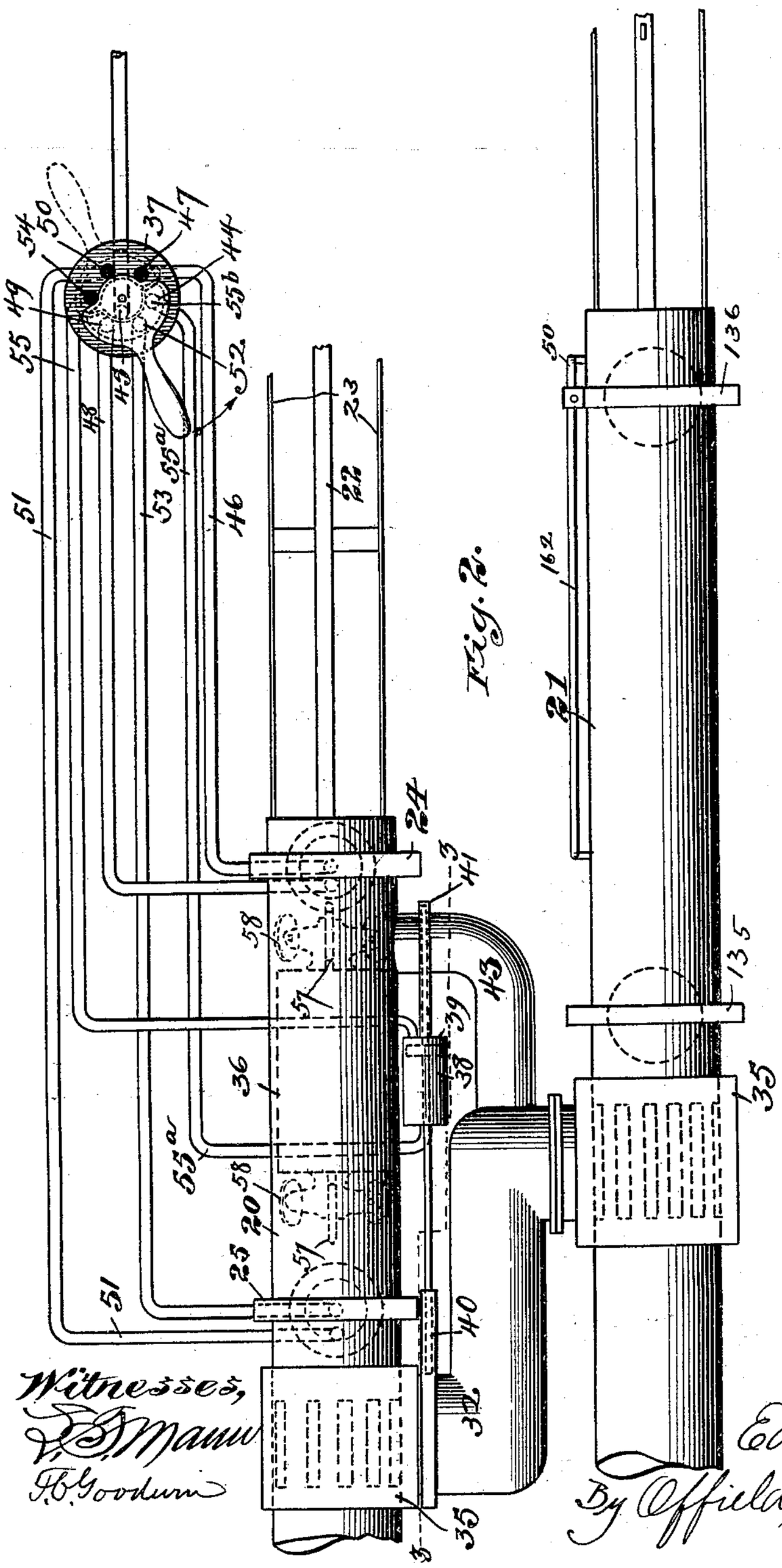


Fig. 2.

Witnesses,
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9 Sheets—Sheet 3.

Fig. 4.

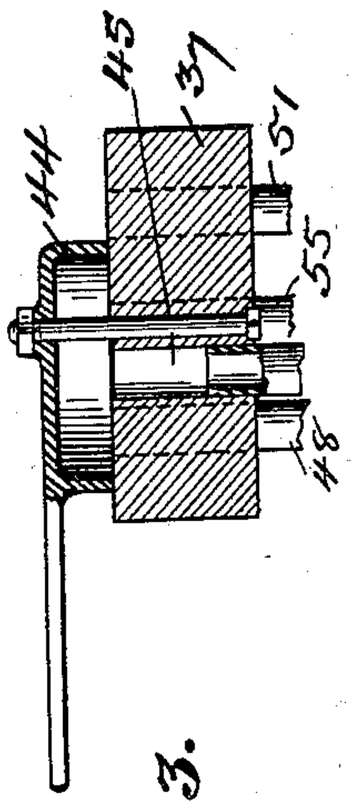


Fig. 3.




Witnesses,
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(No Model.) 9 Sheets—Sheet 4.

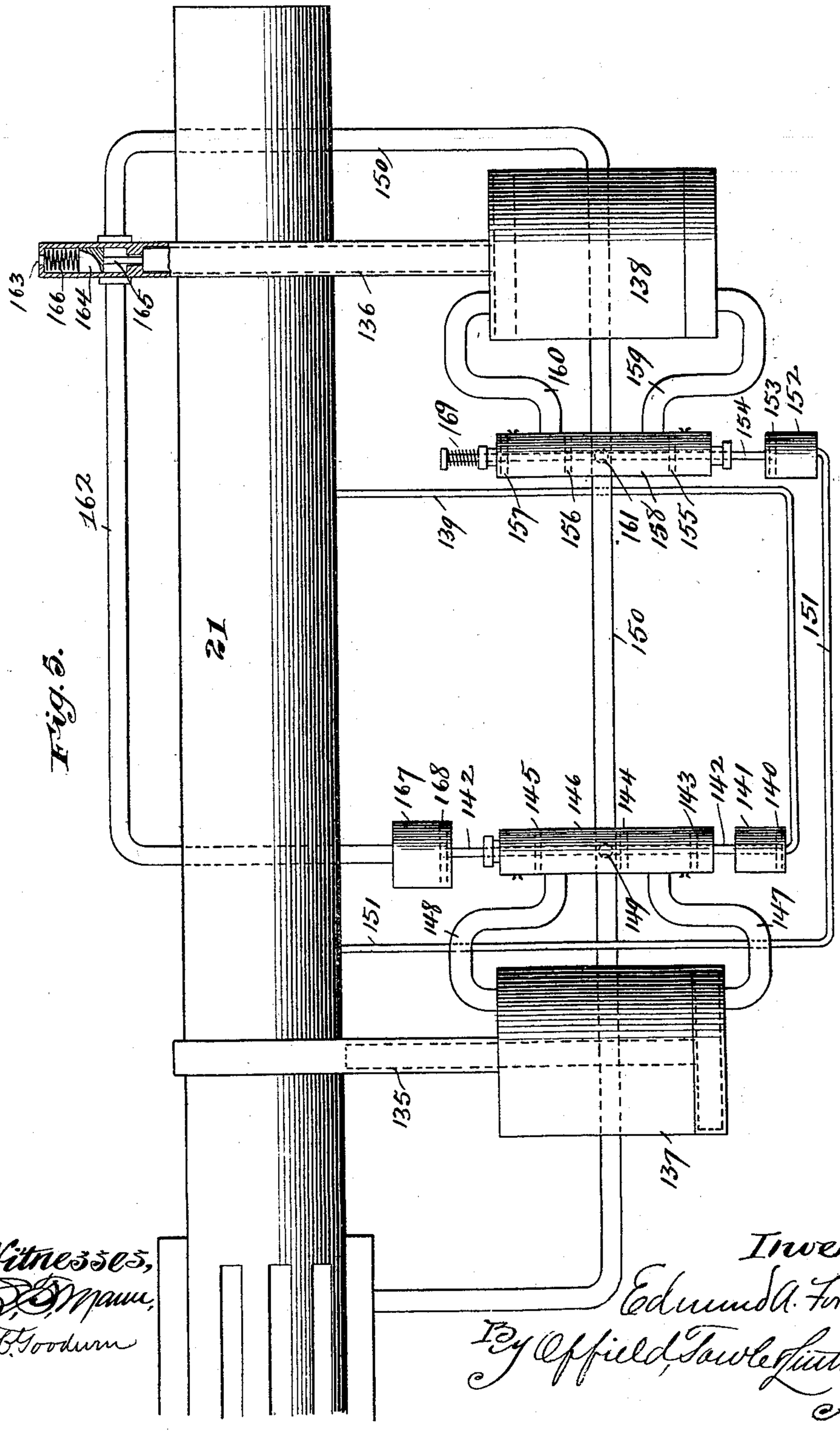


Fig. 6.

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(No Model.) 9 Sheets—Sheet 5.

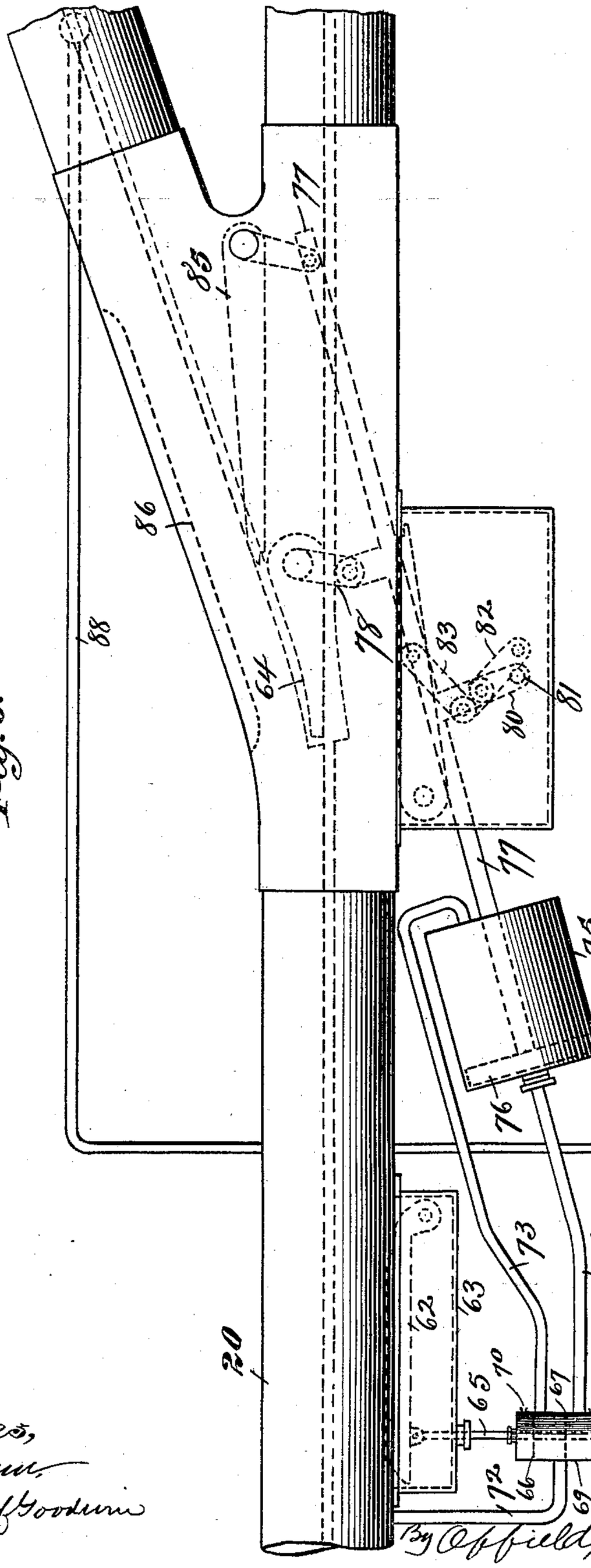


Fig. 6.

Witnesses,
L. S. Mann.
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 624,202. Patented May 2, 1899.

# E. A. FORDYCE.

## PNEUMATIC CARRIER SYSTEM.

(Application filed Mar. 6, 1897.)

(No Model.) 9 Sheets—Sheet 6.

Fig. 7.

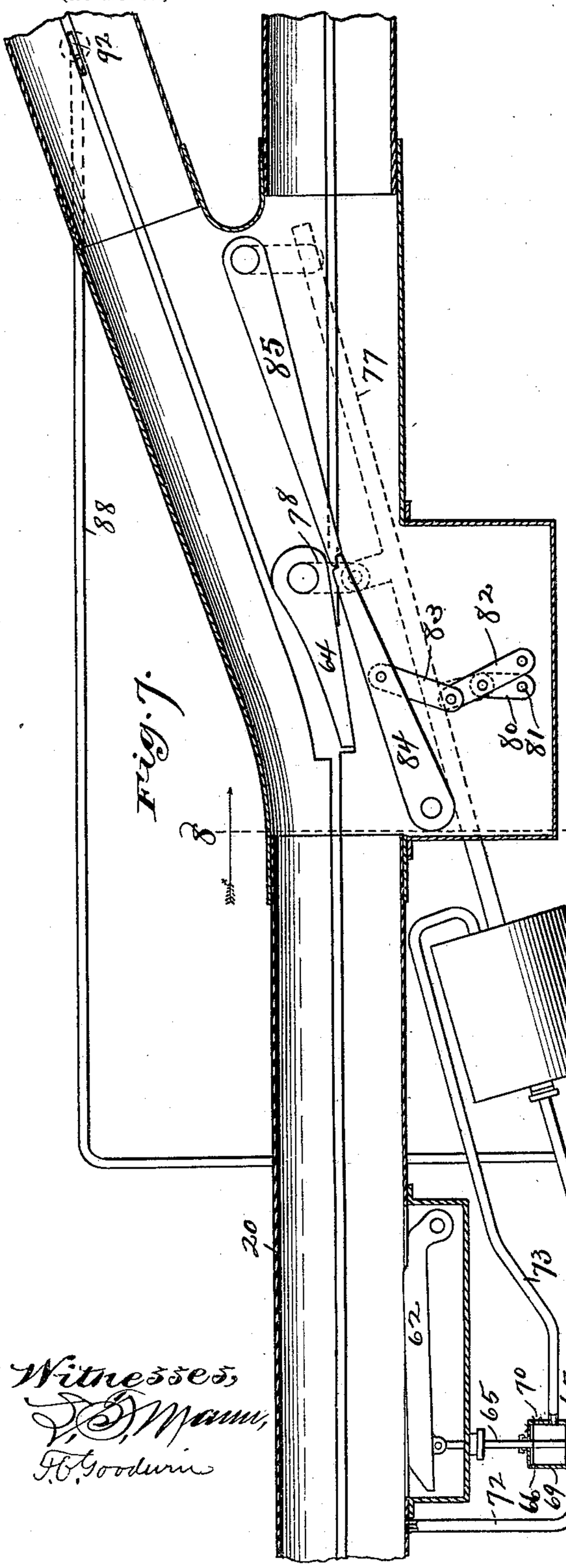
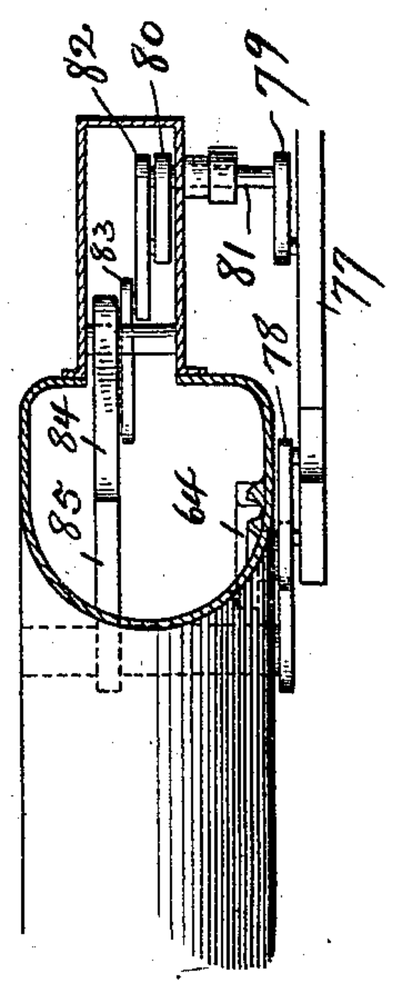



Fig. 8.

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## PNEUMATIC CARRIER SYSTEM.

(Application filed Mar. 6, 1897.)

(No Model.) 9 Sheets—Sheet 7.

Fig. 9

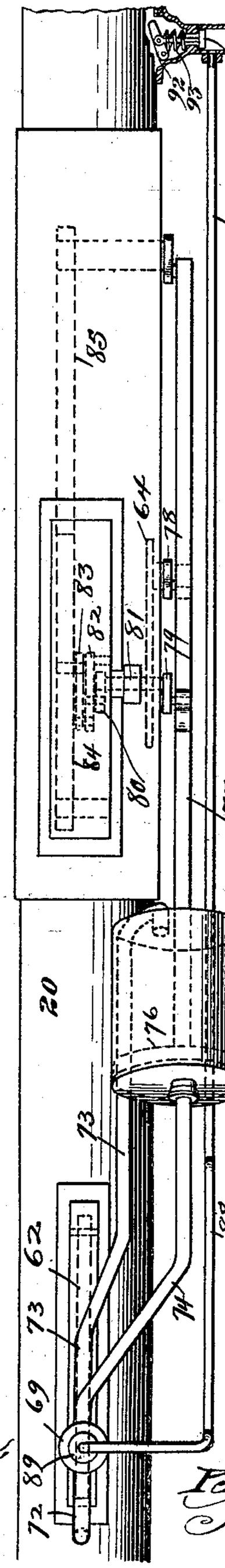



Fig. 11

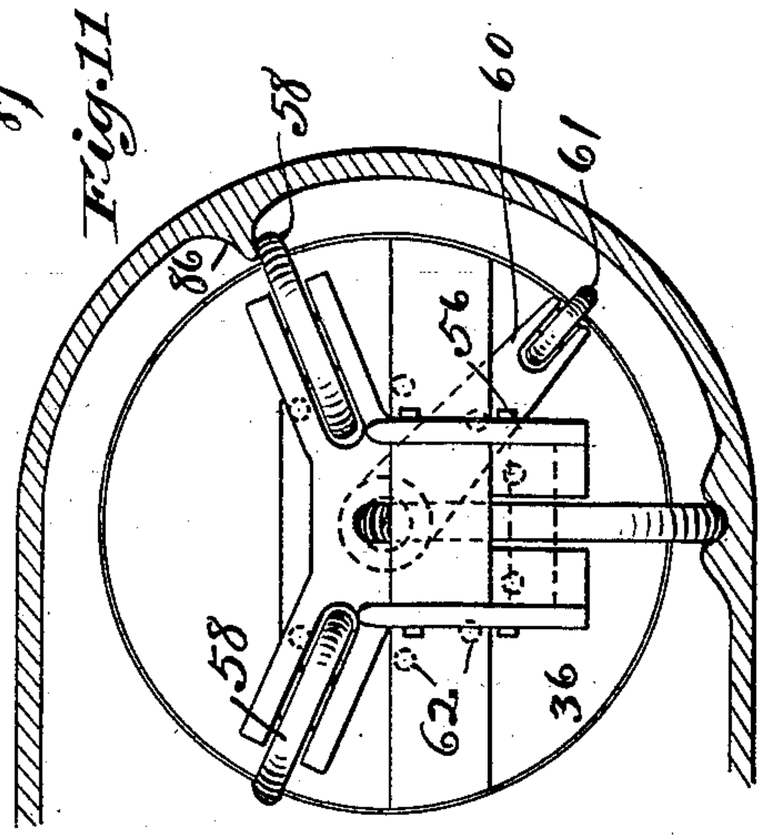
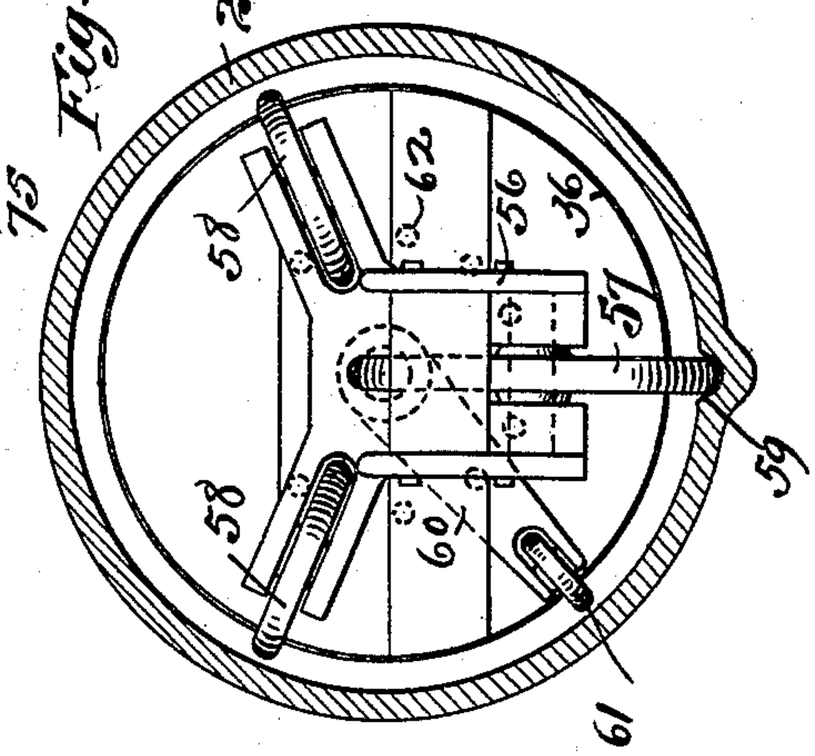



Fig. 10




Witnesses,
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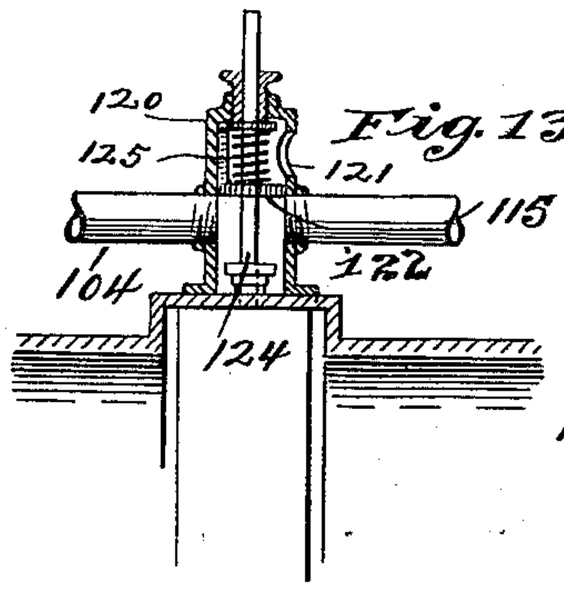


Fig. 13.

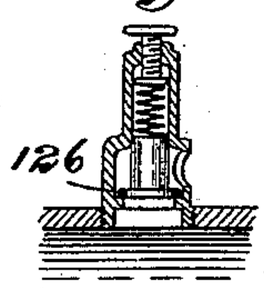


Fig. 14.

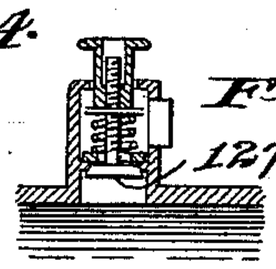


Fig. 15.

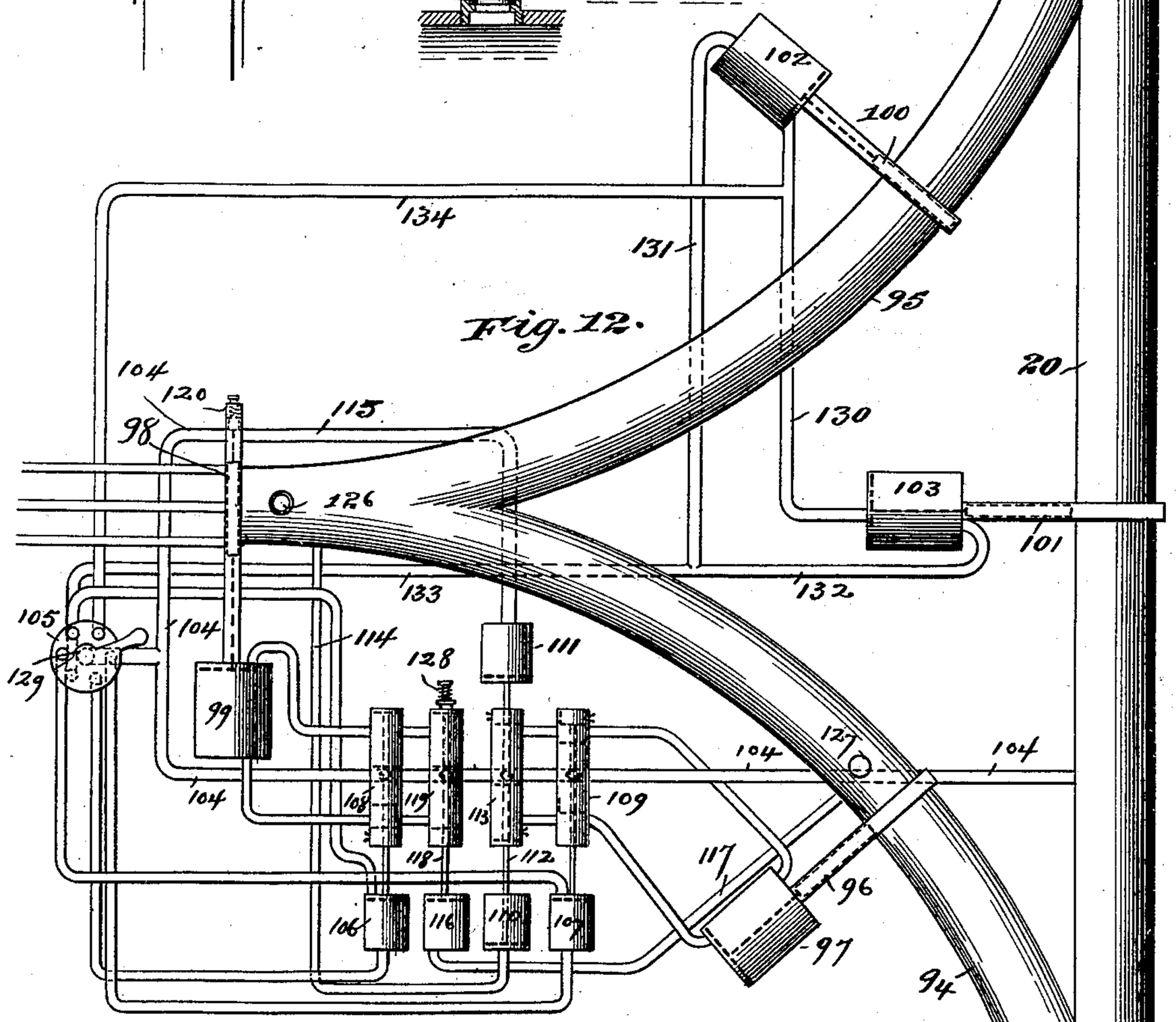


Fig. 12.

Witnesses,
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## PNEUMATIC CARRIER SYSTEM.

(Application filed Mar. 6, 1897.)

(No Model.) 9 Sheets—Sheet 9.

Fig. 16.

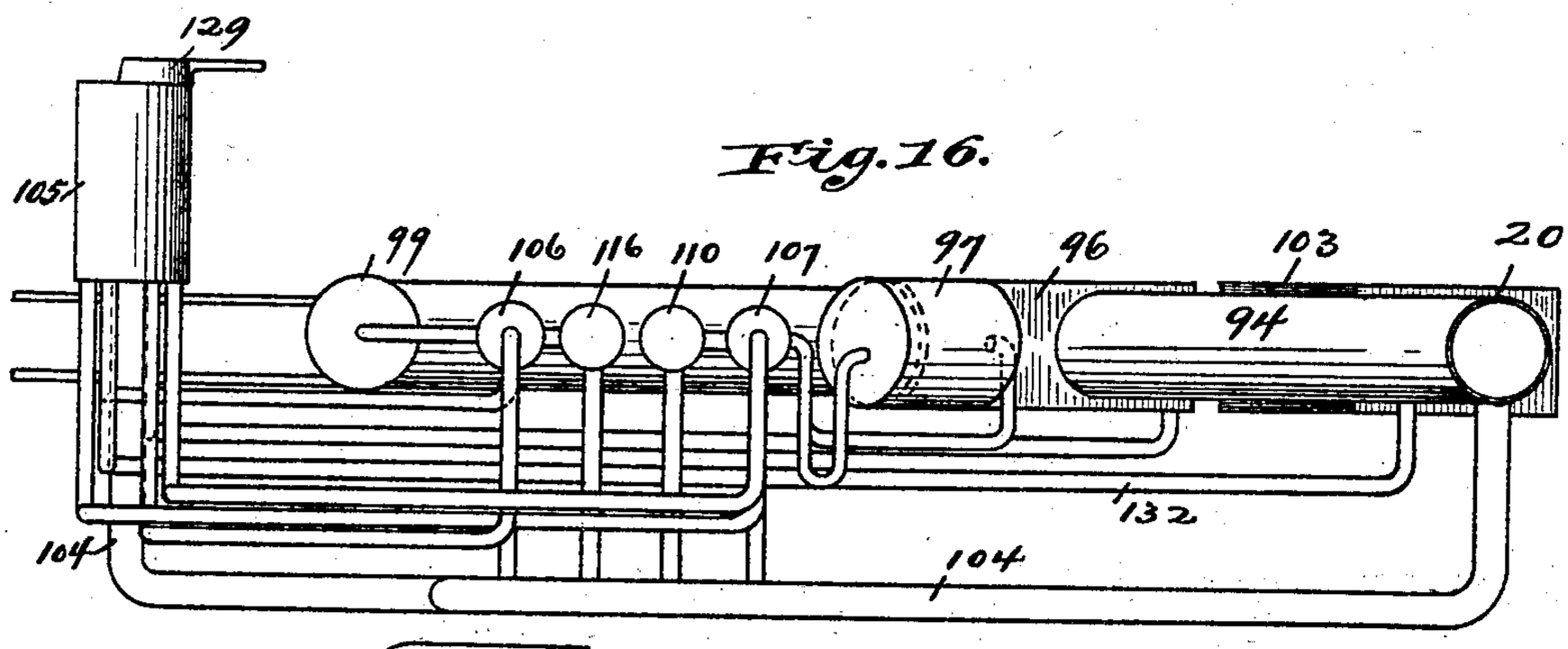



Fig. 17.

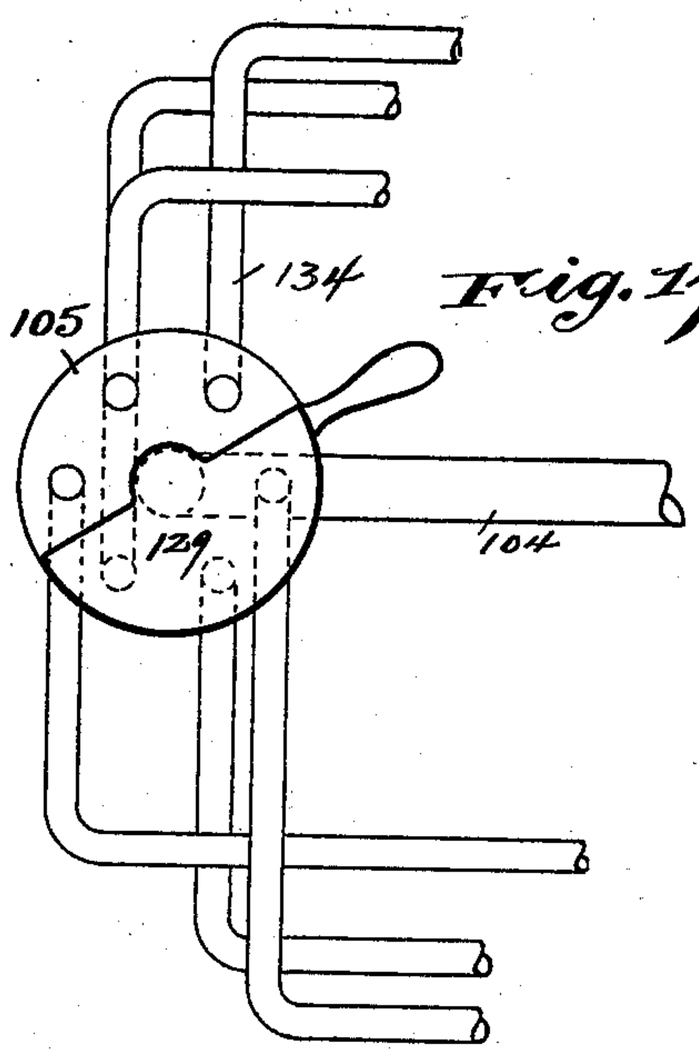
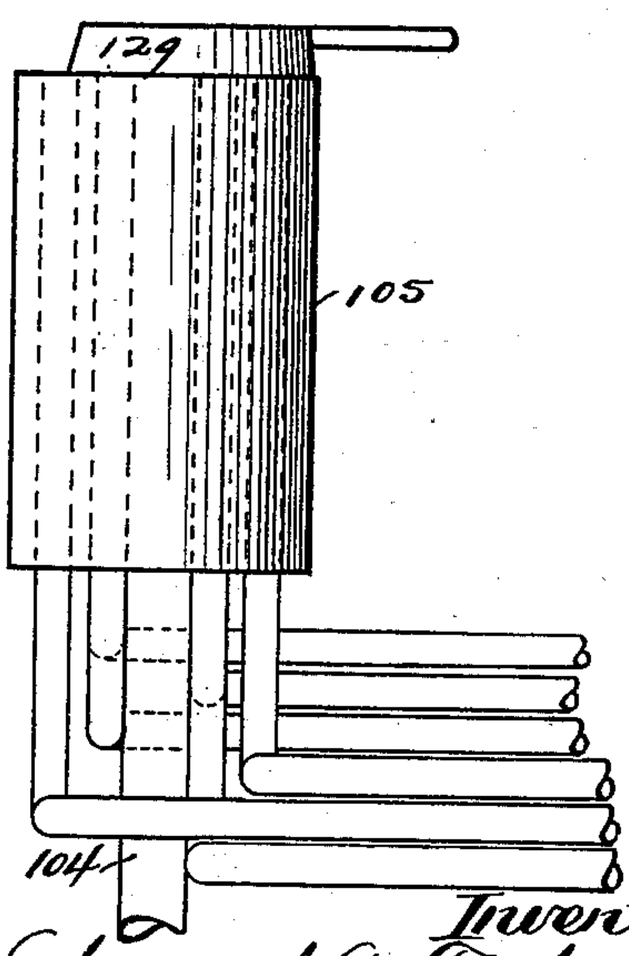



Fig. 18.

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Inventor,
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# UNITED STATES PATENT OFFICE.

EDMOND A. FORDYCE, OF CHICAGO, ILLINOIS.

## PNEUMATIC-CARRIER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 624,202, dated May 2, 1899.

Application filed March 6, 1897. Serial No. 626,200. (No model.)

*To all whom it may concern.*

Be it known that I, EDMOND A. FORDYCE, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Pneumatic-Carrier Systems, of which the following is a specification.

This invention relates to an improved pneumatic-carrier system, and more particularly to a system which is intended for transporting bulky parcels through considerable distances, and the system as shown is designed to be used belowground and in connection with cars capable of carrying loads of merchandise of several hundred pounds weight. Some of the principles of my invention may be applied in systems constructed for lighter work.

My improved system may be used with air under pressure or by the aid of a vacuum or exhaust. As arranged it is intended to be used with pressure.

My system comprises, as hereinafter shown and described, two lines of pipe or tube, one for despatching and the other for receiving, said lines being interconnected near their ends. Each line has at its ends, respectively, a despatching and a receiving terminal, and each line may have between its ends any desired number of intermediate stations, and at each intermediate station is provided a combined receiving and despatching apparatus. The air is controlled in the system by moving gates which are operated by pistons which are moved by pressure or exhaust, the movement of the pistons and the gates being controlled in some instances manually and in other instances automatically by the carrier itself.

With this general statement of the principles and constituent parts of my apparatus I will refer to the accompanying drawings, in which—

Figure 1 is a diagrammatic view showing the complete system, the line-pipes being broken away at different points in order to condense the view. Fig. 2 is a plan view of one terminal of the two lines of pipe. Fig. 3 is a sectional elevation above the line 3 3 of Fig. 2, showing that portion of the apparatus which is used as a despatch-terminal. Fig. 4 is a sectional detail of a valve-box. Fig. 5 is a side elevation of the terminal of the receiving-pipe. Fig. 6 is a plan view at the junction between one of the main tubes and a branch and showing the switch set for the main tube. Fig. 7 is a sectional plan view of the same junction, showing the switch set for the branch. Fig. 8 is a transverse section on the line 8 8, Fig. 7, looking in the direction of the arrow. Fig. 9 is a side elevation of the parts shown in Figs. 6 and 7. Fig. 10 is a transverse section of the main tube, showing a car therein, the latter having a selective device shown in connection therewith. Fig. 11 is a detail sectional view through a portion of the switch-box and designed to show a means for steadying the car while passing the curve. Fig. 12 is a plan view of one of the intermediate stations on the main tube and particularly showing the arrangement of its mechanism for controlling the gates thereof. Figs. 13, 14, and 15 are detail views of valves used in connection with the gate mechanism of the intermediate station. Fig. 16 is a side elevation of such intermediate-station apparatus; and Figs. 17 and 18 are a plan view and elevation, respectively, of the manually-operated valve used in connection with the gates of the station.

The sending-tube 20 and the receiving-tube 21 may be made of cast-iron and of any suitable diameter. It is practicable to operate a system of this sort having a main tube of from twelve to thirty-six inches in diameter. The despatch-tube 20 has a despatch-terminal, which may be of skeleton form, as indicated, and consists simply of tracks or bars 22 23 to support the carrier. The terminal portion of the tube 20 is provided with ways 24 25 for the sliding gates 26 27, said gates being controlled by pistons 28 29 working within the cylinders 30 31. These pistons are moved by pressure. The main pipes are connected together by the cross pipe or branch 32 and by the loop 33, which latter includes the compressor shown at 34. Therefore all parts of the system contain air under pressure. As shown in Fig. 2, the cross connection 32 is of elbow form, and the main tubes 20 21 are simply slitted or perforated, such slits or perforations being inclosed by a casing, as shown at 35. The despatch tube or pipe is therefore subjected to pressure in front of the gate 27, while its por-

tion intermediate the gates 26 and 27 is not subjected to the main pressure. The carrier is indicated by the dotted lines at 36 in Fig. 2, and it is shown in end elevation in Figs. 10 and 11. The gate 27 is normally closed and the gate 26 normally opened. The carrier then may be introduced into the end of the pipe 20, and then the valve mechanism will be manually operated to change the positions of said gates and to admit air behind the carrier for the purpose of carrying it forward into the tube. This valve mechanism is shown in plan view in Fig. 2 and in sectional elevation in Fig. 4. It consists of a stationary body 37, provided with a series of ports. From these ports pipes lead to the respective ends of the cylinders 30 31 and a cylinder 38, Fig. 2, said cylinder containing therein a piston 39 and piston-rods or stems extending through its ends and connected to gates 40 41. The gate 40 partially closes the cross-tube 32, and the gate 41 controls a by-pass 43, which leads from the pipe 32 into the main pipe 20 back of the position of the carrier. The several ports in the valve-body 37 are controlled by a pivoted plate 44. The valve-plate 44 is hollow on its underside, and it always covers the supply-port 45 and is arranged to cover three additional ports.

Now, supposing that the carrier be introduced into the despatch-tube, the gate 27 being closed and the gate 26 open, it will be seen that the piston 29 is at the inner end of its cylinder, while the piston 28 is at the outer end of its cylinder. The outer end of the cylinder 30 is connected to the valve-box by the pipe 46, its port being marked 47, while the opposite end of the cylinder is connected to the valve-box by the pipe 48, its port being marked 49. To move the gate 26 therefore, the valve-box plate is moved in the direction of the arrow, so as to cover the port 47 and open or uncover the port 49. This results in admitting the fluid-pressure entering by way of the port 45 through pipe 46 into the outer end of cylinder 30, thus moving the piston 28 and closing gate 26. At the same time the air in front of the piston escapes through the pipe 48 and port 49. The next operation consists in the opening of the gate 27, and this is done by swinging the valve-box an additional step, thereby covering the port 50 of the valve-box and admitting the motor fluid through pipe 51 to the upper or inner end of the cylinder 31, and at the same time the port 52 in the valve-box is uncovered and the air in front of the piston in the cylinder 31 is permitted to escape through the pipe 53. The continued or additional movement of the valve-box will put port 54 into communication with the supply and air will pass through that port and a pipe 55 into one end of the cylinder 38, so as to drive the piston 39 in a direction to open the gate 41 and partially cut off the current of air passing through branch 32 by means of the gate 40. The air in front of piston 39 escapes through pipe 56 and port $55^b$. This partial closing of the passage between the two main tubes will result in sending the greater portion of the air through the pipe 43 into the sending-tube 20 behind the carrier, and the latter will therefore be forced out into the main-line tube. After the carrier has passed the gate 27 the valve mechanism is returned to its original position, thus in due order and sequence opening branch 32, closing the branch 43, closing gate 27, and opening gate 26. The carrier proceeds through the despatch-tube to the end of the line unless it is switched out at an intermediate station. To enable this switching to be done automatically, the carrier itself is provided, preferably, with selective devices, which will now be described.

The body of the carrier or goods-receptacle 36 is mounted upon a frame 56, supported by wheels 57, and it also has preferably antifriction guide-rollers 58. The tube is provided with a groove 59 for the track-wheel 57, and an arm 60 is pivoted at one end to the frame 56 and at its outer end carries a roller 61. Said arm may be set at any desired angle by means of a pin passing through the arm and into any one of the series of apertures 62. This arm acts as a selective device to operate switching mechanisms, which are shown in Figs. 6 to 9, inclusive. The tube 20 has arranged adjacent to the intermediate stations a pivoted shoe 62, arranged within a suitable air-tight casing 63, the edge of the shoe projecting through a slot in the wall of the tube and in the path of the antifriction-roller on the arm 60. These shoes 62 will be arranged in different positions in the periphery of the main tube and in radial coincidence with the several positions in which the selective device may be placed. The movement of this shoe on its pivot is made to control the switch 64, and this may be done either mechanically, pneumatically, or electrically. I have shown intermediate means whereby the switch is pneumatically controlled, the pressure fluid being diverted from the system. Figs. 6 and 7 show the switch in its two positions. The shoe 62 operates a sliding stem or plunger 65, which has the valve-plates 66 67 68, and the valve-casing 69 has the vents 70 71 therein. The pipe 72 leads from the main tube 20 into one side of the valve-casing, and from the opposite side the pipes 73 74 lead to the respective ends of the pressure-cylinder 75. The piston 76 within said cylinder is connected to a rod 77, which extends back beyond the switch 64, but is connected intermediate its ends to the switch by the link 78. At a point between the cylinder and the switch connection the rod 77 is connected by means of the cranks 79 80 and crank-shaft 81 with the toggle-links 82 83, the latter being pivotally connected to the pivoted guide-bar 84. The extremity of the rod 77 is pivotally and eccentrically connected in a similar manner to the guide-bar 85. The ends of these guide-

bars meet, thereby forming an elevated bridge or guide-rail across the main tube and in line with the inner wall of the branch tube. On the opposite wall of the branch tube a fin or rib 86 is located, under which the roller 58 takes, thereby, in conjunction with the groove 59 in the bottom of the tube, steadying the carrier and guiding it properly into the branch tube. The guard-arms are intended for the same purpose, and both of these provisions may not be found necessary. In Fig. 7 the switch is set for the branch tube, and after a carrier passes through into the branch tube it is necessary to return the switch mechanism to its normal position. To do this, I employ the following mechanism: A pipe 87 is connected into the side of the branch tube, said pipe being open at its lower end, and a pipe 88 is connected therewith above the open end and leads to the lower end of a small pressure-cylinder 89. The valve-stem 65 projects through into said cylinder 89, and a piston 90 reciprocates therein. Normally, therefore, the space below said piston is open to the atmosphere. In the pipe 87 a small plunger 91 reciprocates, its stem being connected with a trip-arm 92, which is normally upheld by the spring 93, thus maintaining the plunger above the end of the pipe 88. As the carrier passes out through the branch tube the switch-arm 92, which will be in the path of the main track-wheel 57, will be depressed, thus driving the plunger below the end of the pipe 88 and permitting the air-pressure from the system to pass through said pipe into the cylinder 89 below the piston therein. This will result in shifting the valve-stem 65 and its valves and returning the shoe 62 to its normal position. In shifting the valve-plates 66, 67, and 68 the air will be exhausted from in front of the piston 76 and pressure admitted behind it to return it to its normal position, and this will result in returning the switch and guard-arms to their normal positions. This switching mechanism may of course be employed simply to divert the carriers to an intermediate station; but as it is desirable to return the carriers into the main line again I have shown in the drawings provisions at the intermediate stations for this purpose. What has heretofore been called the "branch tube" is marked 94, and its outer end or extremity is joined into a return branch tube 95. Beyond the trip 92 above described a gate 96 is arranged so as to close the tube, said gate being controlled by a piston within the cylinder 97. A similar gate is provided at the extremity of the branch tube 94 and return-tube 95 and is marked 98, being controlled by a piston within the cylinder 99. Gates 100 and 101 are arranged in the return branch 95 and in the main tube 20, respectively, and are controlled by pistons working within the cylinders 102 103. Said pistons are moved by air-pressure diverted from the system or main tube through the pipe 104, which leads to the valve-box 105. Said valve-box controls a series of ports and pipes leading from said ports to the ends of the cylinders 102 and 103 and to two additional cylinders 106 107. Pistons working within said latter cylinders have valve-plates working within the valve-casings 108 109, and pipes connect said valve-casings with the opposite ends, respectively, of the cylinders 97 and 99. Said valve-casings are also connected with the supply-pipe 104. Cylinders 110 111 have pistons connected by the valve-stem 112, and said valve-stem carries valve-plates within the cylinder or casing 113, the latter being connected with the supply-pipe 104, and the outer end of the cylinder 110 is connected by the pipe 114 with the branch 94 near its outer end, while the cylinder 111 has its outer end connected with an extension 115 of the pipe 104. A cylinder 116 is connected by the pipe 117 with the branch 94, and a piston therein has a stem 118, carrying valve-plates within the valve-casing 119. The latter valve-casing is connected with the supply-pipe 104 and with the opposite ends of the cylinder 99. A vent is provided in the pipe 115, and said vent is shown in detail in Fig. 13. Said vent consists of a nipple 120, having an opening 121 to the atmosphere. An angle-valve 122, carried by the stem 124, is normally held by the spring 125 in position to close said vent, so that the pressure is normally in chamber 111 upon the piston thereof, thereby maintaining the valve-plates in the valve-casing 113 in position to admit the main-pipe pressure into cylinder 97 and holding the gate 96 open. A relief-valve (shown in detail in Fig. 14 and marked 126) is located near the extremity of the branch 94, which will permit air to escape when an excess pressure is created by the momentum of the carrier within said terminal portion of the branch, and a vacuum relief-valve 127 ( shown in detail in Fig. 15) is located in the branch tube 94 near the gateway 96, and which will be raised to admit air into the system under certain conditions.

As the carrier passes into the branch tube 94, the gate 96 being normally open and the gate 98 closed, the carrier will compress or condense the air in front of it, thereby increasing the pressure of the air in said closed end. The excess pressure will flow through pipe 114 into the cylinder 110, thereby raising its piston and shifting the valve-stem 112 and moving a piston contained in the cylinder 111 against the main pressure received by the latter through pipe 104 and its extension 115. The shifting of the valve-plates in the cylinder 113 will admit the pressure from pipe 104 into the outer end of the cylinder 97, and its piston will be driven in, thus closing the gate 96 behind the carrier. The carrier fitting closely within the branch tube and moving with considerable velocity will after the gate 96 is closed produce a minus pressure in the pipe between it and the gate, and thereby a

suction is produced through pipe 117 on the piston in the cylinder 116, thereby shifting the stem 118 and the valve-plates carried thereby within the valve-casing 119 and admitting the pressure from the pipe 104 through the valve-casing into the cylinder 99, so as to drive its piston to the opposite end of the cylinder, thereby opening the gate 98, and the carrier will pass out. As soon as the carrier leaves the tube the extremity of the latter has only atmospheric pressure therein, and a spring 128 shifts the valve-stem 118 and the piston in the cylinder 116 to the first position, and the air-pressure through pipe 104 again flows into the cylinder 99, closing the gate 98. As the gate 98 opens it releases the stem 124, and the spring 125 shifts the valve 122, thus uncovering the vent 121 and relieving the pressure in pipe 115. As the gate closes again it restores the valve 122 to its normal position, thus covering the vent and permitting the pressure to enter from pipe 104 through the extension 115, forcing the cylinder in piston 111 down, shifting the valve in the casing 113, and admitting pressure to the inner end of the cylinder 97, thereby opening the gate 96.

In order to despatch the carrier through the branch 95, it is necessary to close the main tube 20 and open the branch 95. To do this, the valve-cover 129 is shifted so as to admit air-pressure from the pipe 104 to the outer end of the cylinder 103 and to the inner end of the cylinder 102. Said ends are connected by the pipe 130, while their opposite ends are connected by the branch pipes 131 and 132 with a pipe 133, leading to the valve-body 105, and the connecting-pipe 130 also has communication with the valve-body through the pipe 134, air-pressure being admitted through the last-named pipe. In order to despatch a carrier, it is necessary first to close the gate 96, which is done by shifting the valve-cover 129 so as to admit the pressure to the cylinder 107, which will cause its piston to travel outwardly, thus shifting the valve-plates in the casing 109 and allowing the air-pressure from pipe 104 to escape directly into the outer end of the cylinder 97, thus closing the gate 96. A further movement of the valve-cover will admit air from pipe 104 into the cylinder 106 through its connecting-pipe, thus driving its piston out and shifting the valve-plates in the casing 108 so as to admit the pressure from pipe 104 into the inner end of the cylinder 99, thus opening the gate 98. The carrier is now put in, and the valve-cover is turned back, so as to admit air to the lower end of the cylinder 106, thereby shifting the valve-plates and permitting the pressure to pass into the outer end of the cylinder 99, thus closing the gate, and a further return movement of the valve-cover will admit air to the cylinder 107, thus shifting the valves in the casing 109 and admitting air to the inner end of cylinder 97, thus opening the gate 96. The valve-box cover is now moved so as to admit pressure from pipe 104 into pipe 134 and its branch 130, and this will simultaneously close gate 101 and open gate 100. The flow of air will now be through the branch 94 and will drive out the carrier through the branch 95 into the main tube. The valve mechanism is now moved back one step, thus venting the pipe 134 and admitting pressure through the pipe 133 and its branches 131 132, which will operate to simultaneously close gate 100 and open gate 101.

The above-detailed description discloses how a carrier sent through the despatch-tube may be switched out at an intermediate station, and after being unloaded again despatched from said intermediate station to another station on the line or to the end of said line. Carriers destined for the terminus of the line are received on the terminal device. (Shown particularly in Figs. 2 and 5.) Said terminal portion of the tube 20 is the same as the terminal portion of what has been designated the "receiving-tube" 21, and will therefore be described in connection with the latter. Said tube is provided near its end and beyond the cross-tube 32 with two gates, (indicated at 135 136,) and said gates are controlled by air-pressure exerted within the cylinders 137 138. The carrier passing into the terminal portion of the tube compresses the air in front of it, the gate 135 being open and the gate 136 closed. This excess pressure operates through the small tube 139 to move a small piston 140 in the cylinder 141, and said piston has a valve-stem 142, carrying three valve-plates 143 144 145 within a casing 146, having two vents to the atmosphere and connection by the pipes 147 148 with the opposite ends of the cylinder 137. The movement of the piston 140 raises the valve 143 above the vent adjacent to it, and the valve-plate 144 crosses the port 149, to which air is supplied from the system through the pipe 150. Such air therefore goes directly through the pipe 147 into the outer end of the cylinder 137, driving said piston inwardly and closing the gate 135. The momentum of the carrier produces a vacuum between it and the gate 135, and such rarefaction causes a suction through the small pipe 151 in the cylinder 152, thus withdrawing the piston 153 therein and shifting a stem or rod 154, carrying the valve-plates 155, 156, and 157 in the casing 158. Said casing has vents to the atmosphere and is connected by the pipes 159 160 to opposite ends of the cylinder 138. The shifting of these valve-plates will admit air through a port 161, supplied from the pipe 150, and such air will pass through the pipe 160 into the inner end of the cylinder 138, driving the piston thereof out and opening the gate 136. The pipe 150 is looped, and its extension 162 is provided with a vent at 163, such vent being controlled by a valve 164, said valve hav-

ing a stem 165, which is contacted by the gate when the latter is closed; but when the gate opens the valve is moved by its spring 166, so that the extension 162 is vented to the atmosphere. This relieves the extension 162 of pressure, and said extension is connected to a cylinder 167, having a small piston therein marked 168 and connected to the valve-stem 142. The carrier passes out of the terminal and the end of pipe 21 fills with air at normal pressure, the gate 135 being closed. The spring 169 then returns the valve-stem 154 to its normal position, again shifting the valves 155, &c., and admitting air under the main pressure through pipe 150 into the casing 158 and thence through the pipe 159 into the outer end of the cylinder 138, returning its piston, closing the gate, and also closing the vent, which allows the direct pressure to pass through pipe 150, its extension 162, into the pressure-chamber 167, thereby shifting the valves 143, &c., and admitting air-pressure from pipe 150 through the pipe 148 into the inner end of the cylinder 137 and opening the gate 135.

I claim—

1. In a pneumatic-carrier system, the combination, with a despatch-tube, of sliding gates in the terminal portion of said tube, said gates being separated whereby to receive the carrier between them, pressure-chambers having piston devices for moving said gates, pipes connected with said pressure-chambers for conveying the pressure fluid from the main despatch-tube to the pressure-chambers, and a manually-operated valve for controlling said pipes, whereby said gates may be closed in due order and relation, substantially as described.

2. In a pneumatic-carrier system, the combination, with a despatch-tube and receiving-tube communicating with each other near their terminal portions, the despatch-tube having gates in the terminal portion thereof separated to receive the carrier between them, of pressure-chambers for operating said gates, pipes for delivering the motor fluid to said chambers, a by-pass leading into said terminal portion behind the carrier, and means whereby the motor fluid or a portion thereof may be diverted through said by-pass for expelling the carrier, substantially as described.

3. In a pneumatic-carrier system, the combination, with the despatch-tube and receiving-tube communicating with each other near their terminal portions, the despatch-tube having gates in the terminal portion thereof, whereby said portion may be put into open communication with the body of the tube or closed off therefrom, of a by-pass connecting the receiving-tube and the terminal portion of the despatch-tube between the gates, valves or gates for controlling the passage of the motor fluid to said despatch-tube beyond the gates and to said terminal portion, and means for controlling said gates and valves, whereby the terminal may be cut off from the main pipe and opened to receive the carrier, and then put into communication with the main pipe and closed to the atmosphere and a portion of the motor fluid directed into said terminal portion behind the carrier to move it into the main tube, substantially as described.

4. In a pneumatic-carrier system, the combination, with the main tube and its branch, of a switch located at the junction of said main and branch tubes, means for operating the switch, and movable guides connected with the switch-operating devices and adapted to extend across the switch junction and form continuous side guards or guides for the upper portion of the carrier when passing into the branch tube, substantially as described.

5. In a pneumatic-carrier system, the combination, with a main tube and its branch, each having a groove in the lower portion of its wall, said grooves intersecting at the junction of the main tube and of the branch and adapted to receive therein the wheels of the carrier, of a movable switch arranged in the bottom of the main tube and adapted to engage with the wheels of the carrier traveling in said tube for diverting the carrier into the branch, and a stationary guide-rib on the inner wall of the branch tube at the junction and adapted to engage the carrier near the top thereof, substantially as described.

6. In a pneumatic-carrier system, the combination, with a main despatch-tube having suitable receiving and delivery terminals and intermediate stations each having a receiving branch and a delivery branch, of a gate or valve for closing the extremity of said branches, gates in said branches and a gate in the main tube between the junctions of the branches therewith, and suitable pipe connections, whereby the motor fluid may be diverted from the main into the receiving branch and thence into the despatch branch, substantially as described.

7. In a pneumatic-carrier system, the combination, with the main tube, of intermediate stations therefor, composed of a receiving branch and a despatching branch joined together at their terminal, a gate closing the said terminal, gates or valves in the branches and a gate or valve in the main tube between the junctions of the branches therewith, and pressure devices for operating said several gates with suitable pipes and pipe connections, whereby a carrier received into said station and compressing the air in the terminal of the branch tube operates to open the outlet of said tube and close the gate intermediate said outlet and the main tube, substantially as described.

8. A despatch-tube terminal comprising, in combination, gates adapted to close said tube

at separated points, pressure-cylinders having pistons connected with said gates and suitable pipes and valves, whereby the pressure in the main tube normally operates to hold one of said gates open and the other closed and said valves being adapted to be shifted by the compression of the air in the terminal portion of the tube due to the movement of the carrier toward the end thereof, whereby the position of said gates is reversed, substantially as described.

EDMOND A. FORDYCE.

Witnesses:
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E. L. HUBER.