(No Model.) 3 Sheets—Sheet 1.

C. M. JOHNSON.

PNEUMATIC DISPATCH TUBE SYSTEM.

No. 332,905. Patented Dec. 22, 1885.

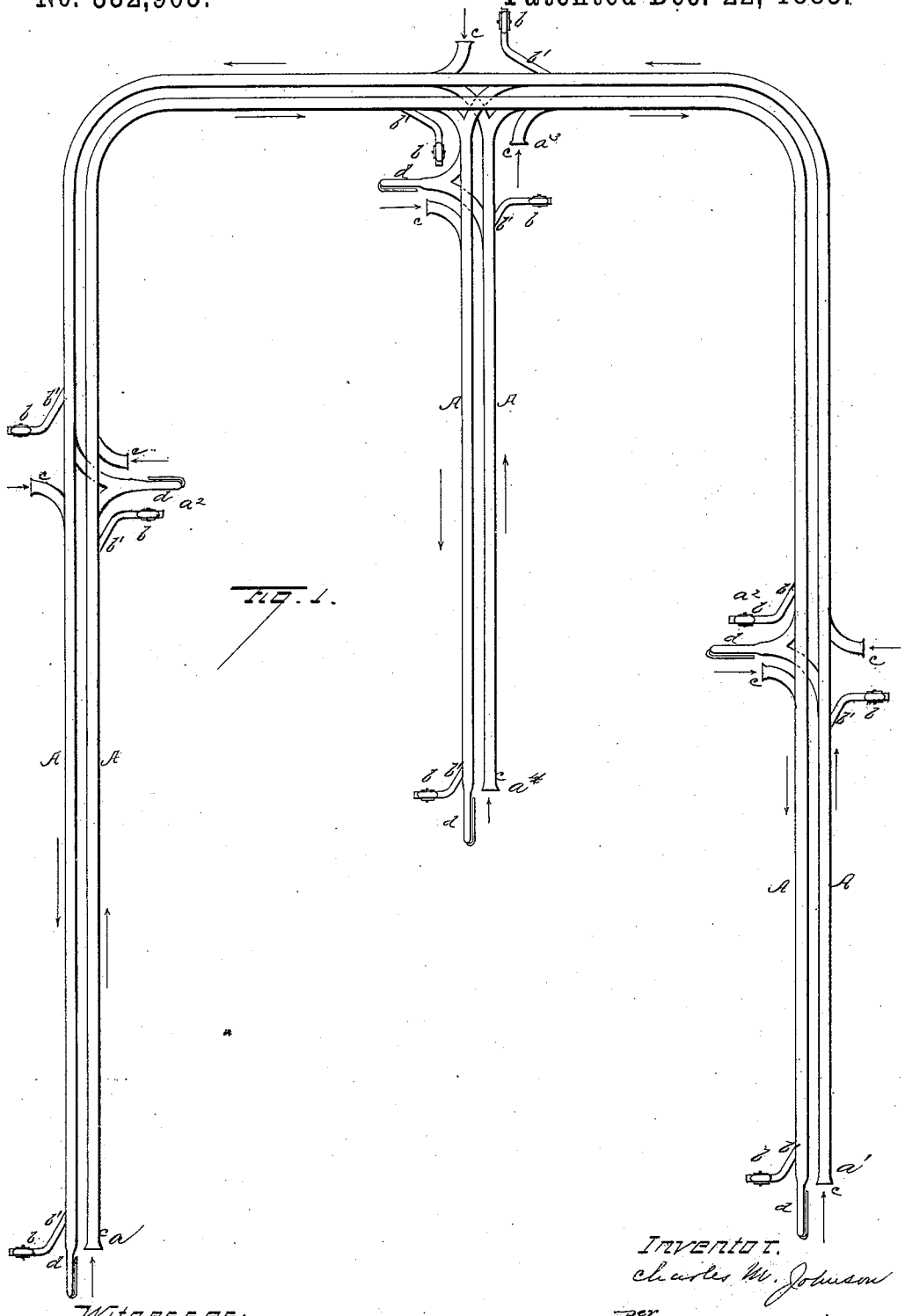

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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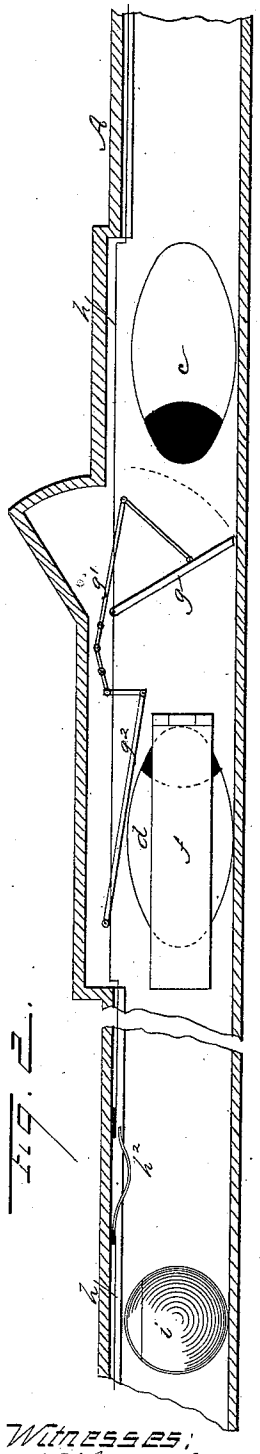

Fig. 2.

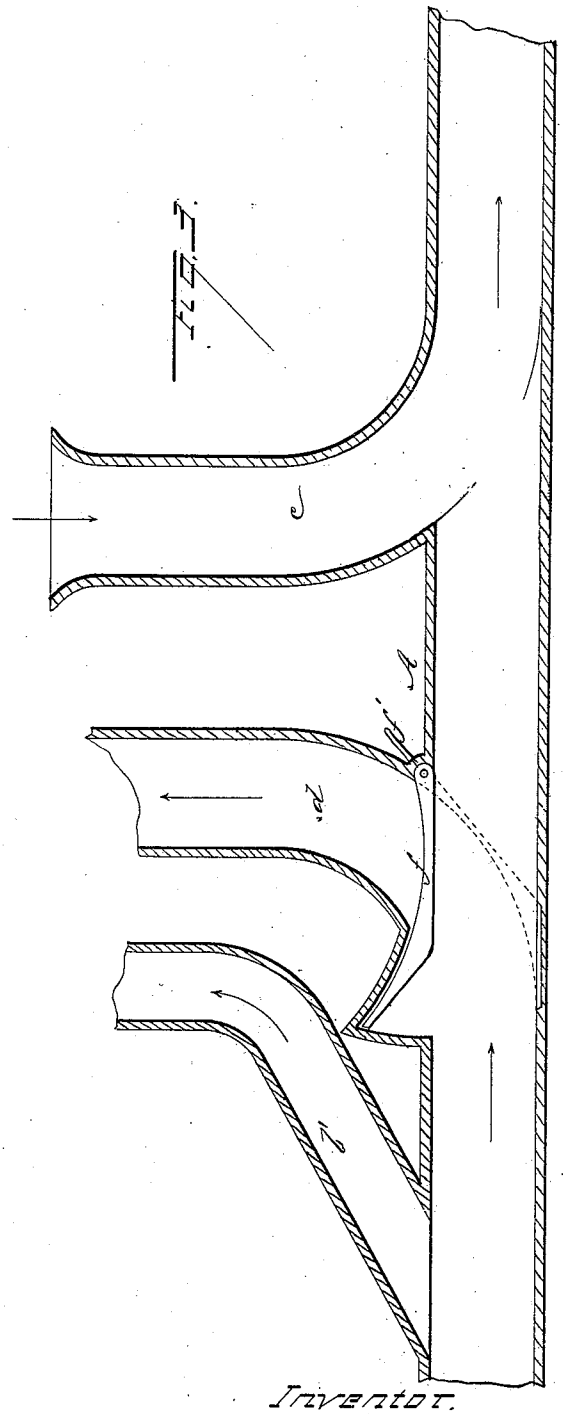

Fig. 1.

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(No Model.) 3 Sheets—Sheet 3.

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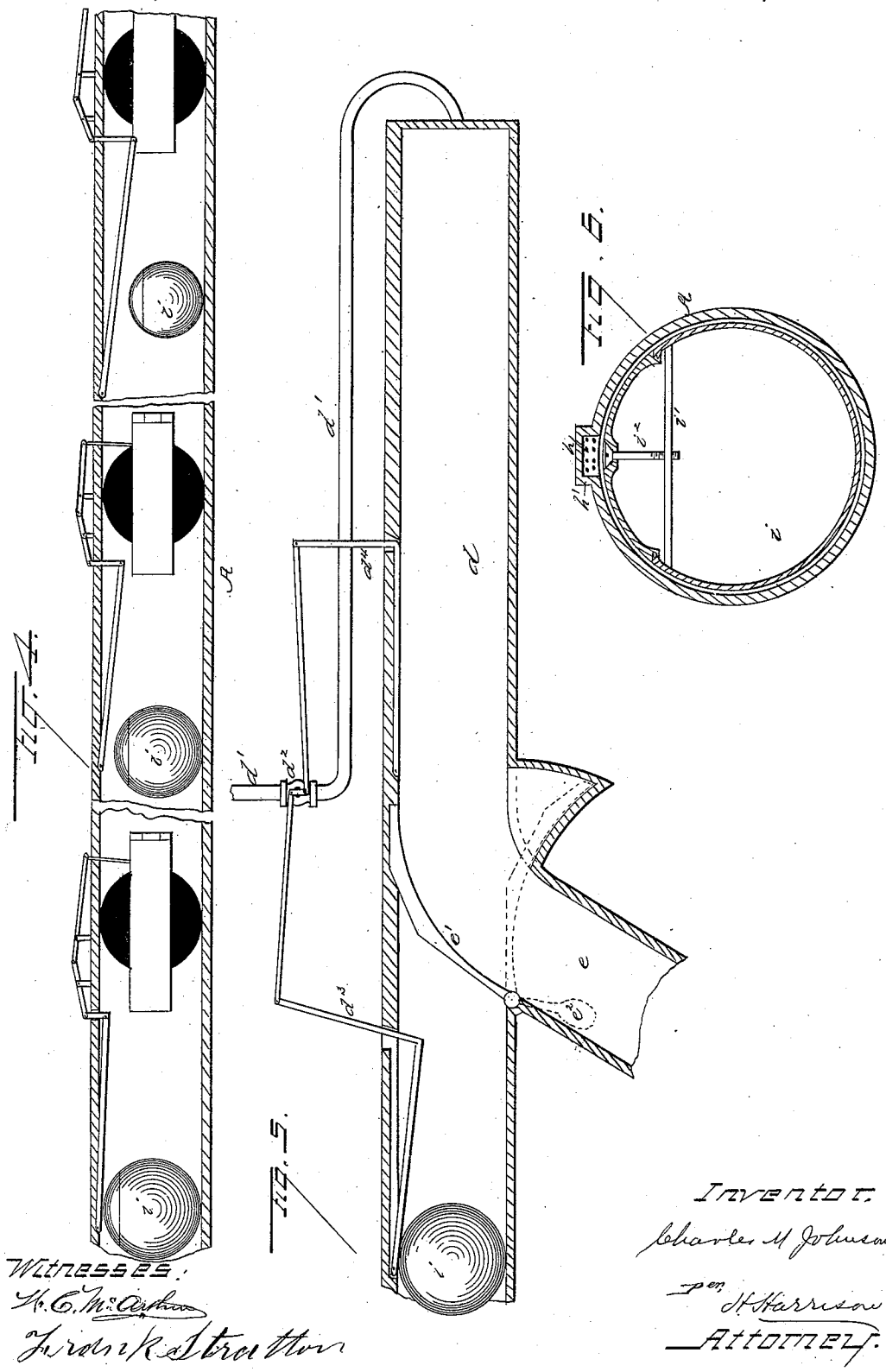

Fig. 4.

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES M. JOHNSON, OF CHICAGO, ILLINOIS.

PNEUMATIC DISPATCH TUBE-SYSTEM.

SPECIFICATION forming part of Letters Patent No. 332,905, dated December 22, 1885.

Application filed March 21, 1885. Serial No. 159,661. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. JOHNSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Dispatch-Tube Systems, of which the following is a specification, to wit:

This invention relates to pneumatic dispatch-tube systems; and it consists in certain peculiarities of the construction and operation of the same, substantially as will be hereinafter more fully described and claimed.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the accompanying drawings, in which—

Figure 1 is a diagram view of my system. Fig. 2 is a vertical, and Fig. 3 a horizontal, section of my tube, showing the means of operating the switches and gates. Fig. 4 is a modified form of gate used with a series of carriers of varying size. Fig. 5 is a sectional view of the receiving-cushion and exit at the terminal, and Fig. 6 is a transverse section of the tube and one of the balls.

A represents the conducting-tubes, of which there will be one or more, as may be required to perform the desired service, two being shown in the diagram of Fig. 1—one for the outgoing and the other for the incoming carriers—and they will be constructed of any material or size best adapted to the object in view, and laid beneath, upon, or above the surface of the ground, as desirable, this not being of any material effect in the system I have in view. The tubes will of course be used in stores, or between houses or business-places, wherever desired; but I have shown and shall now describe the system as applied to public service between cities, and the shorter and more easy uses will be readily comprehended therefrom.

a represents one end or terminal station, and a' the other end of my system, while a^2 represents stations at various points along the line, and a^3 the junction with a branch line running to some point, a^4, off the main line, as will be at once understood.

The tubes or conductors are constructed air-tight, of any desired form, and the carriers are also of various shapes; but I have illustrated and prefer to use a cylindrical tube and a carrier formed of a hollow sphere, which will be hereinafter described in detail.

b represents an exhaust-fan, of suitable form, connected by a pipe, b', with the tube, by which the air is drawn out or exhausted, to allow the pressure of air behind the carrier to force it forward. Each station or terminal is provided with one of these fans, which is connected to the incoming tube, and also with an entrance or supply pipe, c, which connects with the outgoing tube, and through which air is supplied as well as the carriers inserted. Each terminal has its incoming tube provided at its end with a cushioning-cylinder, d, of suitable length, and of a diameter to closely fit the carrier when it enters. The end of this chamber d is connected by a pipe, d', with any suitable reservoir of steam or compressed air, (not deemed necessary to illustrate herewith,) and, as represented in Fig. 5, this supply-pipe is provided with a stop-cock or valve, d^2, connected to two angle-levers, d^3 d^4, hinged within the cushioning-cylinder. When a carrier enters the cylinder, it strikes and throws up the first lever, d^3, and opens the valve to allow the steam or compressed air in the reservoir to rush into the cylinder behind the carrier. When sufficient steam or air has been admitted to accomplish the purpose, the second lever, d^4, is struck and the valve closed, not only preventing the admission of more air or steam, but also preventing that already admitted from being driven back again. The onward force of the carrier compresses the air in the cushion, and the carrier is easily and readily stopped without jar or shock. The expansion of the air or steam again drives the carrier backward and out at the side through an exit-passage, e, connected to the side of the cylinder, and provided with a gate or switch, e', which lies normally across the tube, and while yielding readily to the passage of the carrier on its entrance, at once flies back to position and directs it outward on its return. A weight, e^2, secured upon the gate, operates it automatically to produce this movement. Each station on the line is provided with a cushioning tube or chamber

connected to the main tubes, and one cushion may be used to receive the carriers from both main tubes, or one may be used for each, as desired. In any case the junction of the main tube and the cushioning-chamber is provided with a gate or switch, *f*, operated by a handle, *f'*, on the outside, as in Fig. 3, to cut a carrier out of the main line and direct it into the cushion, when desired. In long lines having more than one station the line will be divided into sections, each of which is provided with an exhaust fan and an air-supply at opposite ends, as indicated in Fig. 1, and the carrier is drawn along by the influence of one of these fans till its section is passed and the next one entered.

To cut off the air-connections between the sections, I hinge within the tube, between the connection of the fan and the next air-supply, a gate, *g*, as in Fig. 2. This gate will yield readily to the passage of the carrier under momentum; but to prevent too sudden a shock I connect it by an intermediate series of levers, *g'*, to a hinged and inclined lever, g^2, the lower end of which is gradually lifted as the carrier passes under it, and thereby lifts or opens the gate. The latter then falls again after the ball has passed, and prevents the air from the adjacent supply from being drawn backward, thereby reducing the force applied to carry the ball forward.

When a carrier is started at any point, the stations along the line are notified by telegraph or similar means of its destination, and as in a long line many carriers may be *en route* at one time they will usually be numbered, and in order that their passage may be accurately known and the proper one cut out at its destination I provide the tube with one or more electric conductors, *h*, either laid alongside or in a recess or groove, *h'*, of the tube. These conductors are at one or more points in each section broken, and provided with a spring-point, h^2, which is pressed aside by the carrier and completes the circuit to register in any suitable manner at the end of the section, the stations, or convenient points, the time of passing a given point. In this way the carriers may be readily counted, their location known, and proper steps taken to cut them out or allow them to pass on, as the case may be.

In Fig. 6 I have shown a carrier, *i*, formed of a hollow ball or sphere having a cap screwed on, as shown. Just below the junction of the cap with the main body is placed a strengthening cross-bar, *i'*, and after being screwed on the cap is locked and braced by means of a screw-rod, i^2, the head of which is recessed in the outer surface of the cap and the point screwed into the cross-bar, as represented. This system of dividing the long line into a series of connected sections, each with its fan and air-supply at opposite ends, enables me to extend the line to any distance and maintain a uniform speed of the carriers throughout the entire length, while the progress of each one is registered, and no mistakes can occur in the shunting of the carriers off the main line.

For short lines—such as store-service and similar uses—I shall use a series of balls of varying size, as indicated in Fig. 4, and connect the switches by systems of levers, similar to those already described, with switch-levers which project at different depths within the tubes and are operated by the proper balls to automatically switch them out at their proper stations. This will be fully understood by reference to Fig. 4.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A pneumatic tube divided into a series of independent sections, each provided with an air-supply and an exhausting apparatus, in combination with a gate hinged within the tube between the sections and closing firmly in one direction, but opening freely in the other, to cut off the passage of air from one section to the other, but admit the easy passage of the carrier, substantially as and for the purpose set forth.

2. A pneumatic tube divided into a series of independent sections, each of which is provided with an air-supply and an exhausting apparatus, in combination with a hinged gate between the sections, to cut off the backward flow of air from one to the other, and an inclined arm hinged within the tube and connected to the gate, to open the latter for the passage of the carrier, substantially as and for the purpose set forth.

3. In a terminal cushion for pneumatic dispatch-tubes, a cushioning-tube provided with a pipe for supplying compressed air or steam, and a valve in said pipe to open or close the same, in combination with a hinged lever-arm projecting within the tube and connected to the valve to open it, and a second hinged lever connected to the valve to close it, whereby the carrier is caused to automatically open and close the valve, substantially as and for the purpose set forth.

4. In a terminal cushion for pneumatic dispatch systems, a cushioning-tube, a pipe connected therewith to supply the cushioning material and provided with a valve, a stop-cock, and a pair of levers projecting within the tube and acting by contact with the carrier to alternately open or close the valve, in combination with an exit-pipe connected upon the side of the cushion, and a gate or switch hinged at its junction therewith and provided with a weight, whereby the switch yields readily to the incoming carrier, but cuts off its retreat to the main tube and directs it to the exit, substantially as and for the purpose set forth.

5. In a pneumatic dispatch system, the combination, with the tube and its carrier, of an electric signal-circuit connected therewith and broken at intervals, and a movable contact-point at said point projecting within the tube, whereby the carrier in passing is caused to

close the circuit to signal its progress, substantially as and for the purpose set forth.

6. A carrier for pneumatic dispatch-tubes, consisting of a hollow sphere having its cap secured thereon by a screw-rod, the head of which is recessed in the cap and the point screwed into a cross-bar within the main body of the carrier, substantially as and for the purpose set forth.

7. The combination, with a pneumatic dispatch-tube, of a cushioning-chamber and means for admitting compressed air or equivalent cushioning-fluid therein, substantially as and for the purpose set forth.

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

CHARLES M. JOHNSON.

Witnesses:
W. C. McARTHUR,
LINA BEECHER.