No. 713,924. Patented Nov. 18, 1902.

K. E. STUART.

PNEUMATIC DESPATCH SYSTEM.

(Application filed Jan. 27, 1902. Renewed Oct. 22, 1902.)

(No Model.) 5 Sheets—Sheet 1.

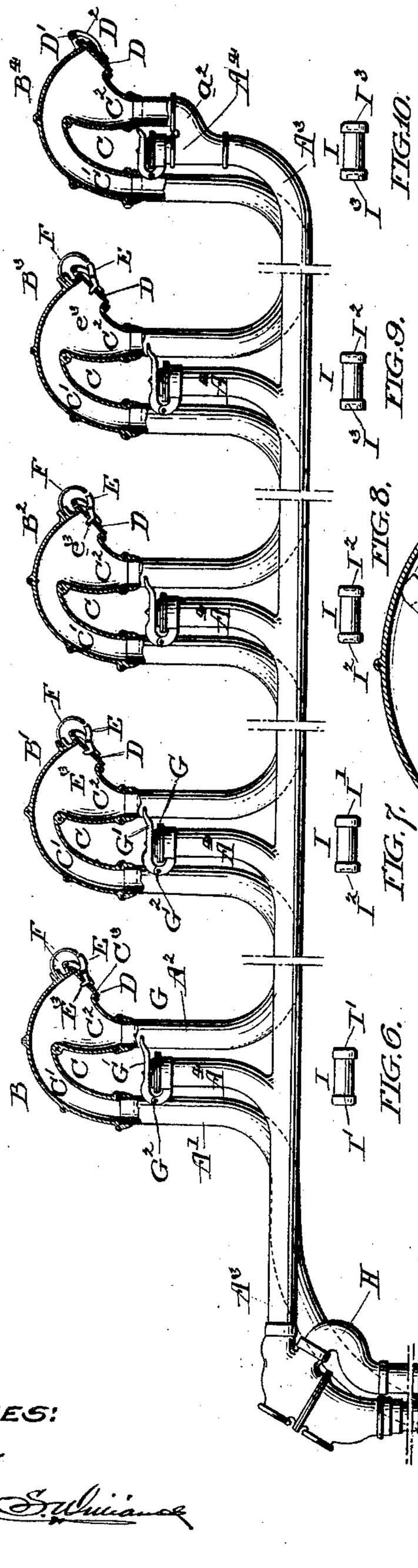

FIG. 1.

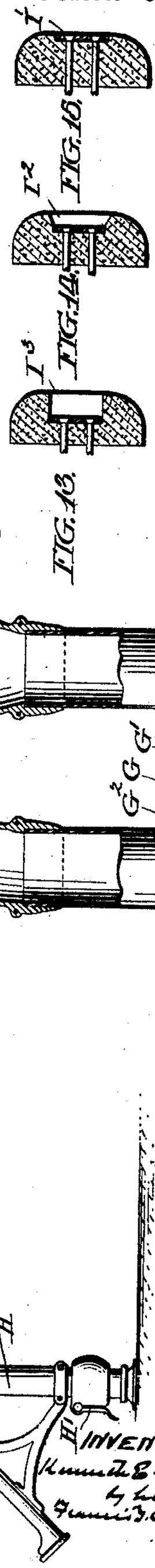

FIG. 10.

FIG. 8.

FIG. 9.

FIG. 6.

FIG. 7.

FIG. 15.

FIG. 14.

FIG. 13.

FIG. 2.

FIG. 3.

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(No Model.) 5 Sheets—Sheet 2.

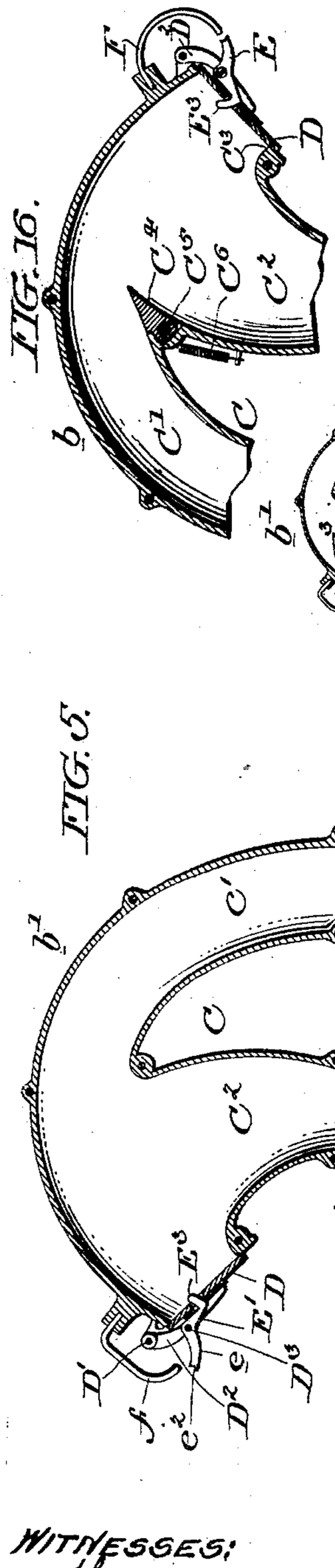

FIG. 1b.

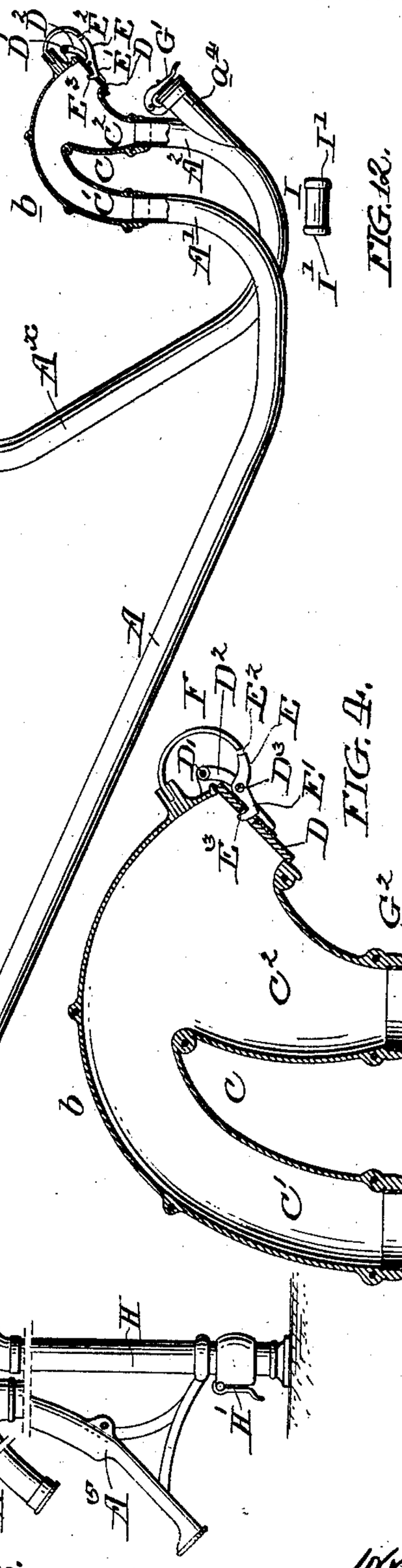

FIG. 4.

FIG. 5.

FIG. 3.

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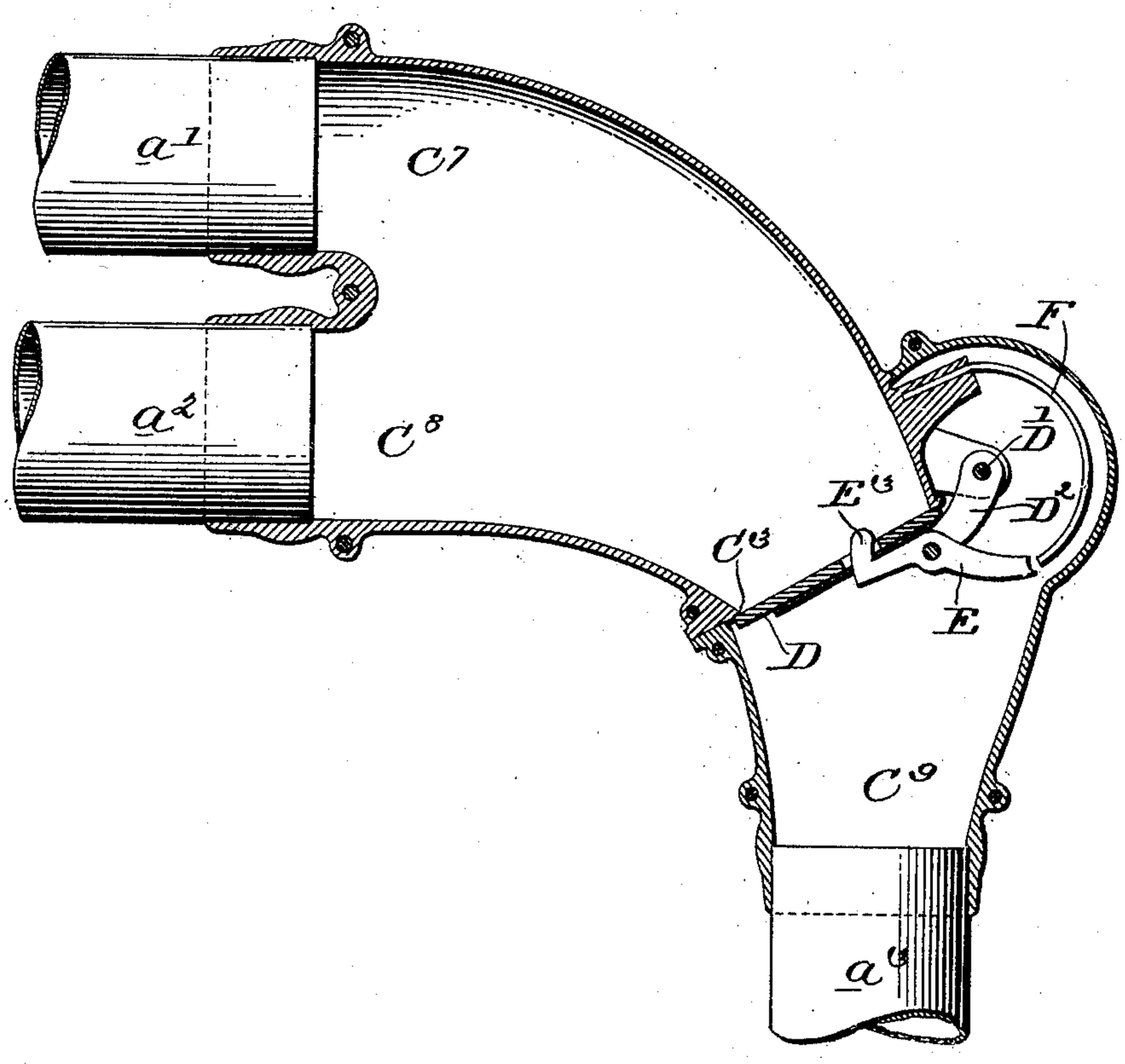
(No Model.) 5 Sheets—Sheet 3.

FIG. 1.



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(Application filed Jan. 27, 1902. Renewed Oct. 22, 1902.)

(No Model.) 5 Sheets—Sheet 4.

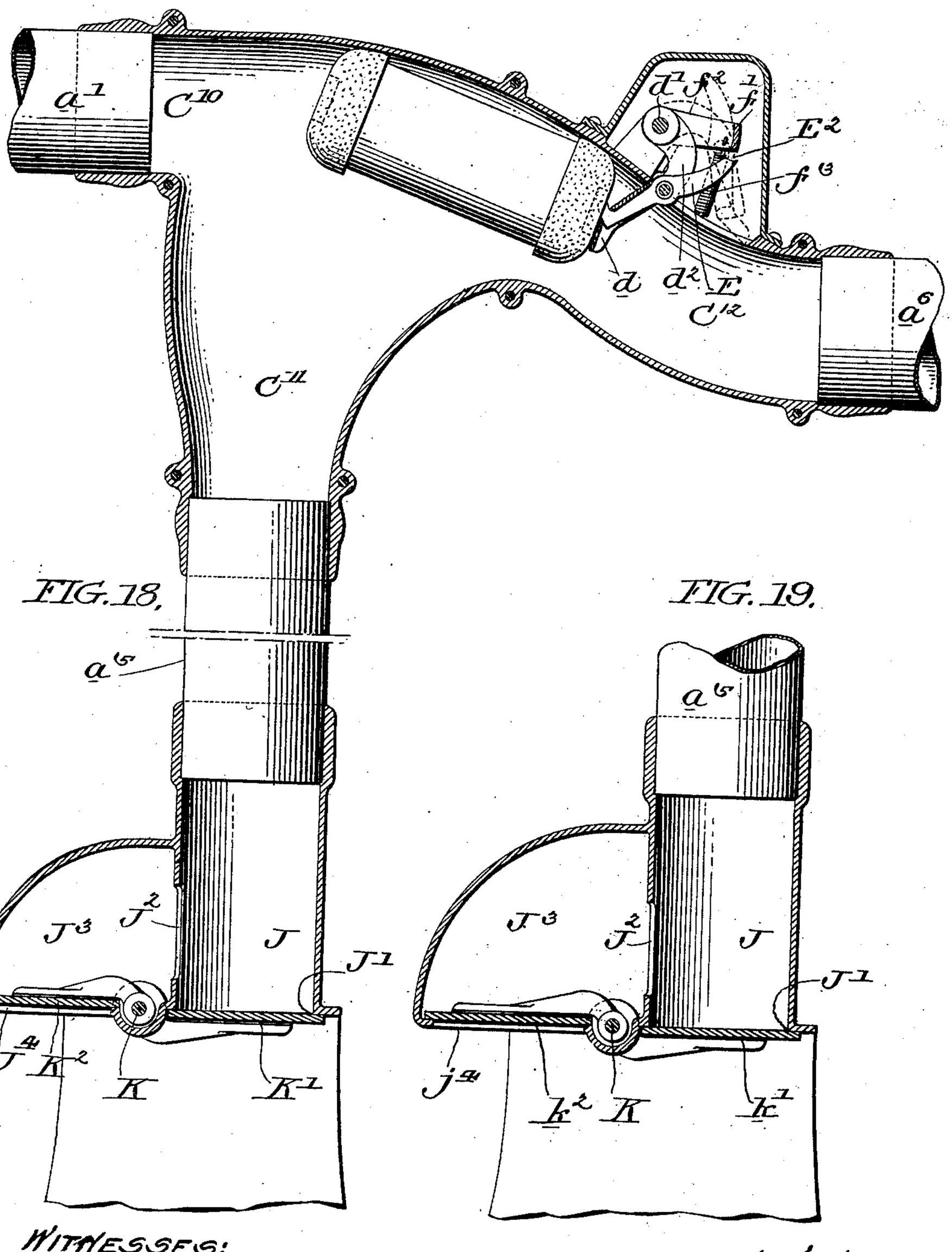

FIG. 18.

FIG. 19.

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(No Model.) 5 Sheets—Sheet 5.

FIG. 20.

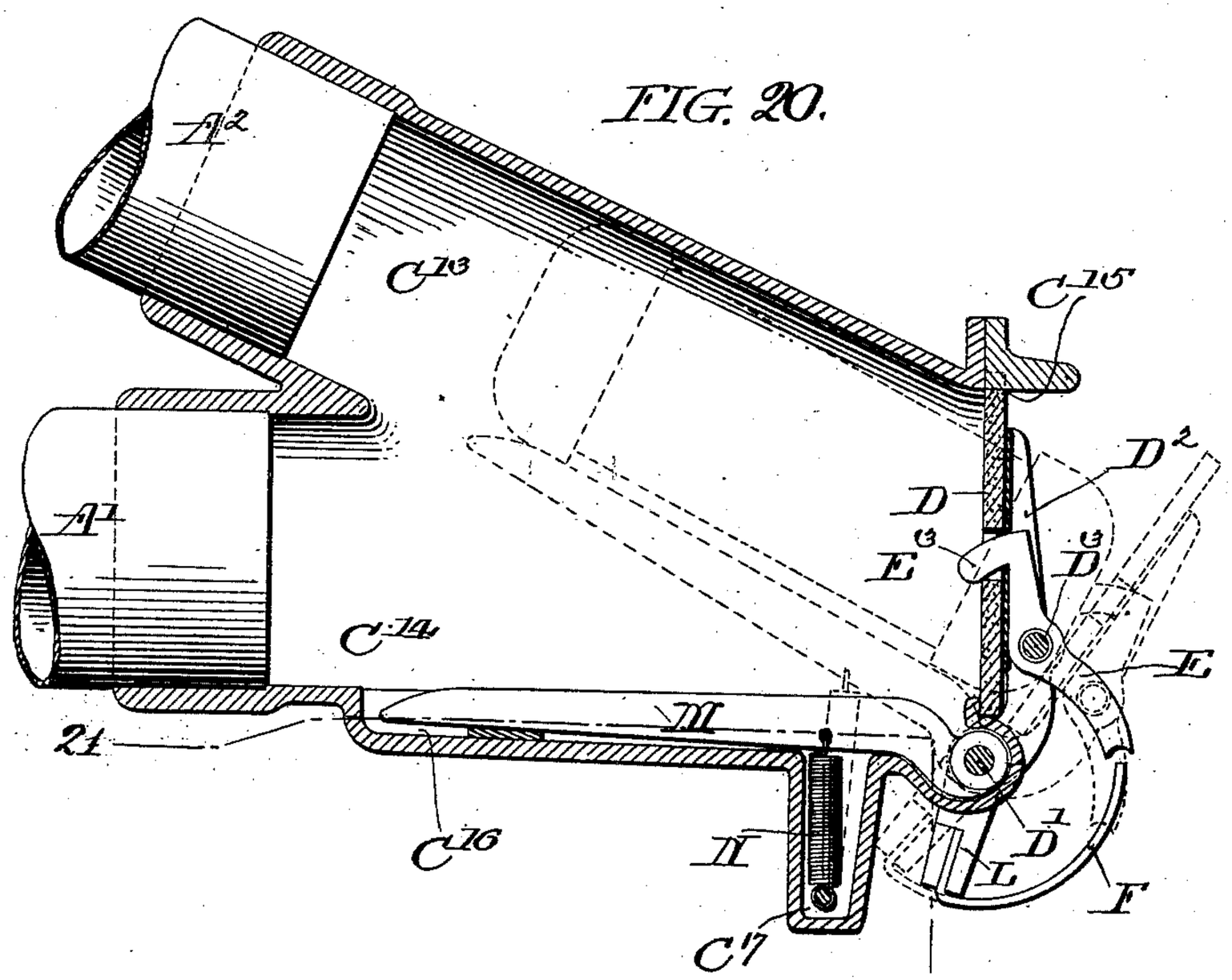
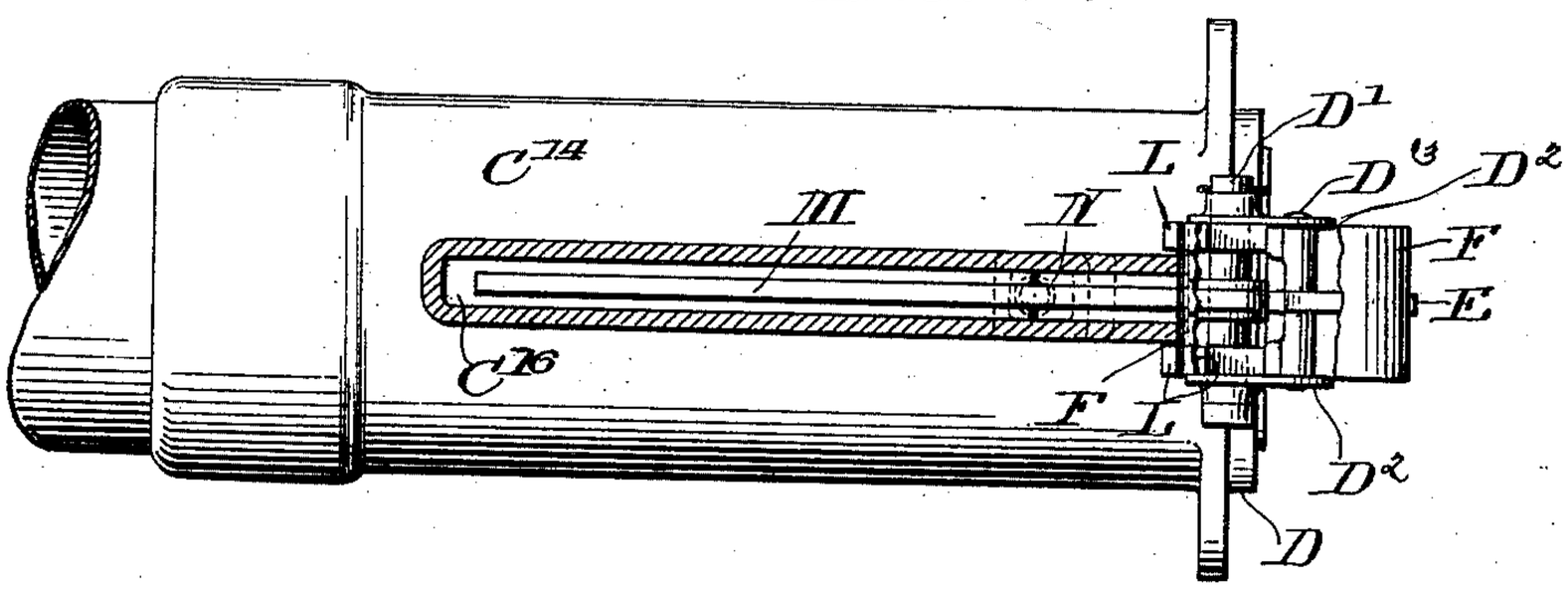


FIG. 21.



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UNITED STATES PATENT OFFICE.

KENNETH E. STUART, OF PHILADELPHIA, PENNSYLVANIA.

PNEUMATIC-DESPATCH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 713,924, dated November 18, 1902.

Application filed January 27, 1902. Renewed October 22, 1902. Serial No. 128,241. (No model.)

To all whom it may concern:

Be it known that I, KENNETH E. STUART, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, having invented a new and useful Improvement in Pneumatic-Despatch Systems, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to pneumatic-despatch systems, and has for its object to provide a system and appliances of great simplicity of construction whereby carriers provided with selective mechanism in their ends are delivered automatically at the proper one of several intermediate stations. My new system for effecting this result will be best understood as described in connection with the drawings in which it is illustrated, and in which—

Figure 1 is a diagrammatic elevation of a system, the tube being carried through five intermediate stations. Fig. 2 is an enlarged sectional view of the intermediate-station mechanism of the first of the intermediate stations in Fig. 1, the mechanism shown not differing in kind from that of the other four of said stations. Fig. 3 is a diagrammatic elevation of another tube system embodying my invention and having two intermediate stations. Fig. 4 is an enlarged sectional elevation of the first of these stations; Fig. 5, an enlarged sectional elevation of the second of these stations. Figs. 6, 7, 8, 9, and 10 are side elevations of the selective carriers adapted for use in connection with the system illustrated in Fig. 1. Figs. 11 and 12 are similar side elevations of the carriers having selective mechanism adapted for use with the system of Fig. 3. Figs. 13, 14, and 15 are enlarged sectional elevations of the three constructions of selective carrier-heads illustrated in Figs. 6 to 12, inclusive. Fig. 16 is a view indicating a slight modification in the construction of the station-heads by which possible recoil of the carrier into or partly into the tube-section C′ is prevented. Fig. 17 is a view showing a modification in the construction of the head and in the suspension of the tubes leading to and from it. Fig. 18 is a sectional elevation illustrating another modification and some additional features of my invention. Fig. 19 is a sectional elevation showing how the balanced-gate construction of Fig. 18 is modified where it is to be used with a pressure rather than a vacuum system. Fig. 20 is a plan view, shown in section, of another modification of my invention; and Fig. 21 is a side elevation of the device shown in Fig. 20, shown partly in section on the line 21 21.

The systems illustrated in both Figs. 1 and 3 and in Fig. 18 are what are generally called "vacuum" systems, the central or principal station having an open-ended sending-tube A, in which the carriers are inserted for transmission to the various intermediate stations, and a receiving-tube A^5, into which the carriers are delivered from the various intermediate stations.

In the system illustrated in Fig. 1 each of the intermediate stations B, B′, B^2, B^3, and B^4 is traversed by the outgoing and return sections of the tube, the return-section being indicated at A^3 and having at each station a sender-tube, (indicated at A^4 A^4, &c.) The outgoing tube proper has at each station an incoming section A′ and an outgoing section A^2, connected by a head C, the head also having an incoming, preferably curved, leg C′ and an outgoing, preferably hopper-shaped, leg C^2, by which it connects with the tube-sections A′ and A^2. In registry with the incoming leg C′—that is to say, in such position that the carrier coming through this leg C′ will be directed against it—is a gated opening C^3, which gated opening is also immediately above the hopper-shaped leg or section C^2 of the head C, so that if the gated opening be closed the carrier, as indicated at I, Fig. 2, after striking the gate and having its motion thereby arrested, will fall into the hopper-shaped leg C^2, but in reversed position to that in which it entered the leg C′, so that it is delivered to the tube-section A^2 with the end which was its rear end in tube-section A′ in advance. It will be obvious that this reversal of the carrier can be effected in the station-heads in various ways, the particular design of the head illustrated being that which I prefer to use, but to which I do not wish to be understood as limiting my claims, except where this particular construction is specific-

ally referred to and called for. For instance, I have shown in Figs. 20 and 21 a construction in which the incoming and outgoing tubes lie in a horizontal plane, C^{14} indicating the portion of the head into which the carrier comes from the tube A′, and C^{13} the leg or branch of the head which connects with the outgoing tube A^2. In this construction the gate D is mounted so as to turn freely upon a pivot-shaft D′, to which is secured a finger M, lying in a lateral cavity C^{16} adjacent to the portion C^{14}, a spring N, secured to the finger M and in a cavity C^{17} of the head, holding the finger normally in the position shown in full lines in Fig. 20. Also secured to the pivot-shaft D′ is an arm L, to which is attached a latched stop, (indicated at F.) It will be obvious that a carrier coming to the head from the tube A′ will be impelled against the gate D, and in case the selecting-head of the carrier is of such character as to first come in contact with the finger E^3 the gate will be unlatched and the carrier enabled to pass freely outward. If, however, the unlatching device is not actuated, the end of the lever E will come in contact with the stop F as the gate opens, and the momentum of the carrier will force the gate open to approximately the position shown in dotted lines in Fig. 20, which motion of the gate carries the finger M to the corresponding position shown in dotted lines, moving the carrier into registration with the tube-section A^2. The opening of the gate and the shifting of the finger M is but momentary, the spring N returning both to normal position as soon as the momentum of the carrier has been overcome, and the carrier is then forwarded through the tube-section A^2. I have illustrated this modification of my invention simply with a view of making clear that my invention in its broad sense is not limited to the utilization of gravity for shifting the carrier from the incoming to the outgoing tube, and it is of course obvious that many simple mechanical devices could be employed for this purpose.

The gated opening C^3 (see Fig. 2) is closed by a light hinged gate, (indicated at D,) the valve portion of the said gate being carried on an arm D^2, hinged to the head at D′, the arm D^2 carrying a pivot (indicated at D^3) to which is connected the pivotal selective latch-lever E E′, carrying on the end of its arm E a latching device, (illustrated in Fig. 2,) as a notch E^2, and carrying on the end of its arm E′ a selective finger E^3, which extends, preferably, through the gate D to the inside of said gate in position to be acted upon by properly formed heads attached to the carriers.

F is a latching-detent which, as shown in Fig. 2 and as preferably constructed, is a spring having its point so arranged with respect to the latch-notch E^2 that it will engage the said notch when the gate begins to open, and thereby prevent the full opening of the gate. If, however, the selective finger E^3 is pressed outward, the latch-notch E^2 will be moved so as to clear the detent-spring and permit the gate to be opened widely for the exit of the carrier.

In the construction illustrated in Fig. 1 the gates D at stations B^2 and B^3 have selective fingers e^3, which extend inward to a greater extent than the fingers E^3 E^3 of stations B and B′, while the gate in the station B^4 has no selective finger at all.

The carriers to be used in the system of Fig. 1 are indicated in Figs. 6 to 10, inclusive, and are provided with selective heads of three constructions, (indicated at I′, I^2, and I^3 in Figs. 13 to 15,) one carrier, Fig. 6, having two heads I′, another carrier, Fig. 7, having one head I′ and one head I^2, the third carrier, Fig. 8, having two heads I^2, a fourth carrier, Fig. 9, having one head I^2 and one head I^3, and the fifth carrier, Fig. 10, having two heads I^3. The carrier of Fig. 6 being introduced into the tube A and having the plain head I′ at both ends will always impinge against the selective finger E^3 of the station B, thereby moving the latch-notch out of engaging position with the spring F, so that the impact of the carrier against the gate D will open it to the full extent and permit the exit of the carrier. The carrier, having one head I′, as shown in Fig. 7, will also be delivered at the station B if it is introduced into the tube A with its head I′ in advance. If, however, it is introduced into the tube A with its head I^2 in advance, the recess in the said head is sufficiently deep to prevent it from coming in contact with the selective finger E^3 of the station B, and consequently the carrier coming in contact with the gate D will only slightly open it, the full opening of the gate being resisted by the engagement of the notch E^2 with the spring F. The momentum of the carrier is therefore arrested, and its rear end therefore falls downward, as indicated in Fig. 2, into the hopper-leg C^3 of the head C, and thence through the tube-section A^2. It passes in reverse direction to the second station B′, where its head I′, coming in contact with the selective finger E^3 of the latch-lever, presses it inward, unlatching the gate, which opens under the impact of the carrier and permits its exit. The carrier intended for delivery at station B^2 has two ends or heads recessed, as indicated at I^2, so that in passing through the stations B and B′ it does not act upon either of the selective fingers, but on entering the station B^2 the comparatively shallow recess in the head I^2 does permit it to come in contact with the long selective finger e^3 of the station, so that it is delivered at that station. For delivery at station B^3 the carrier is formed with one head I^2 and another head I^3, having the deeper recess This carrier for delivery at the proper station B^3 is introduced into the tube A with its head I^3 in advance. It passes from the station B and to the station B′ with its head I^2 in advance, presenting the deeper

selective head I^3 on its entrance to the station B^3 and therefore clearing the selective finger e^3 and presenting its shallower selective head I^2 on its entrance to the station B^3 and therefore acting upon the selective finger e^3, unlatching the gate and permitting the exit of the carrier. The carrier, Fig. 10, for delivery at station B^4 has two heads I^3, which obviously enable it to pass through the four preceding stations, and as the station B^4 is the last of the series no latching mechanism is necessary at this point, the carrier being permitted to come directly in contact with and open the gate D. It will be obvious, of course, that this system may be extended through more numerous intermediate stations by the simple expedient of providing selective heads with deeper recesses.

In the system indicated in Fig. 1 the sender-tubes A^4, by which each intermediate station is connected with a return-tube A^3, are each provided with a valve-like gate G, fastened on a handle-lever G', pivoted at G^2, the gate being opened whenever it is desired to insert a carrier and closed behind it. The air-pump (not shown) is connected near the end of the return-tube A^3 by a branch H H', indicating a valve in this pipe, which can be opened when it is desired to suddenly interrupt the passage of air through the system.

The modification indicated in Fig. 3 is one in which the tube-circuit to and from the main or central station is so constructed that it passes but once through each intermediate station as distinguished from a construction having what is generally known as a "return-tube," such as is illustrated in Fig. 1. It is also a system in which provision is made for delivering carriers from one intermediate station to another. As shown, the first intermediate station (indicated at *b*) is practically identical with the intermediate stations shown in connection with the system illustrated in Fig. 1 except that the station-sender branch a^4 is connected with the outgoing-tube section A^2, as illustrated. The second intermediate station (indicated at *b'*) has, however, the modified construction best shown in Fig. 5—that is to say, the gate D has pivoted to it a selective latch-lever, the latch end of which (indicated at *e*) has its latch-notch e^2 arranged out of registry with the spring-detent, (here indicated at *f*,) so that normally the gate is not latched. The selective finger E^3 is, however, so proportioned that when pushed inward it is flush with the gate, and the latch e^2 is brought into registry with the detent *f*, so that under this condition the gate is latched and prevented from opening. The carriers used in connection with this system are indicated in Figs. 11 and 12, the carrier of Fig. 11 having two selective heads I^2 and the carrier of Fig. 12 having two selective heads I'. For delivery at station *b* the carrier of Fig. 12 is inserted at A, and acting on the selector-finger E^3 in station *b* it unlatches the gate and the carrier is delivered. The same carrier introduced into the intermediate tube-section $A^\times$ in Fig. 3 comes in contact with the selector-finger E^3 in station *b'*, bringing the latch-notch e^2 into registration with the spring-detent *f'*, so that the gate cannot open to permit the exit of the carrier, which therefore passes down to the tube-section A^3 and thence to the central station. For delivery at station *b'* the carrier of Fig. 11 is used. This carrier having the heads I^2 clears the selector-finger at station *b*, and passing through the intermediate tube-section $A^\times$ it also clears the selector-finger of the modified construction at station *b'*. The gate, however, is not latched and opens under the impact of the carrier, which is delivered at the station. Of course the same carrier could be introduced into the sending-section a^4 of station *b'* for return to the central station.

I have heretofore described the application of my invention to systems in which the carrier is impelled from the incoming tube directly against an outlet-gate, which normally closes the portion or branch of the tube or head in which it is situated. It is of course obvious that such a gate could be situated between two portions of a transmission-tube—as, for instance, is shown in Fig. 17—where the incoming and outgoing tube sections *a'* and a^2 are parallel to each other and run horizontally, while a third outgoing-tube section is situated on the rear side of the gate D, against which the carriers are impelled on entering the head. If the selective mechanism is such as to permit the gate D to open, the carriers continue through the tube A^3, while if the gate is locked the carrier falls upon its side and is then sucked or impelled into the tube-section a^2. In such a construction it is of course evident that in place of a gate, as is indicated at D, entirely closing the portion of the tube in which it is situated, a finger or barrier of any kind can be used—such, for instance, as is indicated in Fig. 18—where in place of what can be properly called a "gate" a finger *d* extends into the tube-section, (shown at C^{12},) being pivotally connected to a shaft *d'*, to which is also attached a lever-arm f^2, having a bent end *f'*, which when the finger is in normal position lies in registry with the latch end E^2 of the lever E. The spring f^3 normally holds the parts in the position indicated and is employed so that the barrier or finger *d* even when latched may be moved to some distance against the force of the spring, so as to avoid undue shocks from the impact of the carriers. Where the selective mechanism of the carrier-head is such as to unlatch the barrier, the carrier coming from the tube-section *a'* pushes the barrier out of its way and passes on through the outgoing tubes C^{12} a^6. Where, however, the barrier is not unlatched, the carrier is arrested and falls into the receiving-hopper C^{11} and thence through the tube-section a^5 into a gate-section, (indicated at J,) this section being preferably of a cast-

ing having an outlet-opening J′, through which the carrier can pass, and a lateral opening J^2, leading into a chamber J^3, which has an opening J^4, which in case of a vacuum system should be of smaller area than the opening J′. K indicates a pivot to which is secured a gate K′, adapted to fit upon and close the opening J′ on the outside, and a gate K^2, fitting and closing the opening J^4 on the inside. It will be obvious that a carrier falling or being impelled into the gate-opening J will or may compress the air in front of it, so as to arrest the shock of its impact on the gate K′; but such compression of the air will in no material way tend to open the gate, while the weight of the carrier when it actually comes in contact with the gate K′ will cause said gate to open, permitting it to close at once after the carrier has passed out.

Where my system is used in connection with a pressure system, the balanced gate construction is modified, as shown in Fig. 19, the opening in the chamber J^3 being made larger than the opening J′, as shown at j^4, and closed by a larger gate, (indicated at k^2.) Otherwise the construction and operation of the gate are the same as described in Fig. 18.

From what I have stated above it will be clearly seen that my invention is capable of extensive and varied applications in connection with pneumatic-tube conduits.

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

1. In a pneumatic-despatch system the combination with a despatch-tube of a movable barrier extending into the tube in normal position to be struck by and arrest the motion of an advancing carrier, a latching device arranged to lock the carrier in normal position or in the alternative to have it unlocked and free to move out of the way of an impacting carrier and selective latch-actuating mechanism also extending into the tube in the path of the advancing carriers to be acted upon by selective carrier-heads.

2. In a pneumatic-despatch system, a tube having a branch which lies in the path of carriers transmitted through said tube in combination with a movable barrier extending into the tube in the path of the carrier, selective latching mechanism arranged to be acted on by properly-formed carrier-heads without preventing the carrier from striking the barrier, and whereby the barrier is locked or unlocked in accordance with the selective construction of the carrier end and a second tube branch arranged to receive carriers which are arrested by the barrier.

3. In a pneumatic-despatch system, a tube having a branch arranged in the path of the carrier in combination with a movable barrier projecting into said branch in position to engage the carrier, means arranged to be actuated by selective devices on the carriers for locking or unlocking said barrier, and a second tube branch arranged to receive and transmit the carrier in reversed position when its motion is arrested by said barrier.

4. In a pneumatic-despatch system, a tube having a branch arranged in the path of the carrier in combination with a movable barrier projecting into said branch in position to engage the carrier, means arranged to be actuated by selective devices on the carriers for locking or unlocking said barrier, and a second tube branch arranged in front of and below the portion of the tube in which the barrier is situated into which the carrier falls by gravity when its motion is arrested by the barrier.

5. In a pneumatic-despatch system, a tube having a branch arranged in the path of the carrier in combination with a movable barrier projecting into said branch in position to engage the carrier, means arranged to be actuated by selective devices on the carriers for locking or unlocking said barrier, and a second tube branch arranged in front of and below the portions of the tube in which the barrier is situated into which the carrier falls by gravity when its motion is arrested by the barrier, the head of said branch being formed to reverse the position of the carrier so that it enters the branch with what had been its rear end in advance.

6. In a pneumatic-despatch system, a tube having one or more intermediate stations in combination with movable barriers arranged at such station or stations in the path of the arriving carriers and forward of the receiving end of the outgoing-tube section and means for delivering the carriers arrested by the barrier into the outgoing tube in reversed position.

7. In a pneumatic-despatch system, the combination with a despatch-tube of a movable barrier extending into the tube in position to be struck by an advancing carrier, a latching device arranged to control the movement of the barrier, selective latch-actuating mechanism arranged to be actuated by selective heads in the carriers, a tube branch opening in advance of the barrier and a balanced exit-gate in said branch normally closing its end but adapted to open under the weight of the carrier.

8. In a pneumatic-despatch system, the combination with a despatch-tube of a movable barrier extending into the tube in position to be struck by an advancing carrier, a latching device arranged to control the movement of the barrier, selective latch-actuating mechanism arranged to be actuated by selective heads in the carriers, a tube branch opening in advance of the barrier and a balanced exit-gate in said branch normally closing its end and unaffected by varying pressure in the tube branch but adapted to open under the weight of the carrier.

9. In a pneumatic-despatch system, the combination with a despatch-tube of a barrier ar-

ranged to receive the impact of an arriving carrier, a latch adapted when in operative position to prevent the opening of said barrier and a latch-actuating finger arranged in the front of the barrier to be acted on by selective devices in the carrier ends.

10. In a pneumatic-despatch system, the combination with a despatch-tube of a barrier arranged to receive the impact of an arriving carrier, a latch adapted when in operative position to prevent the opening of said barrier, a latch-actuating finger arranged in the front of the barrier to be acted on by selective devices in the carrier ends and an outgoing-tube section arranged to receive carriers which do not pass out through the barrier.

11. In a pneumatic-despatch system, the combination with a despatch-tube of a barrier arranged to receive the impact of an arriving carrier, a latch adapted when in operative position to prevent the opening of said barrier, a latch-actuating finger arranged in the rear of the barrier to be acted on by selective devices in the carrier ends and an outgoing-tube section arranged to receive carriers which do not pass through the barrier said barrier and outgoing tube being arranged to reverse the position of the carrier.

12. In a pneumatic-despatch system, the combination with a tube of an intermediate station-head C having a curved entrance-section C′, a hopper-shaped exit-section C^2 and a gate-opening C^3 arranged in line with the curved section C′ and above the section C^2 as described and so as to reverse the position of a passing carrier.

13. In a pneumatic-despatch system, the combination with a tube of an intermediate station-head having an opening in registry with the incoming-tube section, a hinged barrier normally extending into said opening, a latch-lever E E′ pivoted to said barrier, a selector-finger E^3 secured to one arm of said lever and extending to the front of the barrier and a latch E^2 secured to the other arm of said lever and arranged to engage or disengage a detent as the selector-finger is moved or left stationary.

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