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Patented Aug. 27, 1901.

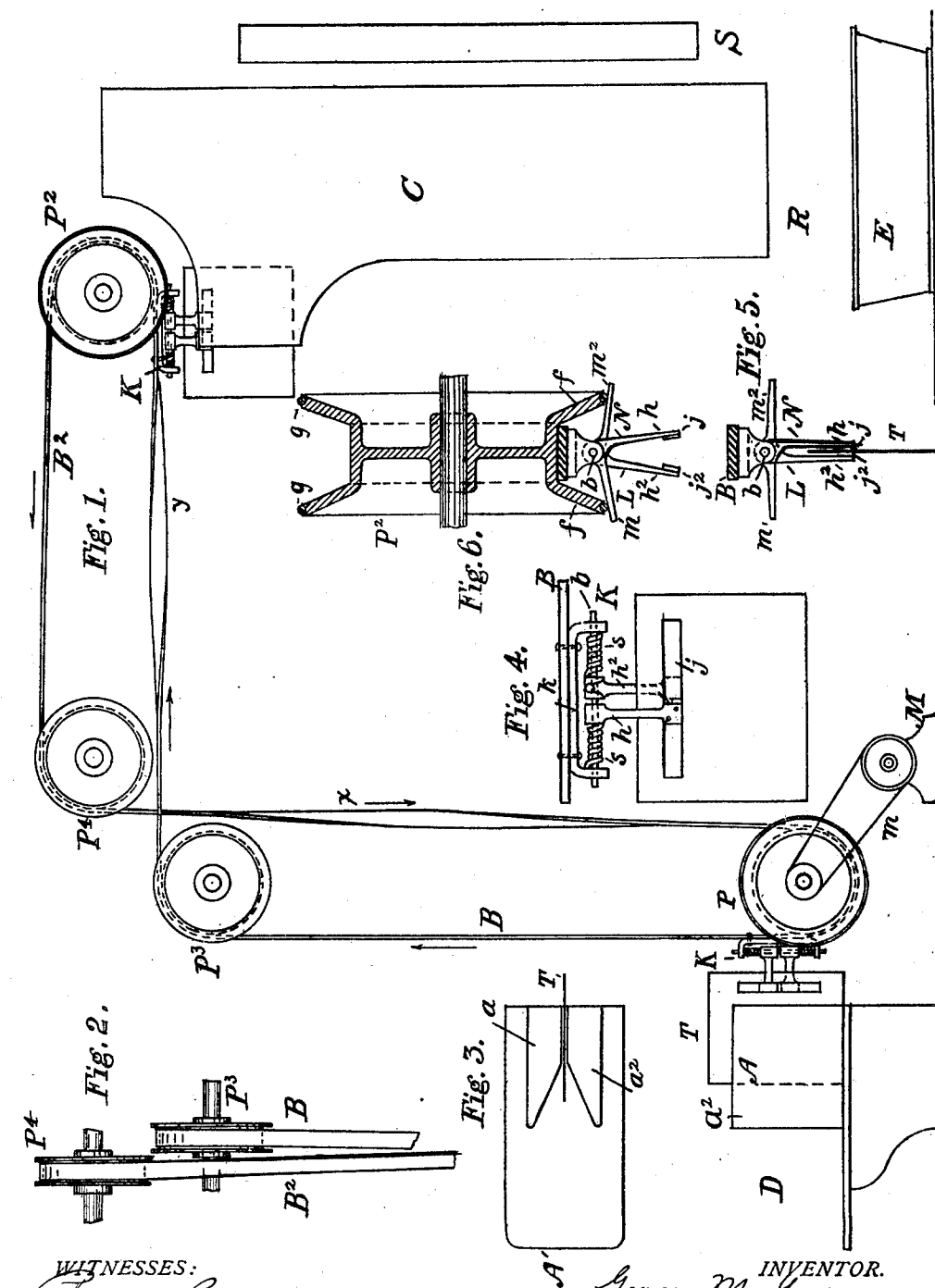
G. M. YORKE.

MECHANICAL INTERCOMMUNICATION BETWEEN TELEPHONE SWITCHBOARDS.

(Application filed Mar. 20, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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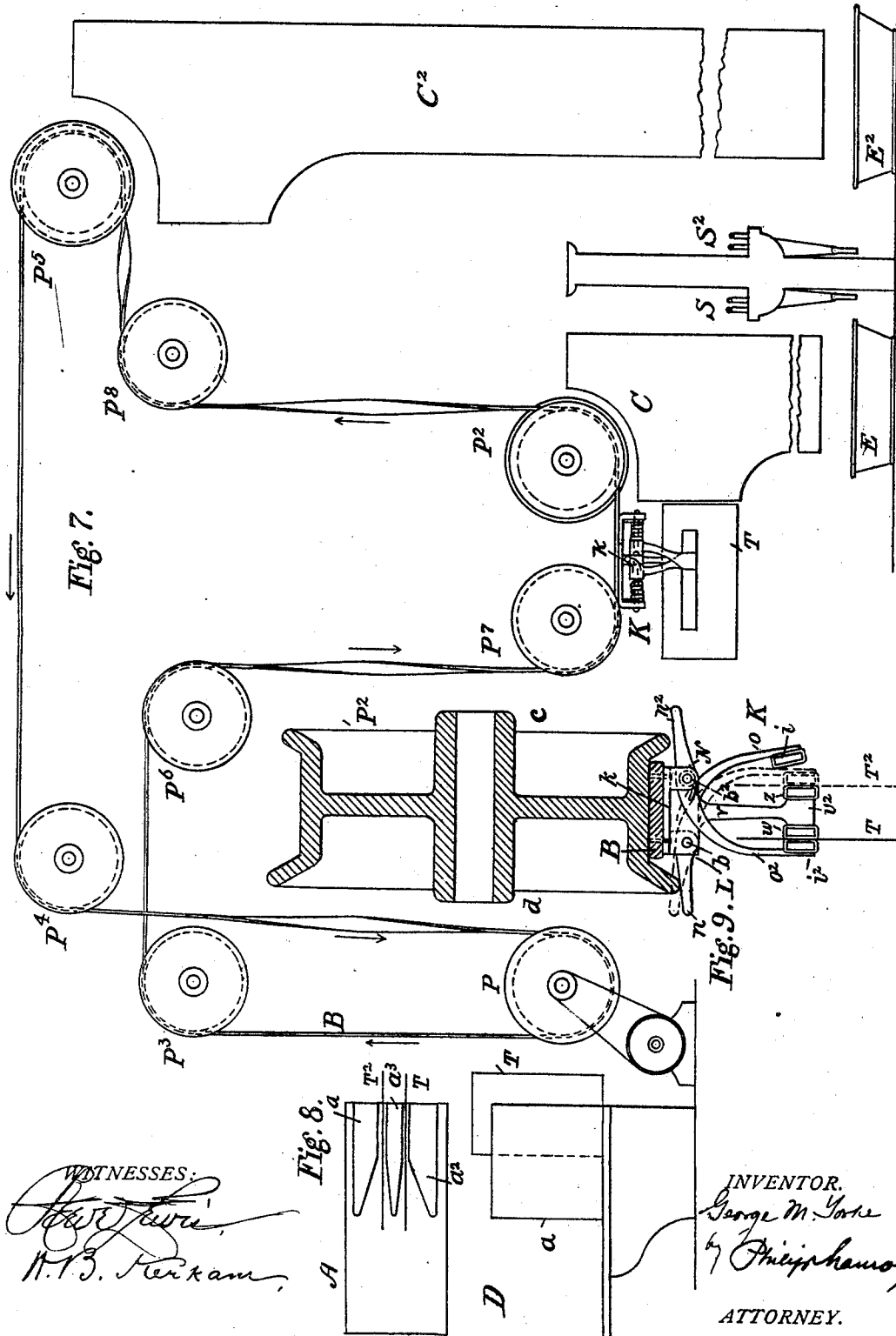
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(No Model.)

2 Sheets—Sheet 2.



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MECHANICAL INTERCOMMUNICATION BETWEEN TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 681,603, dated August 27, 1901.

Application filed March 20, 1901. Serial No. 52,025. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. YORKE, residing at New York, in the county of New York and State of New York, have invented certain Improvements in Mechanical Intercommunication Between Telephone-Switchboards, of which the following is a specification.

This invention relates to telephone-exchange central-station switchboard apparatus, and in particular to appliances for conveying between different switchboards instructions regarding the interconnection of substation-lines or the connection of substation-lines with lines leading to other central stations belonging to either the same exchange or to other exchanges.

In telephone-exchange traffic messages of a certain class are known as "toll" messages. In general these are messages between substations of different exchanges or between widely-separated exchange-districts, and the lines over which they pass between exchanges are called "toll-lines" or sometimes "long-distance lines." They require special attention and care on the part of the operating force of the central station or stations concerned, and for these messages a special charge is made. These conditions make it requisite that the names and telephone-numbers of the call originating and called for substations, together with information as to the date, the time of day, and the time consumed in the exchange of conversation or the transmission of the message, shall be entered on a blank form termed the "ticket." This is done, first, to avoid the confusion and liability to error, which, as experience demonstrates, exists if the said information be transmitted orally (as by an order-wire) between the several operators, and, second, to furnish a record of the transaction for subsequent reference. In the toll or through business as at present conducted a substation or public station desiring a through connection on first sending in a call in the usual manner is responded to by a receiving operator stationed at the switchboard or switchboard-section where the call-receiving devices of the line of such substation are placed to whom the order for the desired connection is given. The

order, with the necessary detailed information, is at once inscribed upon the ticket, and the connection is to be made or completed by a toll or through line operator at another switchboard or switchboard-section, which may, if desired, be termed the "toll" or "connecting" switchboard. These connecting-boards may be arranged at different portions of the central-station switchboard apparatus, and it thus becomes necessary that the ticket stating the order shall be transferred from the operator who records the order to the particular operator or group of operators that handles the through-lines extending to the distant point with which communication is to be established. The present invention provides efficient and speedy means for the accomplishment of such transfer, and its primary object is to furnish an effective system and a convenient and serviceable apparatus for the accurate and prompt conveyance of the tickets from the switchboard or sections where the orders are received and written or collected or from any determinate distributing-point to the particular operator or operators by whom are controlled connections with the through-lines extending to the distant points with which communication is to be established.

The invention may be regarded as an improvement in telephone central-station ticket-transfer service, and comprises a moving or traveling endless belt suitably guided by pulleys extending from the distributing center or the place where the tickets when made are placed for distribution to the receiving point or points at or near the line switchboards where the connections desired are to be effected, one or more ticket holders or carriers attached to the belt and moving therewith, and means for enabling the carriers to automatically grasp the ticket at the sending-point and to automatically release them or let them go at the point or points of delivery. There is also a suitable receptacle or rack for the tickets at the distributing center wherein the said tickets are held in a position where they can be conveniently taken up by the moving carrier and suitable chutes and receptacles at the receiving point or points to receive the released ticket and lead or guide the same to

its depository. The central point or distributing-station is placed at any preferred or convenient position in the operating-room, and the tickets may be brought manually thereto. A separate chute may be placed at or in close proximity to each connection-making switchboard section or group of sections.

In the drawings accompanying this specification, Figure 1 represents the distributing system complete in a non-selective form—that is, organized to carry tickets from the point of distribution to one operative switchboard or group of switchboards only, it being understood that as many independent belts in such a system must be employed as there are stations to which tickets have to be distributed. Fig. 2 is an end view of the supporting or guide pulleys of the two portions of the belt, showing the different vertical planes in which they are hung. Fig. 3 is a top view of the ticket-rack at the distributing-point, a side view of the same being shown in Fig. 1. Fig. 4 represents a portion of the belt, a single carrier attached thereto, and a ticket held by the carrier. Fig. 5 is an end view of Fig. 4, indicating the elbow-levers thereof. Fig. 6 is a sectional elevation of the terminal pulleys, showing the ticket-carrier passing the same and the pulley-flanges acting upon both elbow-levers to separate the carrier-jaws. Fig. 7 represents a modified system wherein one belt is enabled to distribute tickets to a plurality of switchboards or groups of switchboards or like receiving-stations. Fig. 8 is a top view of the double ticket-supporting rack, of which a side view is shown at the distributing-station of Fig. 7; and Fig. 9 shows in section the terminal pulley employed in the said modified system, together with a double ticket-carrier, the said pulley being adapted to act on one particular pair only of the carrier-jaws.

Referring, in the first place, more particularly to the appliances illustrated by Figs. 1 to 6, D is the distributing-point or the sending-station of the ticket-transfer system, and R a single receiving-point, where are deposited tickets intended for the guidance or instruction of the operators at a switchboard or group of switchboards S. A is a receptacle or ticket-supporting rack placed at the sending-station D. E is a basket or other depository wherein the tickets reaching the receiving-station are deposited, and C is a chute or guide channel receiving them and conducting them to said basket. B is the endless movable belt, having its direction of motion indicated by the arrows. P^2 are the terminal pulleys therefor. $P^3 P^4$ are the supporting or guide pulleys at the apex of the direction-changing angle of said belt, and M represents any suitable motor furnishing motive power through the initial belt m to the pulley P, and thus imparting rapid motion to the belt B. The pulleys $P^3 P^4$ are in different vertical planes, as indicated in Fig. 2, where the portion of the belt moving from

D to R is indicated by the reference-letter B, while the returning portion of the belt is marked B^2 . By this arrangement the ticket-carrier presently to be described is enabled to pass over the pulley P^3 without interference from the pulley P^4 . In a ticket-carrier system actually constructed good results have been attained with an endless belt of single-ply leather three-fourths of an inch wide, the tickets carried being approximately five inches long, four inches wide, and eight one-thousandths of an inch thick. The ticket-receptacle A at the distributing-point D has two guide-blocks $a a^2$ with a narrow space between them, the said blocks being beveled at the end most distant from the traveling belt, and thus forming a flare to the space between which facilitates the placing of tickets. The tickets T to be distributed are thrust into the said flare and stand edgewise within the slit or space between the guide-blocks, as shown in Figs. 1 and 3. At the receiving-station there may, as shown, be a separate chute C and depository E, the former having a receptive channel extending under the pulley P^2 , as shown, or the two may be combined into a single receptacle of any designed form. The chute may be made of sheet metal of a frame with glazed sides or of open-work, as preferred. The traveling belt is shown as having two attached ticket-carriers; but of course one, two, or more may be employed.

The preferred construction and arrangement of the ticket holders or carriers K is best shown by Figs. 4, 5, and 6. The base k of each carrier K is riveted to the belt B and has its ends turned away therefrom substantially at a right angle to support a pivot-pin or fulcrum b , whereon as an axis are mounted two bell-crank or elbow levers LN, having actuating or tripping arms $m m^2$, respectively, on one side of the common fulcrum b and jaw-carrying arms $h h^2$ on the other side of said fulcrum, the latter arms $h h^2$ being provided, respectively, with laterally-elongated jaws $j j^2$, which are made by the springs s to normally press against one another, and thus to grasp or hold a ticket or paper placed between them. The actuating-arms $m m^2$, which may be made integral with the jaw-holding arms $h h^2$, are when pressed adapted to act in opposition to the said springs, and thus to separate the jaws and release a ticket or paper held thereby. The ticket holder or carrier is therefore literally a spring-clip whose jaws are held normally together by a spring and are separated when required by pressure brought to bear on the arms m and m^2 , which constitute latches, the former moving the jaw j and the latter the jaw j^2 . In Figs. 4 and 5 the jaws j and j^2 are closed and are represented as holding a ticket T between them; but in Fig. 6 the carrier K is represented as being passed over the pulley P^2 or P and as having its jaws separated by the wide flanges f of the pulley, one on each side thereof. The said flanges f

press against the lever-arms m and m^2 , respectively, and the jaws are thus separated and remain apart as long as such pressure continues. If the pulley P at the sending-station D be the one exercising the said pressure, the jaws are opened as soon as the lever-arms m and m^2 are fully under the two pulley-flanges and remain open until the said arms are freed from the pressure of said flanges.

The receptacle or rack A has its position so adjusted with respect to the pulley P that as the carrier K passes around the pulley the jaws j and j^2 will pass, as shown in Fig. 1, over the two sides of the waiting ticket T , bestriding the same, and will close on it as the carrier leaves the pulley, thus removing it from the receptacle and carrying it along to the receiving-station. Similarly at the receiving-station of the traveling belt B the lever-arms m and m^2 of the carrier pass under the broad flanges f of the pulley P^2 , the jaws j and j^2 separate, and the ticket T is released and dropped into the chute C , finding its way into the basket E for the conveyance of the necessary information to the operators at switchboard S . The ticket is of course released as soon as the flanges press the actuating arms or latches m and m^2 , and though this release may occur before the ticket is wholly within and above the chute-channel the speed of the belt and the consequent momentum of the ticket carries the latter forward until it strikes the back wall of the chute, from whence it drops vertically into the basket. The levers and base of the carriers K may conveniently be made of aluminium to reduce their weight, and the jaws j and j^2 may be coated with soft elastic rubber to avoid unnecessary noise and jar and to provide a steady grasp of the ticket. Moreover, for the avoidance of clashing and unnecessary wear and tear between the edge of the flanges of the pulleys P and P^2 and the carrier-levers L and N the edge of the said flanges may be grooved and a soft and elastic cord g , of rubber or like material, may be placed in said groove to serve as a cushion at the point of contact between the flanges f and the lever-arms m and m^2 . In operation one, two, or more tickets to be transferred to the connection-making switchboards are placed in the space or slit between the guide-blocks a and a^2 of the ticket-supporting rack A . The first carrier K carried on the traveling belt which passes seizes the said ticket or bunch of tickets, the jaws being opened when they reach the said tickets by the cooperating pulley-flanges f and permitted to close on the ticket by their release from the pressure of said flanges before they have passed over the said ticket.

The ticket or bunch of tickets is thus carried along by the belt-carrier until another similar broad-flanged pulley is reached. This, as shown, is the pulley P^2 , and its flanges pressing upon the two lever-arms m and m^2 the jaws are again separated and the ticket falls from them through the chute or hopper into the basket E . For the sake of simplicity all rep-

resentation of the mechanical details of the bearings and hangers for the pulleys and pulley-shafts have been omitted. In this apparatus the traveling belt is twisted once at y between the pulleys P^3 and P^2 to transfer the carrier from the upper to the under side, and in returning is twisted in the contrary direction at x between the pulleys P^1 and P to restore the said carrier again to its outer position.

It has already been mentioned that the ticket carrier and apparatus thus far described is not selective and involves the employment of as many belts as there are receiving points. The system may, however, be readily applied selectively to the service of two receiving-points or stations by a modification now to be described. Figs. 7, 8, and 9 illustrate such a modification. In these figures the traveling belt B is shown as extended and running between the distributing-point D and receiving-points for two switchboards or switchboard groups S and S^2 , (shown as being placed back to back between the ticket-receiving chutes or hoppers C and C^2), which are arranged to receive tickets from the carriers K and guide them to the receptacles E and E^2 . Any suitable system of guide-pulleys may be adopted. In the drawings, P^3 , P^6 , P^7 , P^8 , and P^4 are guide-pulleys. P is the terminal pulley controlling the carriers at the distributing or receiving point, and, as in the former case, has a wide flange on both sides. P^2 is the terminal pulley controlling the carrier and adapted to release tickets destined for the receptacle E , and P^5 is the terminal pulley controlling the carrier and adapted to release tickets destined for receptacle E^2 . The said pulleys P^2 and P^5 each have a wide flange on one side only, the pulley P^2 in the drawings having its wide flange on the side most distant from the observer or presenting to the eye the side c of Fig. 9, while pulley P^5 has its wide flange in front and presents to the eye the side d of Fig. 9. The pulley P^2 is thus adapted to operate on but one of the lever-arms m of the carriers, while the pulley P^5 is also adapted to act on but one, but the other one, m^2 , of the said lever-arms. While there is a separate hopper for each delivering-pulley, a single ticket-supporting rack A at the sending-point D may suffice, this, however, having separate and distinct ticket-holding slits arranged between the central block a^3 and the side blocks a and a^2 , respectively. The spring clip or carrier likewise is modified, and, keeping in mind the consideration that it is not necessary to have both jaws of the said carrier movable, a form of carrier has been devised which can be actuated by a single flange-pulley, and by employing such carriers with a double set of jaws a double flange-pulley at the sending-point and two single but opposite flange-pulleys at the receiving-points, respectively, one belt is enabled to deliver tickets selectively to two receiving-points. The said double

carrier or clip is shown in Fig. 9 with one of its pair of jaws closed and the other pair open. As in the single carrier, the base k is riveted to the belt, but from its center a fixed web v projects downwardly to an enlarged end v^2 , which is expanded laterally into the fixed jaws w and z , one on each side. The movable jaw i on one side is attached to the arm o of the elbow-lever L , pivoted at b and provided with the arm n on the other side of the said fulcrum to be acted upon by the pulley having its flange appropriately placed, and the jaw i^2 in like manner is attached to the arm o^2 of the other lever N , fulcrumed at b^2 and adapted to have its arm n^2 depressed by the pulley having its single flange on the opposite side. The operation of this arrangement is evident. P being a double-flanged pulley is used at the sending-station D , and when the carrier reaches that station the two sets of jaws are by the two flanges of said pulley opened simultaneously as the carrier passes the ends of tickets T and T^2 , protruding from the rack. The said jaws close on the tickets and the carrier moves along with both. When the first single-flanged pulley is reached, the flange thereof presses one only of the levers— n , let us say—and the ticket or tickets held between the movable and fixed jaws i and z are released and deposited in the proper receptacle, and when the next single-flanged pulley is reached, the flange thereof being at the opposite side, the lever-arm n^2 is in turn acted upon, the jaws i^2 w separate, and the remaining ticket is dropped into the receptacle E^2 . All of the pulleys may of course be provided on both sides with an ordinary narrow flange, if such device be necessary for guiding the belt; but the flanges of the pulleys at the transmitting and receiving stations, which are arranged to engage with and depress the controlling-levers of the carrier, are of considerable width. Whenever herein the term "flange" or "wide flange" is employed, it is these arm-engaging flanges that are meant, and it is to be furthermore understood that the term "single flange" in like manner refers solely to a single flange sufficiently wide to reach and act upon the lever-arm of the carrier. The flanges of the guide-pulleys must, of course, be so narrow that they will not operate or press upon the lever-arms. A speed of travel for the belt which has given good results is three hundred feet per minute, and with this speed the spring-carriers will satisfactorily pick up, carry, and release as many as three or four tickets for each jaw.

It is obvious that no attempt has been made to preserve in the drawings the relative proportions of different appliances, the size of the chutes, pulleys, and receptacles, for instance, being reduced in much greater degree than that of the tickets and carriers.

Although this system of mechanical transmission by spring-lever carriers and flanged

pulleys at the delivery-points, constituting automatic actuating devices therefor, is primarily designed for the distribution of telephone-switchboard-order tickets, it is obviously not restricted to such work, but may be employed for any work of analogous character, such as that of carrying letters, cards, or papers from any distributing-point to one or more delivery-points in the manner described herein.

I claim—

1. A ticket or paper transfer apparatus, consisting of a traveling endless belt running between sending or distributing and receiving stations; a ticket holder or carrier attached to the said belt and adapted to automatically pick up tickets at the sending-station, and release them at the receiving-station, the said carrier comprising separable jaws, a spring normally closing or holding the said jaws together, and an elbow-lever carrying on one side of its fulcrum the movable member of said jaws, and formed on the other side into an actuating or tripping arm extending laterally near to, but beyond the edge of said belt; and a pulley for the said belt at each of the said stations having a flange crossing the said actuating-arm and adapted to depress the same, and thereupon to separate the jaws for the grasp or release of the tickets; substantially as set forth.

2. The combination in a ticket or paper transfer service apparatus, with a traveling endless belt running between sending and receiving stations; a ticket holder or carrier attached thereto and comprising a clip having jaws normally closed by a spring; of means for automatically opening or separating the said jaws at the sending and receiving stations respectively for the grasp or release of a ticket, said means consisting in a wide-flanged pulley for the said belt at the said sending and receiving points; and a lever on the carrier attached to the movable jaw thereof and having a tripping-arm extending across the belt beyond the line of the flange of said pulleys and within range thereof to be depressed thereby, as the said carrier passes the said pulleys; substantially as and for the purposes specified.

3. In a telephone central station a call-receiving switchboard, a connection-switchboard; a system of apparatus for transferring instruction-tickets from the former switchboard to the latter, comprising a ticket-supporting rack at the said call-receiving switchboard; a ticket-receiving receptacle at the said connection-switchboard; a belt traveling over pulleys between the said switchboards; a carrier or ticket-holder attached to said belt, and comprising jaws held normally closed by spring-pressure, and having a movable member controlled by a lever with an actuating-arm extending laterally across the belt and adapted when pressed to open said jaws; and pulleys at both of the said switchboards, hav-

ing wide flanges adapted to engage said levers and operate said jaws at said switchboards, and thereby take up tickets from the rack at the first switchboard, and deposit them in the
 5 receptacle at the connection-switchboard; substantially as described.

4. In a transfer-service apparatus organized to take up tickets or papers from a single distributing or transmitting station and
 10 deliver the same to two receiving-stations, the combination substantially as hereinbefore described, of a belt traveling between the said sending and receiving stations; a pulley therefor at the sending-station having a flange
 15 at both sides; a pulley therefor at each receiving-station having a single flange, the said flanges being on opposite sides of their respective pulleys; and a double carrier or ticket-clip attached to said belt and comprising
 20 two sets of jaws held normally closed by spring-pressure, and an independent lever controlling the movable jaw of each set, and extending laterally across and within range of the flanges of the said pulleys each on its
 25 own side, whereby both sets of jaws may be simultaneously opened by the said double-

flange pulley, and each set selectively opened by the said single-flange pulleys, respectively.

5. The combination in a ticket-transfer system and apparatus, of an endless belt traveling over pulleys between a transmitting
 30 and two receiving stations; a ticket-carrier or spring-clip attached thereto, and traveling therewith, and having two sets of normally closed jaws, one for each receiving-station;
 35 and automatically-operated devices adapted to open the said two sets of jaws simultaneously at the sending-station, and selectively at the two receiving-stations respectively;
 40 whereby tickets may be taken up by both sets of jaws at the said sending-station, and delivered by each set of jaws at the appropriate receiving-station only; substantially
 as and for the purposes set forth.

In testimony whereof I have signed my
 45 name to this specification, in the presence of two subscribing witnesses, this 11th day of March, 1901.

GEORGE M. YORKE.

Witnesses:

HARRY H. BRIGHAM,
 JAS. S. MCCULLOH.