C. S. JENNINGS.

MONITOR SYSTEM FOR CARRIER DESPATCH APPARATUS.

APPLICATION FILED APR. 8, 1914.

1,210,481.

Patented Jan. 2, 1917.

5 SHEETS--SHEET 1.

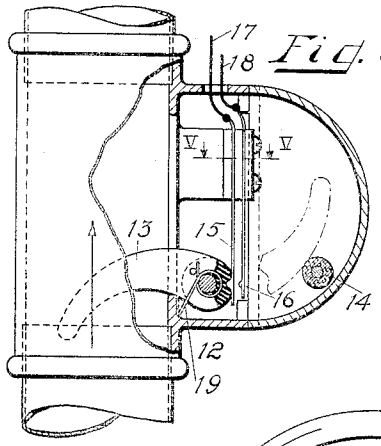


Fig. 3

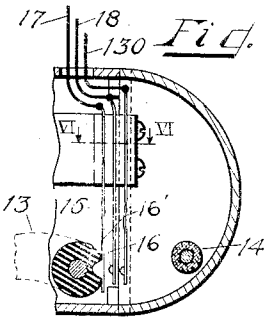
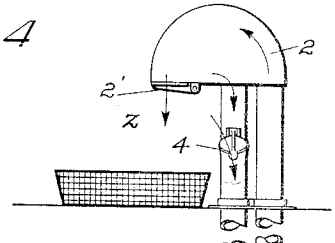


Fig. 4



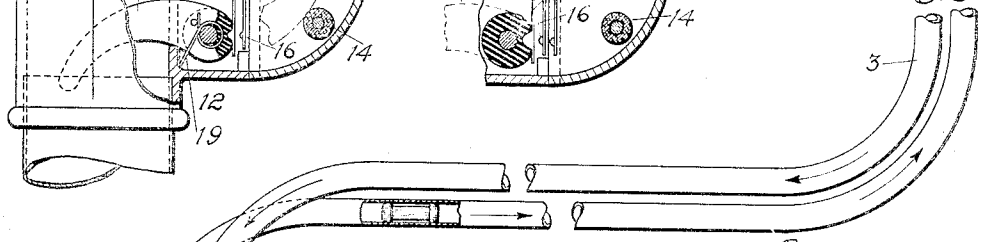


Fig. 1

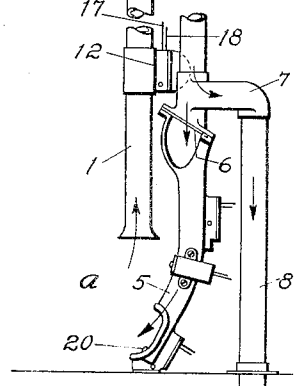


Fig. 6

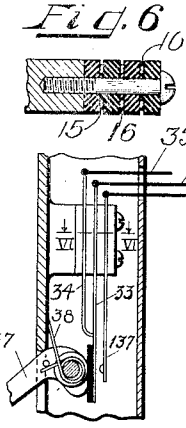


Fig. 2a

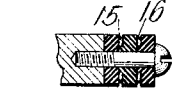


Fig. 5

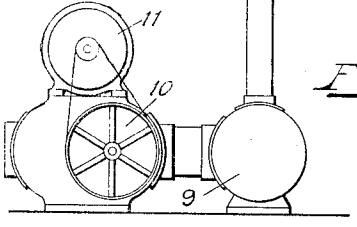


Fig. 2

Fig. 7

Witnesses.

Harry M. Godden.

Charles A. Laurin

Inventor:

Chester S. Jennings

By Chas. P. Hidden

Attorney.

C. S. JENNINGS.

MONITOR SYSTEM FOR CARRIER DESPATCH APPARATUS.

APPLICATION FILED APR. 8, 1914.

1,210,481.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 2.

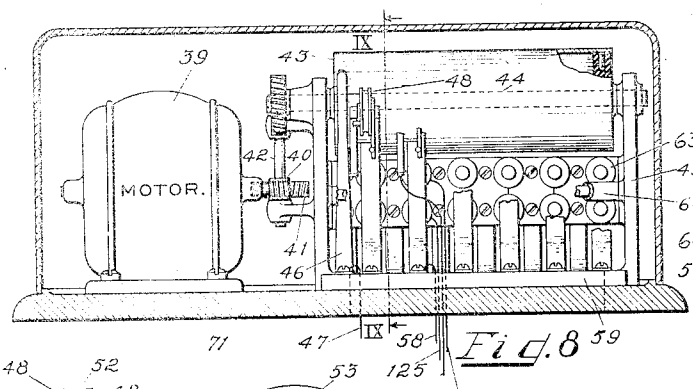


Fig. 8

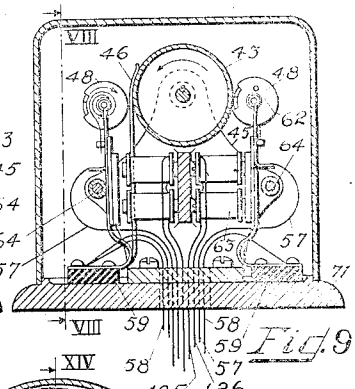


Fig. 9

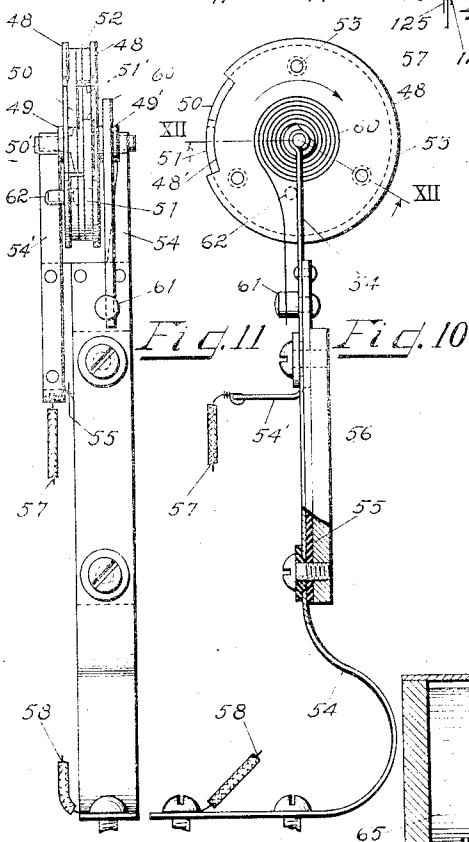


Fig. 11

Fig. 10

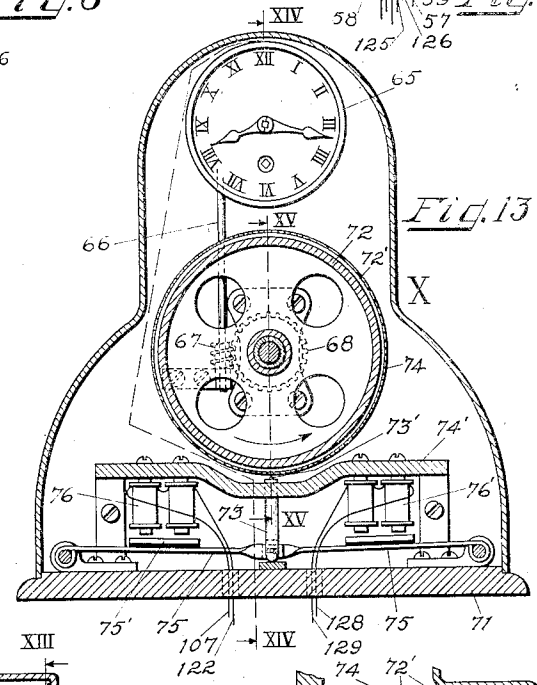


Fig. 13

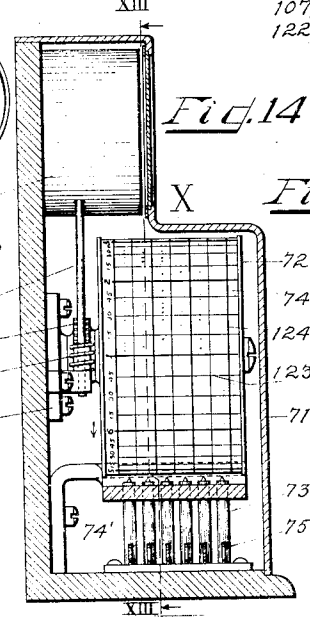


Fig. 14

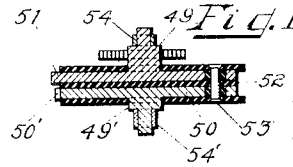


Fig. 12

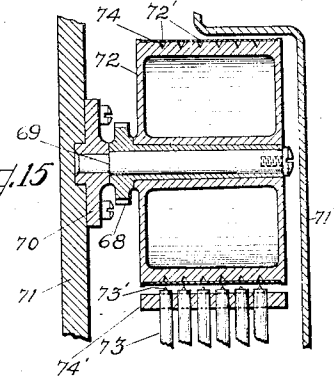


Fig. 15

Witnesses.

Harry M. Godden.

Charles O Laurin

Inventor.

Chester S. Jennings

By Chas P Hidden

Attorney.

C. S. JENNINGS.

MONITOR SYSTEM FOR CARRIER DESPATCH APPARATUS.

APPLICATION FILED APR. 8, 1914.

1,210,481.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 3.

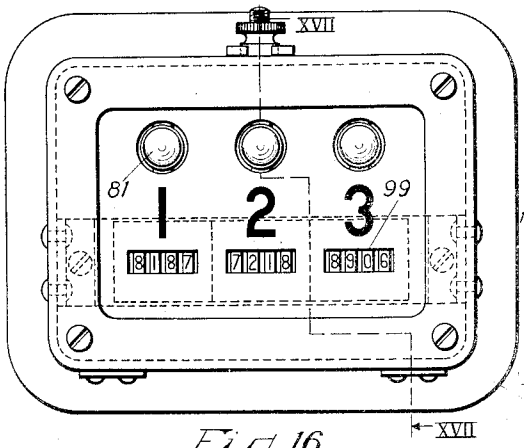


Fig. 16

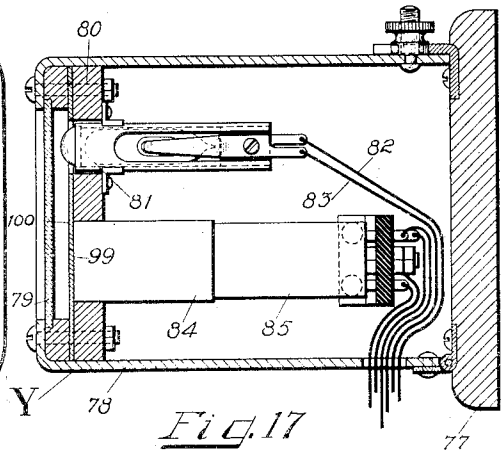


Fig. 17

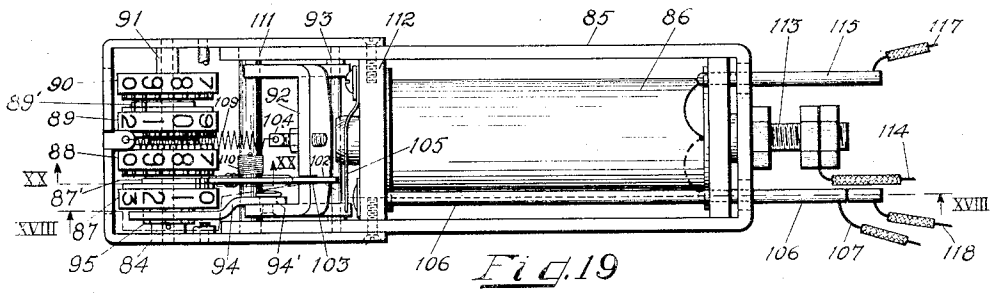


Fig. 19

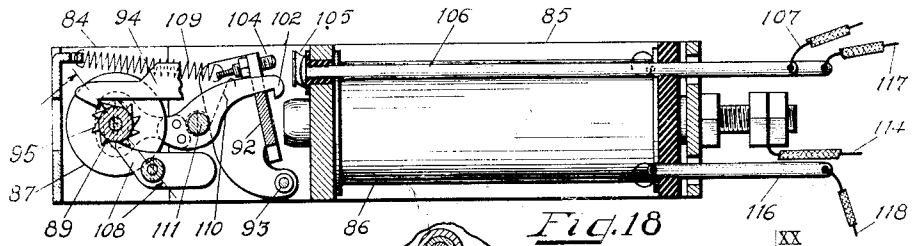


Fig. 18

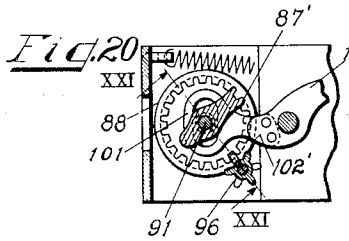


Fig. 20

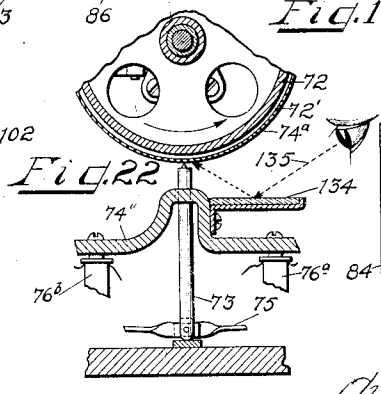


Fig. 22

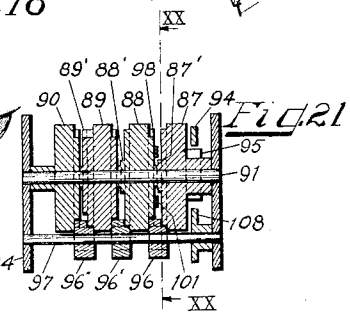


Fig. 21

Witnesses.

Harry M. Goddin.

Charles O Laurin

Inventor.

Chester S Jennings

By Chas A Hidden

Attorney.

C. S. JENNINGS.

MONITOR SYSTEM FOR CARRIER DESPATCH APPARATUS.

APPLICATION FILED APR. 8, 1914.

1,210,481.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 4.

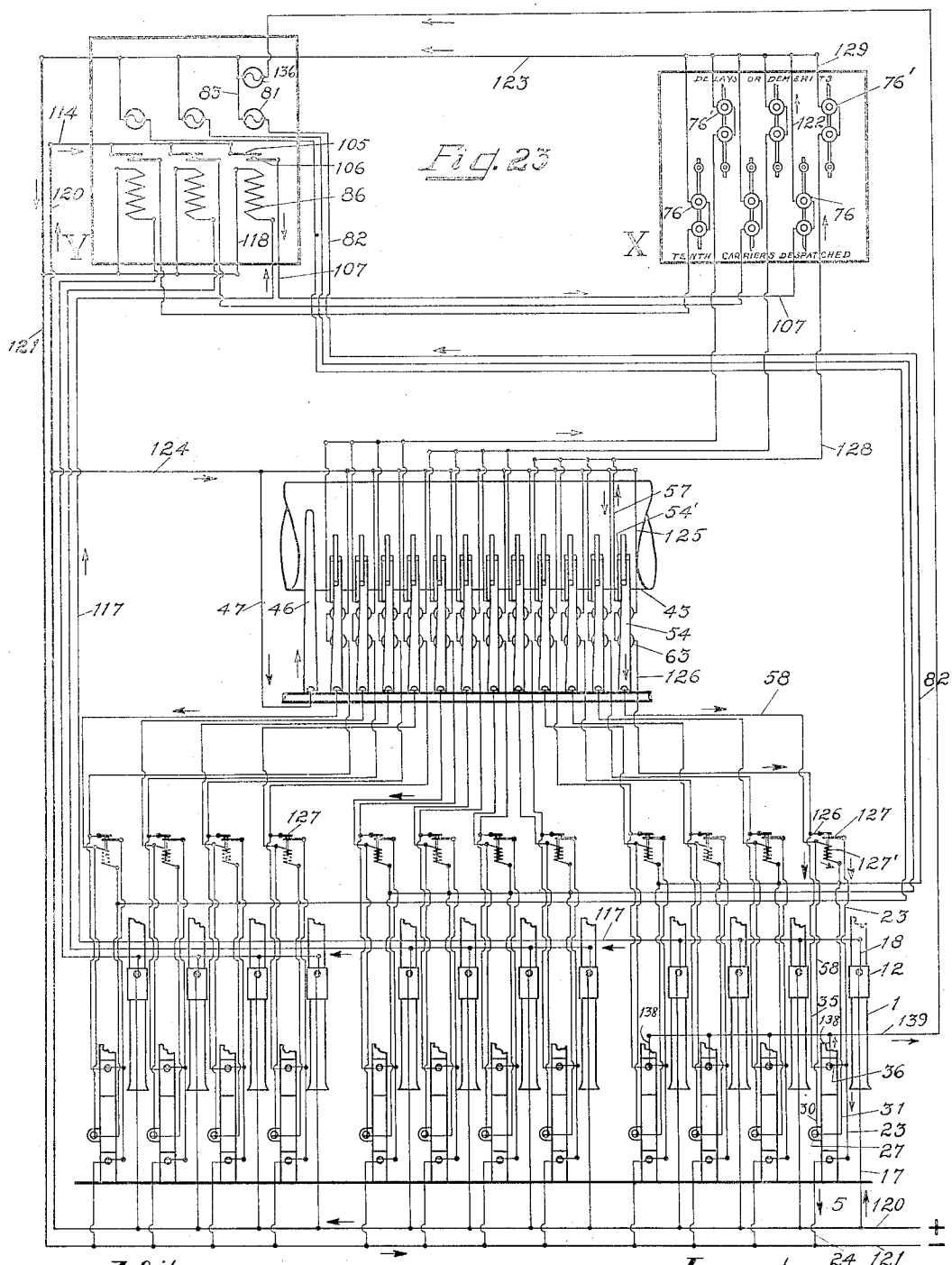


Fig. 23

Witnesses.

Harry M. Goddan.

Charles O. Laurin

Inventor.

Chester S. Jennings.

By Chas. P. Hidden

Attorney.

C. S. JENNINGS.

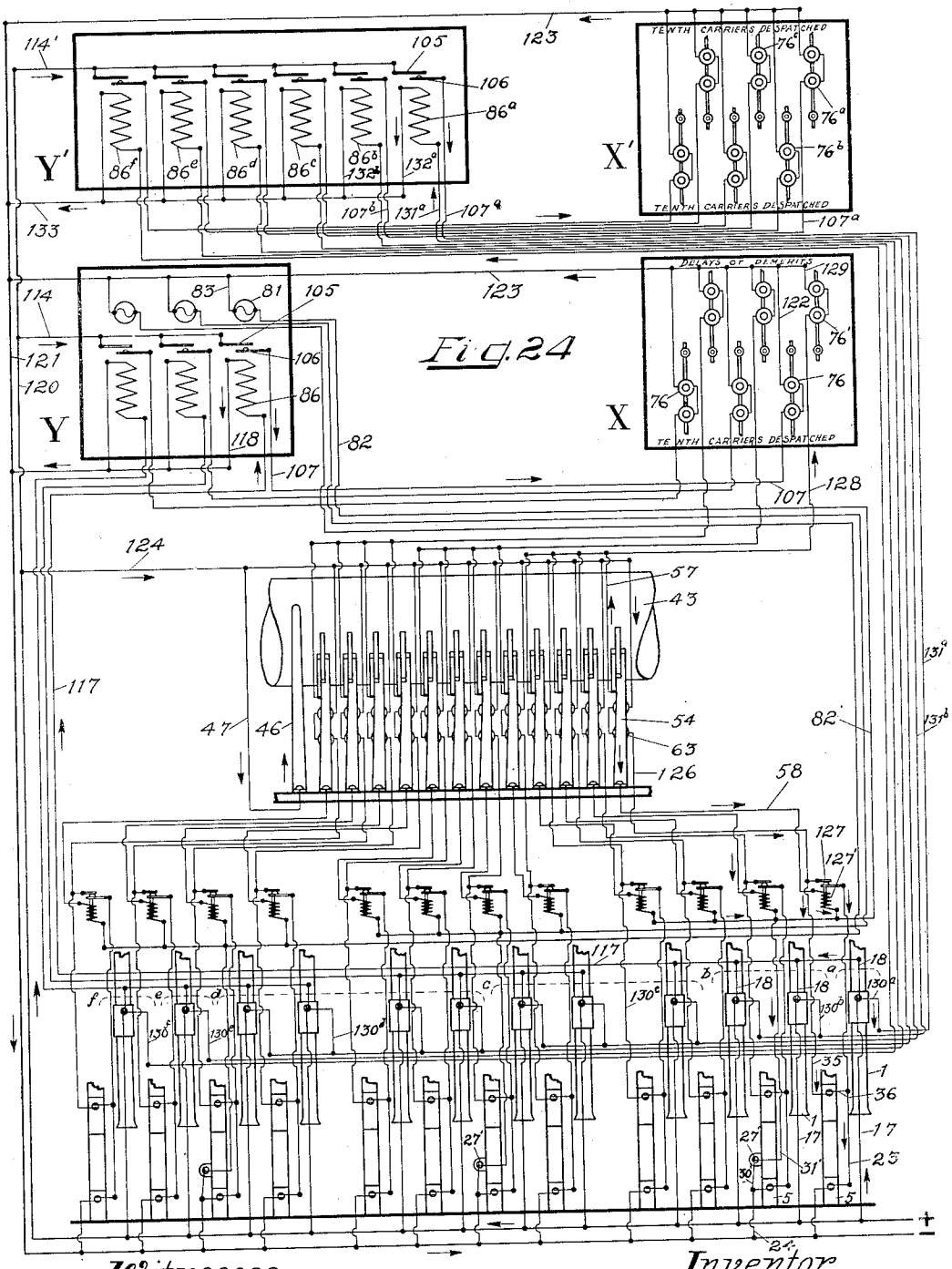
MONITOR SYSTEM FOR CARRIER DESPATCH APPARATUS.

APPLICATION FILED APR. 8, 1914.

1,210,481.

Patented Jan. 2, 1917.

5 SHEETS—SHEET 5.



Witnesses.

Harry M. Goddin.

Charles O. Lauria

Inventor.

Chester S. Jennings

By Chas. P. Goddin

Attorney.

UNITED STATES PATENT OFFICE.

CHESTER S. JENNINGS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE LAMSON COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

MONITOR SYSTEM FOR CARRIER-DESPATCH APPARATUS.

1,210,481. Specification of Letters Patent. Patented Jan. 2, 1917.

Application filed April 8, 1914. Serial No. 830,391.

To all whom it may concern:

Be it known that I, CHESTER S. JENNINGS, a citizen of the United States, residing at Forest Hills, Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Monitor Systems for Carrier-Despatch Apparatus, of which the following is a specification.

This invention relates to a monitor system for carrier despatch apparatus and more especially for pneumatic tube apparatus, and has for one of its objects the provision of means for, preferably, both indicating and recording upon a suitable medium, delays in the handling of carriers.

A further object has been to record the individual despatch of carriers from a given station or desk; and to preferably record said despatch of carriers upon a sheet of paper or the like, in such manner that comparison may readily be made with the record of possible delays, whereby to account for the latter, if an operative has not been negligent or derelict in the performance of duty.

In department stores, for example, prompt carrier service with regard to cash or credit transactions is of exceedingly great importance, since customers will not tolerate unnecessary delay in the receipt of change due them or in the receipt of articles purchased on credit.

In the United States Letters Patent to Frederick L. Soule, Number 1,084,759, dated January 20, 1914, there is disclosed the broad idea of providing means for indicating, or otherwise taking cognizance of delay in removing a carrier from a receiving shelf, for example, of a pneumatic despatch tube system; and my present invention may be regarded, in certain of its aspects as a development of, or improvement upon the Soule construction, by means of which any delay in handling a carrier delivered to a determined point or station, may be permanently recorded, and in which, further, means are provided for showing an accumulation of carriers at such point, which carriers are not receiving the desired attention. Records are also automatically kept of conditions at such a station which might excuse the operative, when such delays occur.

I have further aimed to provide in combination with apparatus of this description novel timing mechanism, which is particularly adapted to store service requirements, and which mechanism is preferably so constructed as to control a plurality of instrumentalities for effectuating the various operations of the system hereinafter referred to.

I have further aimed to so construct the apparatus herein described as to enable the manager of the store, for example, to entirely overcome by its use a serious difficulty encountered in the running of department stores; namely:—that of supplying him with accurate information whereby to enable the manager to efficiently transfer help from one department where such help is not needed to another department where help is perhaps urgently needed.

In a large department store, certain departments will be subject to a rush of customers either at certain times in the day or under special conditions, such for example, as a bargain sale. At present the head of a department where a rush is occurring, when the finds himself with more work to be handled at any given time than his force can adequately cope with, notifies the general manager, and the latter, short of a special inspection, is unable to check up the statement of the department manager, to ascertain whether the extra help is really needed or not. If he concludes that more help is needed, he then is obliged to either personally inspect other departments, to ascertain just how busy they are, or to communicate with such departments to find out whether they can spare help. This frequently causes vexation and interferes with the smooth operation of the store as a whole.

By means of the apparatus hereinafter described the general manager of a concern is at all times able to tell at a glance just how much work is being done in each department and consequently of his own knowledge, and even without request for help, to despatch help from one department which is not busy to another which is.

These and other objects of my invention will be hereinafter referred to and the novel elements and combinations of means whereby said objects may be attained will be more particularly pointed out in the claims appended hereto.

In the drawings which form a part hereof and in which like reference characters designate like parts throughout the several views, I have exemplified preferred constructions;

but as I am aware of various changes and modifications which may be made herein without departing from the spirit of my invention, I desire to be limited only by the scope of said claims.

Referring to the drawings: Figure 1 is a somewhat diagrammatic elevation of a pneumatic tube system, showing certain contact devices hereinafter referred to, in position thereon. Fig. 2 is a detail elevation, drawn to a larger scale and partly broken away, of the carrier receiving apparatus at one of the stations which is hereafter referred to as the cashier's desk. Fig. 2ª shows a modification of the contact parts in the upper portion of the receiving shelf. Fig. 3 is a detail section of a contact in the tube from which carriers are despatched from said station. Fig. 4 is a modification of the device shown in Fig. 3. Fig. 5 is a detail section taken on line V—V of Fig. 3. Fig. 6 is a detail section taken on line VI—VI of Fig. 4. Fig. 7 is a fragment of a card upon which the records are made. Fig. 8 is a vertical longitudinal section of the timing mechanism above referred to; the section being taken on line VIII—VIII of Fig. 9. Fig. 9 is a section taken on line IX—IX of Fig. 8. Fig. 10 is a detail side elevation, partly broken away, of a portion of the said timing device. Fig. 11 is an end elevation of the parts shown in Fig. 10. Fig. 12 is a section taken on line XII—XII of Fig. 10. Fig. 13 is a vertical transverse section of a clock-work mechanism which includes the drum upon which the card shown in Fig. 7 is mounted; such section being taken on line XIII—XIII of Fig. 14. Fig. 14 is a section taken on line XIV—XIV of Fig. 13. Fig. 15 is a detail section of the recording drum taken on line XV—XV of Fig. 13. Fig. 16 is a front elevation of a counting mechanism in connection with which signal lights are provided. Fig. 17 is a section taken on line XVII—XVII of Fig. 16. Fig. 18 is a section taken through the counting mechanism, the casing of which is shown in Fig. 17, the section being substantially parallel to the plane of the paper and the line of this section being further shown at XVIII—XVIII in Fig. 19. Fig. 19 is a plan view of the apparatus shown in Fig. 18. Fig. 20 is a section taken on line XX—XX of Figs 19 and 21. Fig. 21 is a section taken on line XXI—XXI of Fig. 20. Fig. 22 is a fragmentary section showing a modification of the lower portion of the apparatus shown in Fig. 13; which modification is embodied in a second or auxiliary clock-work mechanism hereinafter referred to. Fig. 23 is a wiring diagram of a system constructed in accordance with the present invention; and Fig. 24 is a wiring diagram of a preferred system which embodies certain features not included in the diagram shown in Fig. 23.

Referring now to Fig. 1, an exhaust system of pneumatic transmission has herein been diagrammatically shown, in which the outgoing tube 1 from the cashier's station *a* leads to a suitable terminal 2 of well known construction, located at a clerk's station *z*. The usual valve 2′ is provided upon the terminal 2 to permit of the egress of carriers while normally preventing an inflow of air into the return tube 3 which leads from the despatching terminal 4 at station *z* to the receiving shelf 5 at station *a*. The usual flexible valve 6 is disposed at the top of the receiving shelf, normally to prevent ingress of air to the conduit 7 which leads from the return tube to the exhaust tube 8; and the latter may be connected to a drum 9 from which air is exhausted by means of a suitable blower 10 driven by a motor 11, all in a well known fashion.

Considering first the construction in connection with the wiring diagram shown in Fig. 23. A circuit making device broadly designated 12 (Fig. 1) is located in tube 1 adjacent the mouth thereof, which for simplicity in the exemplified construction has been shown as being normally open. Air normally flows through the transmission tubes in the direction of the arrows indicated thereupon and when a carrier is inserted into the tube 1 its forward end strikes against a trip 13, shown in Fig. 3, and said trip is thereby promptly snapped around into its dotted line position against a buffer stop 14, and in so doing cams over a resilient contact strip 15 into engagement with a contact 16; both of these contacts being within the casing of the apparatus 12. Contacts 15 and 16 are suitably mounted and insulated from each other, as shown in Fig. 5, and wires 17 and 18 respectively lead therefrom to points hereinafter referred to. A light spring 19 acts to return the trip 13 to its normal position, shown in Fig. 3, as soon as the carrier has cleared said trip. At the bottom of the receiving shelf is a trip or lever 20 against which the first carrier to enter the shelf impinges, and the weight of this carrier forces trip 20 into its dotted line position 20′, thereby camming over a resilient contact strip 21 into engagement with a similar contact strip 22. The contacts 21 and 22 may be insulatedly mounted in the same manner as contacts 15 and 16 and have wires leading therefrom respectively designated 23 and 24 which lead to parts hereinafter described. The cam lever 20 is normally held in its uppermost position by a light spring 25 so that wires 23 and 24 are normally dead. Above the aperture in the shelf 5, through which the carriers are removed, is a bracket 26, which may be screwed fast to the shelf and in which is mounted the bulb 27 of a small signal light. The construction of the bracket 26 need not

be herein particularly described, other than to state that the light 27 is suitably connected by spring contact clips 28 and 29 with wires 30 and 31, which are preferably normally unenergized, and that the light may be covered by a semi-translucent shell or globe 32. Above this light is a casing in which are mounted spring contacts 33 and 34 which are respectively connected to wires 36 and 35; said contacts being normally in engagement, but being adapted to be separated or cammed apart by the movement of a lever of trip 37, which normally extends into the path of carriers descending the shelf. This trip is also provided with a light spring 38 whereby as soon as a carrier has cleared the trip, the latter will be moved again into the position in which it is shown in Fig. 2.

In Fig. 8 I have shown a preferred timing mechanism which constitutes an important part of the present system. Herein, a small constantly operating motor 39 drives a worm 41 and thereby a wheel 40 mounted on the shaft 42. The latter is suitably geared to a constantly rotating electrically conductive drum 43, so that the latter advances in the direction of the arrow marked thereupon in Fig. 9, at a very slow rate. It will be understood of course that the shaft 44 upon which drum 43 is mounted is suitably journaled in a frame 45 and that this entire appaartus is preferably incased, as shown in Figs. 8 and 9. The drum 43 is insulatedly mounted upon its shaft and is at all times in engagement with a resilient contact strip 46 from which extends a lead or wire 47, hereinafter referred to in connection with the wiring diagram. Upon either side of drum 43 is a series of time element devices, the details of which are best shown in Figs. 10 and 11. Herein two disks 48 of insulating material are mounted upon the hubs 49 and 49′ of contact disks 50 and 51, which latter are spaced from each other by an insulating plate or disk 52, the whole being suitably riveted together, as at 53, in such manner that insulation is maintained between disks 50 and 51. The insulating disks 48 may be of fiber or other suitable material and are cut away arcuately around portions of the peripheries thereof, as at 48′. At these points also, but for shorter distances, the disks 50 and 51 are correspondingly cut away as at 50′—51′ and suitable extensions or trunnions upon the hubs 49 and 49′ are journaled in the upper extremities of resilient strips 54 and 54′. These strips are riveted or otherwise suitably connected to an insulating strip 55 which may be backed by an iron armature 56 for a portion of the length thereof. The strip 54′ has the lower extremity thereof turned outwardly, as shown in Figs. 10 and 11, and has connected thereto a wire or lead 57, while the strip 54 may extend down and may be bent around to form a yielding or resilient support for the armature 56 and its associated contact parts. Strip 54 is connected at its lower extremity to a wire or lead 58 and may be mounted directly upon an insulating block 59 as shown in Fig. 9. The hub 49 has connected thereto a light spiral spring 60 which normally tends to move it in a direction opposite to the arrow shown upon disk 48 in Fig. 10; the outer and lower end of said spring being connected to a stud 61 mounted upon the strip 54. A pin or stop 62 limits the backward rotation of disks 48 by spring 60; said pin projecting laterally from one of said disks and engaging the strip 54′ when the contact parts are in the positions in which they are shown in Figs. 10 and 11. As previously stated there are provided a series of these timing elements preferably all operated by power derived from a common source, to wit, drum 43, and there are preferably as many of said elements as there are receiving shelves. Directly below the drum 43 is a series of electro-magnets 63 which control the respective armatures 56 and thereby the respective timing elements. These magnets may all be conveniently mounted upon a central rib or bar of the frame 45. As shown in Fig. 9, the left hand timing element is out of engagement with drum 43; it being moved to the position in which it is shown by reason of its resilient mounting, and the outward movement being limitd by a stop bar or sleeve 64, one of which extends the length of the frame upon either side thereof. The timing element shown to the right in Fig. 9 is, however, in engagement with drum 63 and has been wound around to a point where its contact disks have successively engaged said drum; the rearmost edges of the recesses 48′ in the friction insulating disks 48 having been turned into engagement with the smooth surface of the drum 43 so that slippage occurs between the contact 51 and said drum.

The clockwork driven mechanism X shown in Figs. 13, 14 and 15 comprises a clock 65 having a spring sufficiently strong to not only drive the usual clock mechanism but to further drive a shaft 66, which extends through the case of the clock, as shown in Fig. 14; said shaft in turn operating a worm 67 and wheel 68, the latter being mounted upon a stud 69, as shown in Fig. 15; said stud extending out from a small bracket 70 which is directly connected to the frame 71, which carries the clock and its associated parts. The hub of the gear 68 is prolonged to form, in effect, a hollow coned spindle upon which is mounted the drum 72 which carries the record card or sheet. The drum may be readily removed from its spindle by removing the cover 71′

of the mechanism and thereafter forcing off said drum from its tapered spindle with slight pressure. The drum is preferably grooved, as at 72′, to receive the points 73′ of pins 73 which are electro-magnetically moved up into engagement with the paper or other suitable material 74 from which the card or chart is made; and obviously since the paper is not backed by the drum at the points where the needles or points 73′ impinge thereagainst, said paper will be perforated whenever a pin 73 is raised. These pins may be mounted in a frame 74′ and preferably have the lower extremities thereof connected to pivoted arms or levers 75, each of which carries an armature 75′ which is controlled by a corresponding electro-magnet 76; also carried by frame 74′. When these magnets are not energized gravity returns the corresponding armatures and pins 73 to their lowermost positions.

Referring now to Figs. 16 to 21 inclusive, I have therein shown a suitable counting mechanism in combination with circuit making parts, all broadly designated Y, the purpose and mode of operation of which will be referred to hereinafter in connection with the description of the system as a whole. It will be well, however, first to consider the construction of these particular parts and their relationship to each other. A suitable upright base 77 carries a casing 78, the front of which may be closed by a glass plate 79. Connected to the plate or frame 80 within this casing are clips adapted to hold signal lights 81 similar to those designated 27. The wires 82 and 83 leading from these lights will be hereinafter referred to. Projecting laterally from the frame 80 and securely fastened therein below the lights 81 are counting mechanisms each mounted in a U-shaped frame 84 to which is connected a somewhat similar frame 85 which carries the magnet 86 which actuates said counting mechanism. The counting mechanisms in the present instance each comprise four numbered disks respectively designated 87, 88, 89 and 90, all loosely mounted upon a spindle 91. Between these disks and the magnet 84 is an armature 92 mounted upon a shaft 93; said armature being pivotally connected at 94′ to a pawl 94. For convenience of illustration in Fig. 18 a portion of this pawl and the corresponding portion of the armature has been broken away, but the connection has been shown fully in Fig. 19. Pawl 94 engages a ratchet 95, which preferably has ten teeth; and said ratchet may be integrally connected to the first or units disk 87, as shown in Fig. 21. Upon the opposite side of disk 87 is a toothed lug 87′ which is adapted to engage a six toothed star wheel 96, once in every revolution of the disk 87. It will be understood that from the manner in which the section has been taken which is shown in Fig. 20, the part therein designated 87′ is integrally connected to the reduced side of the disk 87 which has been cut away in said figure, and that the star wheel 96, while every tooth thereof is adapted to engage the bifurcated end of its operating part 87′, has the alternate teeth thereof cut away, as indicated in Figs. 20 and 21, to clear this reduced side of disk 87; so that when the star wheel is not operatively engaged by part 87′ it is locked against rotation by the engagement of the uncut teeth with the said reduced portion of the disk, in a known manner. The star wheel 96 is loosely mounted upon a shaft 97 upon which are also mounted identical star wheels 96′ and 96″ as shown in Fig. 21. Whenever the star wheel 96 is rotated one sixth of a revolution by its engagement with part 87′, its teeth, which are in engagement with a gear 98 which is integrally connected to disk 88, advance said disk a sufficient distance to expose a new digit through the slot 99 in a cover plate 100 back of the glass 79; frame 84 being of course correspondingly apertured. Disk 88 is similarly reduced upon the left hand side thereof, as shown in Fig. 21, and correspondingly carries a star wheel actuating part 88′ similar to the part 87′ above referred to, and this part in turn actuates the star wheel 96′ and thereby correspondingly advances the disk 89 one step for every revolution of the disk 88. The section plane of disk 89, shown in Fig. 21, also passes longitudinally through the part 89′, and of course this element actuates the star wheel 96′ and thereby the disk 90 in similar fashion to the corresponding parts just described. Between the disks 87 and 88 there is disposed a guide member 101 which is preferably of light gage sheet metal riveted to a latch 102; the member 101 being slotted, as shown in Fig. 20, to clear the small hub of the disk 87 which projects out beyond the part 87′ thereof, and spaces said disk from the adjoining disk 88. Armature 92 is slotted at 103 for the reception of this latch so that normally the travel of said armature is limited thereby, but whenever the toothed part 87′ passes the upper arm 102′ of the latch 102 it rocks the latter counter-clockwise, as viewed in Figs. 18 and 20 and thereby releases armature 92, permitting it to make its full travel. A set screw 104 carried in the end of the armature is at such time adapted to operatively engage a spring contact 105 and press the same into engagement with the contact head of an electrically conductive rod 106; and owing to the fact that there are 10 teeth in the ratchet 93 this contact will be effected at every tenth energization of magnet 86. Rod 106 has connected thereto a lead or wire 107 which will be hereinafter referred to. The star wheel

is prevented from being reversely actuated by its pawl 94 by a weighted locking pawl 108; so that by no possibility can contact between members 105 and 106 be established at other than every tenth actuation of the armature 92. The latter is normally held away from magnet 86 by a light spring 109 and a similar spring 110 connected to the shaft 111 upon which the latch 102 is mounted, normally holds said latch in its operative position; although gravity will normally tend to so hold it even if spring 110 were not provided. The contact 105 is mounted upon the portion of the frame 112 through which extends the adjacent pole of the magnet and said contact is hence grounded to said frame. The core of the magnet has outwardly projecting therefrom a stud 113 by means of which the magnet is bolted to the frame and this stud, which is in electrical communication through the frame with contact 105, has connected thereto a wire 114. Hence, whenever the armature is permitted to make its full travel, electrical communication between wires 107 and 114 will be established. The magnet 86 is also provided with conductive rods 115 and 116 which are connected to the respective extremities of its coil and which have attached thereto leads or wires 117 and 118.

Having thus described in detail the mechanical elements involved in the system diagrammatically represented in Fig. 23, I shall now consider the operation of the system while describing the electrical connections between these elements. In this figure, three cashiers' desks or stations have been shown, each being provided with four despatching tubes 1 and four receiving shelves 5; each of said shelves being further provided with a signal light 27. For convenience of description the circuits leading from the right hand despatching tube and receiving shelf will first be considered. The positive lead or main 120 has connected thereto the wire 17 which leads to the contact making device 12 upon the despatching tube, and the wire 18 hereof is connected to the common lead 117, for these devices, which extends to the coil of the first of the magnets 86 in the mechanism Y shown in Figs. 16, 19, etc. The wire 118 which is connected to the other extremity of this magnet coil extends thence to the negative lead or main 121; whereby this magnet is energized every time that a carrier is despatched. Energization of magnet 86 attracts its armature 92 and thereby actuates the counting mechanism, the units disk 87 of which is advanced one step per carrier despatched and of course after ten carriers have been despatched the disk 88 correspondingly advances one step or digit, etc. As previously stated the contacts 105 and 106 are only engaged at every tenth energization of magnet 86 and hence every tenth carrier despatched will cause current to flow from the positive main 120, at the further extremity thereof, through wire 114 and the magnet frame to contacts 105 and 106, and thence through wire 107 to one of the magnets designated 76 below the drum 72, shown in Fig. 13. The current leaving this magnet flows via wire 122 to a common return wire 123 which is connected to the negative main. Thus upon the despatch of every tenth carrier through a determined despatch tube, the armature 75′ of the magnet corresponding to said tube will be lifted and will thereby drive the perforating point of the corresponding pin 73 through the paper 74. It will be understood of course that this paper is divided transversely by lines 123^a which correspond to time intervals and since the drum carrying the record card or sheet continuously rotates in correspondence with the movements of the clock, it will be obvious that practically the exact moment when any given carrier is despatched will be recorded upon sheet 74 in the column which corresponds to the tube through which said carrier travels. It may be here stated that the lines 124 on sheet 74, which extend longitudinally thereof and at right angles to line 123^a, form these columns, and in practice the first column from the left in Fig. 14 will contain the records of tenth carriers despatched from the cashier's station at the left in Fig. 23. The next column is for records of delays or demerits at this station. The third recording column, from the left, in Figs. 7 and 14 will contain records of tenth carriers despatched from the middle station, while the fourth column will similarly show the delays; and the fifth and sixth columns will correspondingly pertain to the right hand cashier's station with its four despatching tubes and four receiving shelves.

When a carrier is delivered to the cashier's station or desk through the tube 3 which delivers to the right hand receiving shelf 5 in Fig. 23 (corresponding to the despatching tube the recording circuit for which has just been traced), said carrier impinges against the trip or lever 20 in said shelf and makes connection between contacts 21 and 22, thereby completing a circuit from positive main 120 through a lead 124 and thence through a wire 125 to the magnet 63 of the timing element which corresponds to this shelf. The current flowing through this magnet flows part-way through a wire 126 and is there branched, a portion traversing a normally closed circuit breaker 127 and thence through wire 23, contacts 21 and 22 and wire 24 to the negative main; while the remainder of the current flows via wire 35, contacts 33 and 34, and wire 36, to wire 23 and thence out, together with the remainder of the current.

to the main 121. As long as a single carrier is in the receiving shelf and remains in contact with lever 20 the partial circuit through circuit breaker 127 will be maintained and hence the insulating friction disks 48 which correspond to this magnet 63 will be pulled in toward and held in engagement with the continuously rotated drum 43 until they have been rotated from the position in which they are shown to the left in Fig. 9 to a point where the cut-away portions 48′ of said disks encounter said drum, whereupon the contact disk 50 will be snapped into engagement with the conductive surface of the drum and the following circuit is completed: Current flows from wire 124 which is in communication with the positive main, via wire 47 to contact 46, drum 43, contact 50, strip 54′, wire 57 and a wire 128 which preferably leads from a group of wires 57, to one of the magnets 76′ which corresponds with the magnet 76 previously referred to, but which is on the demerit or delay side of the recording mechanism shown in Fig. 13. The current then passes from this magnet through a wire 129 to the common return wire 123 previously referred to, which leads to the negative main 121. The energization of magnet 76′ causes one of the pins 73 to be raised and indent the record sheet in the column thereof which is immediately to the right of the column in which records are kept of the despatch of carriers through the despatch tubes corresponding to the receiving shelf in question. Thus a delay on the part of an operative in removing a carrier within a period of, let us say, ten seconds, if that be the time which the corresponding timing element has been set to determine, will result in impressing upon the record sheet a demerit mark against this operative. Almost immediately after contact 50 has engaged the drum 43, the continued rotation of the latter will effect its engagement with contact disk 51 and shortly thereafter its disengagement from disk 50. This latter action deënergizes magnet 76′ so that the record sheet is not torn by the continued pressure of the recording needle thereagainst. The engagement of contact 51 with drum 43, however, completes the following circuit: From the positively energized wires 124 and 47, current flows through strip 46, drum 43, contact 51, strip 54, wire 58, and wire 30 to the cashier's signal lights 27, thence via wire 31, to a wire 82, which is connected to the signal light 81 in the apparatus shown in Fig. 16, which corresponds to this particular cashier's station, current thence flowing via wires 83 and 123 to the negative lead 121. Hence, lights show simultaneously at the supervisor's station and at the dilatory cashier's desk, indicating to the operative there stationed, and to the supervisor, that a carrier has remained in the shelf corresponding to the signal light shown, for a period in excess of the time allotted for the normal removal of said carrier, and further indicating that a demerit mark has been made against this operative upon the recording sheet. Thereafter the lower edges or outer corners of the recesses 48′ of disks 48 are rotated into engagement with the drum 43 and stop further rotation of said disks; contact 51, however, remaining in slipping engagement with said drum and consequently lights 27 and 81 continue to show as long as this single carrier remains in the shelf. The instant that the carrier is withdrawn, lever 20 is raised by its spring 25, which interrupts circuit between contacts 21 and 22, and the various above described parts are again deënergized preparatory to making indications for the next carrier, if such indications be required.

It may happen that a second carrier is delivered to the receiving shelf 5 before the first carrier is removed and to indicate such a condition the lever 37 and certain coöperating parts are provided which, when a second carrier occupies the position in which one is shown in Fig. 2, will hold said lever in its dotted line position 37′ and thereby interrupt the normally closed partial circuit, above referred to, which includes contacts 33 and 34 and wires 35 and 36; the former of these extending to the wire 126 and the latter to the wire 23 to which current flows through the normally closed circuit breaker 127, in the manner above described. When, however, contact disk 51 engages drum 43 it not only lights the lamps 27 and 81 but further energizes the coil 127′ of the circuit breaker 127, since coil 127′ is in shunt between wires 58 and 82. This energization of coil 127′ interrupts the circuit which includes wire 126 and a portion of wire 23, but since at such time contacts 33 and 34 will normally be closed the whole current will pass around this break in the circuit, through wires 35 and 36. When, however, the second carrier interrupts this branch also, current will cease to flow through the magnet 63 of the particular timing element which corresponds to the receiving shelf in question, so that the resilient mounting 54 will disengage contact disk 51 from the drum and thereby interrupt the signal lamp circuit while at the same time deënergizing coil 127′, if the circuit which controls said part has been energized by the completion of the period of 10 seconds from the arrival of the first carrier in the lower end of the shelf, and allowing circuit breaker 127 to again close. This reclosure of the latter element immediately reenergizes magnet 63 which again snaps the timing element back into engagement with the drum; but spring 60 has in the mean-

time, and while this element was out of engagement with the drum, rotated disks 48 back to their first position so that the element will time again for its full period and this period will now run against the second carrier so that if this carrier be not allowed to descend past lever 37 within ten seconds of the recording of the first demerit, a second demerit will be entered upon the record. Further, if when the first carrier has been removed and the second carrier has dropped clear of lever 37 and moved into engagement with lever 20, then if said second carrier, which has now become the first, be not removed within ten seconds of its engagement with lever 20, another demerit will be recorded. Thus the arrival of a first carrier starts the time interval running and the arrival of a carrier either within or after said interval re-times the time element mechanism to run for this second carrier at any time after the lapse of the first period which ran against the first carrier. Further, if this second carrier be allowed to remain more than ten seconds said time element mechanism is again automatically re-timed owing to the fact that upon the completion of the time period running against the second carrier, circuit is closed between the drum and the contact 51 as soon as the latter contact engages said drum, with the general result that if this second carrier be allowed to remain up in the shelf in the position in which it is shown in Fig. 2, an additional demerit mark will be recorded every ten seconds as long as said carrier continues to press against lever 37, while the lights 27 and 81 will flash intermittently at ten second intervals immediately after each demerit recorded. If no second carrier follows the first into the shelf such a repetition of demerit marks for a single carrier would not be made, and the signal lights at both the cashier's desk and at the supervisor's station would remain continuously lighted. The supervisor can, therefore, tell quite accurately from the inspection of his light 81, what kind of a delay is occurrring at the cashier's desk, *i. e.*, whether a single carrier has arrived and has been left in the shelf or whether another carrier or carriers have also arrived to which no attention is being paid by this particular cashier. In even a moderately busy system, however, the second carrier will be very apt to follow the first within a reasonably short time with the result that if the cashier is not attending to duty a succession of demerits will be recorded. Since every tenth carrier despatched through the corresponding tube, or indeed through any one of the tubes which are under the charge of a given cashier, will cause an indentation or mark to be made in the column, immediately adjacent and to the left of that in which these demerits are being recorded, an inspection of the record will show whether the cashier's neglect to remove carriers from a given receiving shelf or shelves was justified by the press of other work. Thus if in the column which indicates every tenth carrier despatched there be but few indentations within a given period of, let us say, ten minutes, while during this same period there are a number of indentations in the delay or demerit column, it becomes at once evident that this particular cashier has been derelict in duty during this period; whereas, if the record shows that a large number of carriers were despatched while at the same time a number of delays were recorded, it becomes equally evident that the cashier was so burdened with work as to be unable to promptly attend to the removal of carriers from the shelves.

The drum 72 is of course rotated at sufficient speed to normally enable the inspector to distinguish apart the successive indentations in a given column thereof owing to the lapse of ten second intervals between each of said indentations in the demerit column; but if a serious delay of carriers is occurring at any given shelf so that a demerit is recorded every ten seconds during an extended period, these indentations may follow each other so closely as to make practically an indented line in the record. Even here, however, it is possible upon a close inspection to tell about how many demerits such a line represents, especially since if this line extends uninterruptedly through a period of say two minutes, such two minute period will be represented by a determined space on the record sheet, and dividing the 120 seconds which it represents by 10, the fact that 12 demerits have been recorded is practically self-evident. If a third carrier follows the first two into the shelf so that all three are at rest therein, the record will only be made for the first and second carriers in the manner above described, but the moment that the first carrier is removed, the time period again starts and the former third carrier, now the second, will, since it is at such time in engagement with lever 37, cause the recording of demerits at ten second intervals if no further attention is paid by the operative to this shelf. It hence behooves the cashier or operative to take no chances, since a delay in removing the carrier in sight may cause an accumulation of carriers in the shelf which, if not very promptly attended to thereafter, will result in the recording of a considerable number of demerits. It will be observed too that upon the arrival of the first carrier the signal light at the cashier's desk only shows after the demerit has been recorded and that while, other than for the continued showing of the lights respectively at this desk and at the supervisor's station,

no further demerit will be entered upon the sheet for this first carrier, a second carrier may arrive at any time, and the arrival of this second carrier will be indicated by the deënergization of the electric lights and that the second demerit will be recorded after the lapse of about ten seconds; again before the lights (this time momentarily) flash. The circuit breaker 127 has not been shown in detail since the construction is well known and it has accordingly been diagrammatically represented in the usual manner.

As will be at once evident upon inspection of Fig. 23, the circuits for the respective despatching tubes and shelves are practically identical so that it may be merely noted that one light 81 is provided for each group of four shelves and that correspondingly there is but one magnet or coil 86 for a common group of despatching tubes; so that the despatch of a carrier through any one of the four despatch tubes constituting a group will energize said magnet and thereby operate the register corresponding to this group; while every tenth carrier, no matter through which of these four tubes said carrier may be despatched, will cause an indentation to be made upon the record sheet; there being but one magnet 76 for each group of despatching tubes. Correspondingly all demerits against a given cashier are recorded through the instrumentality of a single demerit magnet 76′. Therefore, the record sheet for three cashiers' stations or desks having a definite number of despatching tubes leading therefrom and being provided with a like number of receiving shelves, will have alternately disposed thereon three columns representing tenth carriers despatched and three columns representing demerits. There are preferably provided, however, as many time element devices as there are receiving shelves; since an attempt to utilize one time element device for more than one shelf will be apt to result in unfair recording of delays. In the preferred system there is installed an additional clock-work mechanism X′ similar to that shown in Fig. 13 and an auxiliary register cabinet Y′ similar to that shown in Figs. 16 and 17, except that in the case of this latter, no lights need be provided, but there is a magnet 86 for each department in the store over which supervision is to be exercised.

Referring more particularly to Fig. 24 it will be observed that there are twelve despatching tubes and a corresponding number of receiving shelves arranged in groups of four, as in the preceding case; one cashier being provided for each group. These tubes, however, may extend to different departments so that the first set may run, for example, to the jewelry department; this set being desigated *a*. Similarly a second set *b*, in the present instance comprising two despatching tubes and two shelves, may run to the silk counter. A third set comprising three despatching tubes and three receiving tubes with their shelves, broadly designated *c*, may serve to convey cash and charge or credit slips and the like pertaining to a third department. A fourth group or set designated *d* may similarly connect a fourth department with the cashiers' desks, since, in this case, as also in the case of group *c*, a plurality of cashiers may handle the work pertaining to such a given department. Finally the tubes under groups *e* and *f* may correspondingly pertain to two additional departments. In the register cabinet there will be a corresponding magnet 86^a, 86^b, 86^c, etc., for each of these departments and it will be observed that the single despatching tube corresponding to the department designated *a* has in the present instance three wires extending from the contact maker therein, instead of two, as in the preceding case. A detail of this contact maker is shown in Fig. 4; the only difference between the device shown in said figure and that shown in Fig. 3 being that in addition to contacts 15 and 16 a third contact normally spaced away from contact 16 is provided, this latter contact being designated 16′. When a carrier swings around the lever 13, it first cams contact 15 into engagement with contact 16 and immediately thereafter the latter is moved into engagement with contact 16′. The connections to the contacts 15 and 16 are practically identical with those discussed in the consideration of Fig. 23; the first described register cabinet Y with its magnets 86 and light 81 being controlled by these contacts and said magnets 86 operating the registering mechanism to record the despatch of every tenth carrier on the disks 87, 88, etc.; while in similar fashion the magnets 76 are energized to impress upon the record sheet an indentation for every tenth carrier despatched.

The third contact 16′ in the carrier actuated circuit maker has connected thereto a wire 130 which for convenience of reference is marked 130^a, 130^b, etc., in accordance with the departmental group to which these wires may happen to pertain. Thus, there will be two of these wires in group *b*, both in parallel; three in group *a*, similarly in parallel; four in group *d*, in parallel, etc. Wire 130^a is connected to a wire 131^a which leads to the magnet 86^a in the upper or departmental register Y′. Similarly the two wires 136^b are connected to a wire 131^b which extends to magnet 86^b, etc. Wires 132^a, 132^b, etc., extend to a common return wire 133 which is connected to the negative main 121. Hence the despatch of a carrier through any one of the despatch tubes leading from the cashiers' desks, which handle the transactions of

a given department, will momentarily energize the magnet 86^a, 86^b, etc., which pertains to such department and the register controlled by such magnet will be advanced one unit accordingly. Every tenth carrier despatched will be recorded upon a second chart which is advanced by clockwork practically identical with that shown in Figs. 12 and 13; the magnets by means of which this second chart is perforated being respectively designated 76^a, 76^b, etc., in the clockwork mechanism X'. It will be observed that in this second or auxiliary clockwork mechanism no demerit magnets are provided, since this device is merely for the purpose of recording on the second sheet every tenth carrier despatched from the cashiers' stations through any one of the despatch tubes leading from said stations to a given department.

As in the case of the three-magnet register cabinet Y, previously described, the respective contacts 105, and 106 for each of the magnets in the departmental register Y', may have connected thereto wires 107^a, 107^b, etc., which wires respectively extend to the said magnets 76^a, 76^b, etc., in the auxiliary mechanism X' while contacts 105 may all be connected to a common wire 114' which leads from the positive main 120, and the six magnets 76^a, 76^b, etc., may be connected by a common wire 123' with the negative main 121. Since for convenience of construction the pins 73 are disposed below the drum 72 in both the demerit and departmental clockwork mechanisms, it has been found desirable to provide a mirror 134 in connection with the supporting frame 74'' for the magnets 76^a, 76^b, etc., as shown in Fig. 22. Herein the drum has been spaced somewhat farther from said magnets, the frame being bowed up in a ridge, as shown in Fig. 22, to properly support the upper ends of the pins 73. When the eye of the operator looks along the line 135 a reflection of the second or departmental recording sheet 74^a is perceived and hence the record of tenth carriers despatched for any given department may be reviewed right up to the instant that the inspection is made. This enables the supervisor or manager, by a glance at the mirror 134, to ascertain at any given moment just how much work is being done in a given department; since of course the carriers despatched to such department from the cashier's station will quite accurately indicate how many transactions are occurring at said department. Hence if a department is burdened by a rush of customers, the supervisor will be able to tell at a glance when such is the case and he also can tell at the same instant what other departments are not busy and from which clerks can hence be spared. The provision of this system, therefore, it is believed marks a great step forward in department store service.

While the invention has been primarily made with the object of improving service of this description, I am aware that it is adapted for use in various other ways so that I do not desire to be limited to the service in question. It may also be pointed out that while the greater part of the wiring diagram shown in Fig. 24 is substantially similar to that shown in Fig. 23, in addition to the provision of the departmental register and auxiliary clock mechanism, a further slight change has been effected, in that in place of providing a cashier's signal light for each receiving shelf; but one such light designated 27' is provided for each cashier, or in other words in the present instance for every four receiving shelves. In the system shown in Fig. 24, therefore, the wire 58 which leads from the strip 54 is not branched down to the cashier's signal light directly, as was the case in the apparatus discussed in connection with Fig. 23; but rather the entire current which flows through wire 58 upon the engagement of contact disk 51 with the drum 43, flows through coil 127' and thence through wire 82', which corresponds to wire 82 in the previously described system, in both directions; a portion of the current flowing up to light 81 and thence through wires 83 and 123 to the negative main 121, while the remainder of the current flows either backwardly, or forwardly as the case may be, through wire 82' to a wire 31', through lamp 27', and thence via wire 30' to the wire 24 which connects contact 22 of the receiving shelf with the negative lead 121. Herein it is preferable to have the resistance of any given light 27' equal to that of the corresponding light 81, so that current from the wire 58 is substantially equally divided through wire 82' and wire 31'; whereas, in the previously described system, diagrammatically represented in Fig. 23, each signal light 27 has preferably the same resistance as the corresponding coil 127', to prevent current backing up to light any other one of the lamps 27 pertaining to a given cashier's station. Finally, in certain cases, as for example when the time interval for delays is extended to one half minute or even longer, the intermittent flashing of a light 81 at the supervisor's station would not be a sufficiently positive indication of a delay at any given station. Under such conditions, I therefore prefer to provide an indicating means for the second carrier which is separate from the lamp 81 which lights continuously for the first delayed carrier. The preferred indicating means for the second carrier is a red colored lamp or light 136 which is controlled by a third contact 137 in the casing which

houses contacts 33 and 34 (see Figs. 2 and 2a.) A wire 138 connects each of these third or auxiliary contacts 137 with a common lead 139 which runs to lamp 136, as shown in Fig. 23. The instant that a second carrier, in any one of the receiving shelves at the right hand cashier's station, encounters the trip 37 for said shelf, not only is circuit interrupted between contacts 33 and 34 in the manner above described, but, further, contact 33 is cammed over into engagement with the auxiliary contact 137; whereupon a portion of the current flowing through wire 23 toward wire 24 and negative main 121, is shunted off through wire 36, contacts 33 and 137, wire 138 to lamp 136 and thence out via wires 83 and 123 and the negative main, and as long as a second carrier remains in engagement with lever or trip 37, this red light will continue to show except at intervals when it is merely momentarily deënergized by the periodic interruption of the circuit at circuit breaker 127, in the manner above described. The periodic flicker of the red light is of advantage in that it not only serves especially to call attention to the light but the number of successive flickers further show the number of allotted periods that are passing at this particular station during which second carriers are in need of attention.

Having thus described my invention what I claim is:—

1. In a carrier despatch monitor system, in combination with pneumatic despatch tubes having a despatching and receiving station, means for recording delays in attending to carriers delivered to said station during any given unit of time, said means including material upon which a record of said delays is made and a device to mark said material, means for recording the number of carriers despatched from said station during the same unit of time, said recording means also including material to be marked and a second device to mark the same, the respective records made by said first and second mentioned means being adapted for comparison to show whether the delays were excusable on account of the press of work at said station, and means to synchronously move the material upon which delays are marked and that upon which the number of despatched carriers are marked, with respect to the corresponding devices aforesaid.

2. In a carrier despatch monitor system, in combination with pneumatic despatch tubes having a despatching and receiving station, time element mechanism, a record sheet displaced thereby in accordance with the timed movement of said mechanism, and means, controlled by carriers despatched to said station and subject to a determined delay in handling after their arrival thereat, for recording on said sheet said delays.

3. In a carrier despatch monitor system, in combination with pneumatic despatch tubes having a despatching and receiving station, time element mechanism, a record sheet displaced thereby in accordance with the timed movement of said mechanism, demerit mechanism for recording upon said record sheet demerits indicative of delays in handling carriers, and means to automatically actuate said demerit mechanism when a carrier which has arrived at said station remains thereat without attention for a period in excess of a determined time.

4. In a carrier despatch monitor system, in combination with pneumatic despatch tubes having a despatching and receiving station, time element mechanism, a record sheet displaced thereby in accordance with the timed movement of said mechanism, demerit mechanism for recording upon said record sheet demerits indicative of delays in handling carriers, and means to automatically actuate said demerit mechanism when a carrier which has arrived at said station remains thereat without attention for a period in excess of a determined time, said last mentioned means including an auxiliary time element mechanism which times said period and means for stopping the running of said auxiliary mechanism when the delayed carrier is attended to.

5. In a carrier despatch monitor system, in combination with pneumatic despatch tubes having a despatching and receiving station, time element mechanism, a record sheet displaced thereby in accordance with the timed movement of said mechanism, demerit mechanism for recording upon said record sheet demerits indicative of delays in handling carriers, means to automatically actuate said demerit mechanism when a carrier which has arrived at said station remains thereat without attention for a period in excess of a determined time, and co-acting means to record an additional demerit for a second carrier back of that first mentioned after said second carrier has remained undisturbed at said station in excess of a determined period.

6. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered, and mechanism for recording demerits indicative of delays in excess of a determined period in removing carriers, which have been delivered to said station, from a portion of said station, said mechanism including a time element device having a part adapted to move in a determined path and a demerit recorder controlled by the arrival of said part at a determined point in said path.

7. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are

delivered, and mechanism for recording demerits indicative of delays in excess of a determined period in removing carriers, which have been delivered to said station, from a portion of said station, said mechanism including a time element device having a part adapted to move in a determined path and a demerit recorder controlled by the arrival of said part at a determined point in said path, and means to re-set said part to travel said path controlled by the arrival of a second carrier at said station.

8. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered, and mechanism for recording demerits indicative of delays in excess of a determined period in removing carriers, which have been delivered to said station, from a portion of said station, said mechanism including a time element device having a part adapted to move in a determined path and a demerit recorder controlled by the arrival of said part at a determined point in said path; means to re-set said part to travel said path controlled by the arrival of a second carrier at said station, and to again re-set said part upon the removal of but a single one of said carriers from said portion of said station.

9. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered, delay-indicating means, including a time element device, for rendering evident the presence of a carrier in a part of said station in excess of an allotted time, means for rendering evident the working conditions at said station to show whether such delay was excusable, said last mentioned means including mechanism to record the despatch from said station of only certain out of a series of successively despatched carriers, said certain carriers being spaced from each other in said series by determined numbers of other and individually unrecorded carriers.

10. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered, delay-indicating means, including a time element device, for rendering evident the presence of a carrier in a part of said station in excess of an allotted time, means for rendering evident the working conditions at said station to show whether such delay was excusable, said last mentioned means including mechanism to record the despatch from said station of every tenth carrier, the remaining carriers being individually unrecorded.

11. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station from which said carriers are despatched, material upon which is made records of the number and relative frequency of despatch of carriers from said station, means to make said records upon said material, time element mechanism for effecting timed relative movement between said material and said record making means, and means at said station for controlling actuations of said record making means.

12. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station from which said carriers are despatched, material upon which is made records of the number and relative frequency of despatch of carriers from said station, means to make said records upon said material, time element mechanism for effecting timed relative movement between said material and said record making means, and means, controlled by despatched carriers, for controlling actuations of said record making means.

13. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered, material upon which is made records of the number and relative nearness to each other of delays in the handling of said carriers at said station in excess of allotted times within which carriers should normally be attended to, means to make said records upon said material, time element mechanism for effecting timed relative movement between said material and said record making means, and carrier controlled means, including a time element device, for controlling actuations of said record making means.

14. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered and from which said carriers may be despatched, material upon which is made records of the number and relative frequency of despatch of carriers from said station and of the number and relative nearness to each other of delays in the handling of carriers arriving at said station, means to make said records upon said material, time element mechanism for effecting timed relative movement between said material and said record making means, and carrier controlled means for controlling said record making means.

15. In carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered and from which said carriers may be despatched, material upon which is made records of the number and relative frequency of despatch of carriers from said station and of the number and relative nearness to each other of delays in the handling of carriers arriving at said station, means to make said records upon said material, time element mechanism for effecting timed relative movement between said material and

said record making means, carrier controlled means for controlling said record making means to record delays upon said material, and means at said station for controlling said record making means to record the despatch of carriers.

16. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined portions thereof corresponding to said departments, time element mechanism for effecting timed relative movement between said material and said record making means, and means to actuate said record making means for any given department in a determined manner for any predetermined plurality of carriers despatched along said certain guiding means corresponding to said department.

17. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined portions thereof corresponding to said departments, time element mechanism for effecting timed relative movement between said material and said record making means, and means to actuate said record making means for any given department in a determined manner for every determined number of carriers despatched along said certain guiding means corresponding to said department.

18. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined portions thereof corresponding to said departments, time element mechanism for effecting timed relative movement between said material and said record making means, means to actuate said record making means for any given department in a determined manner for every determined number of carriers despatched along said certain guiding means corresponding to said department, and means for automatically tallying the number of despatched carriers so recorded.

19. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined portions thereof corresponding to said departments, time element mechanism for effecting timed relative movement between said material and said record making means, means to actuate said record making means for any given department in a determined manner for every determined number of carriers despatched along said certain guiding means corresponding to said department, and means for automatically indicating delays in excess of allotted times in the handling of said carriers at determined delivery stations in said system from which said guiding means extend to said departments.

20. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined portions thereof corresponding to said departments, time element mechanism for effecting timed relative movement between said material and said record making means, means to actuate said record making means for any given department in a determined manner for every determined number of carriers despatched along said certain guiding means corresponding to said department, and means for automatically indicating delays in excess of allotted times in the handling of said carriers at determined delivery stations in said system from which said guiding means extend to said departments.

21. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined portions thereof corresponding to said departments, time element mechanism

for effecting timed relative movement between said material and said record making means, means to actuate said record making means for any given department in a determined manner for every determined number of carriers despatched along said certain guiding means corresponding to said department, and means for automatically recording, in properly spaced relationship on the record, delays in excess of allotted times in the handling of said carriers at a determined delivery station in said system.

22. In a carrier despatch system, the combination of a series of groups of means for guiding carriers when in transit, said groups respectively extending to different departments served by said system, material upon which is made records of the number and relative frequency of despatch of carriers in determined directions along certain of said guiding means, means to make said records upon said material in determined columns thereon corresponding to said departments, time element mechanism for effecting timed relative movement between said material and said record making means, means to actuate said record making means for any given department in a determined manner for every determined number of carriers despatched along said certain guiding means corresponding to said department, means for automatically recording, in properly spaced relationship on the record, delays in excess of allotted times in the handling of said carriers at a determined delivery station in said system, and auxiliary means for separately recording in columns parallel to those aforesaid the number of carriers despatched from said station, the columned records of delays and of carriers despatched from said station being in correspondence for equal periods of time and comparable to show if said delays are excusable.

23. In a carrier despatch apparatus, the combination of means for guiding carriers in transit, a station to which said carriers are delivered, a timing device, and means co-acting therewith to record a demerit against the operator at said station for a delay in attending to a carrier reposing at a part of said station for a time in excess of a period determined by said timing device.

24. In carrier despatch apparatus, the combination of pneumatic transmission tubes with automatic means for keeping a timed record of the despatch of carriers through certain of said tubes, and automatic means for isochronally, with respect to said first record, keeping an additional record of delays in handling carriers to be transmitted through certain of said tubes, so that said records may be readily compared.

25. In carrier despatch apparatus, the combination of pneumatic transmission tubes with automatic means for keeping a timed record of the despatch of carriers through certain of said tubes, automatic means for isochronally, with respect to said first record, keeping an additional record of delays in handling carriers to be transmitted through certain of said tubes, so that said records may be readily compared, and mechanism, controlled by said first mentioned means, for automatically tallying the number of carriers despatched as the timed record thereof is made.

26. In carrier despatch apparatus, the combination of pneumatic transmission tubes with automatic means for keeping a timed record of the despatch of carriers through certain groups of said tubes, automatic means for isochronally, with respect to said first record, keeping an additional record of delays in handling carriers to be transmitted through certain of said tubes, so that said records may be readily compared, and mechanism, controlled by said first mentioned means, for separately tallying the number of carriers despatched through each of said groups of tubes.

27. In carrier despatch apparatus, the combination of pneumatic transmission tubes with automatic means for keeping a timed record of the despatch of carriers through certain of said tubes, automatic means for isochronally, with respect to said first record, keeping an additional record of delays in handling carriers to be transmitted through certain of said tubes, so that said records may be readily compared, and auxiliary means for signaling whenever a delay occurs and whether said delay is of a single carrier or of a plurality of carriers.

28. In carrier despatch apparatus, the combination of pneumatic transmission tubes with automatic means for keeping a timed record of the despatch of carriers through certain of said tubes, automatic means for isochronally, with respect to said first record, keeping an additional record of delays in handling carriers to be transmitted through certain of said tubes, so that said records may be readily compared, and auxiliary means for signaling whenever a delay occurs.

In testimony whereof I have affixed my signature, in the presence of two witnesses.

CHESTER S. JENNINGS.

Witnesses:
M. K. PORTER,
E. M. JORDAN.