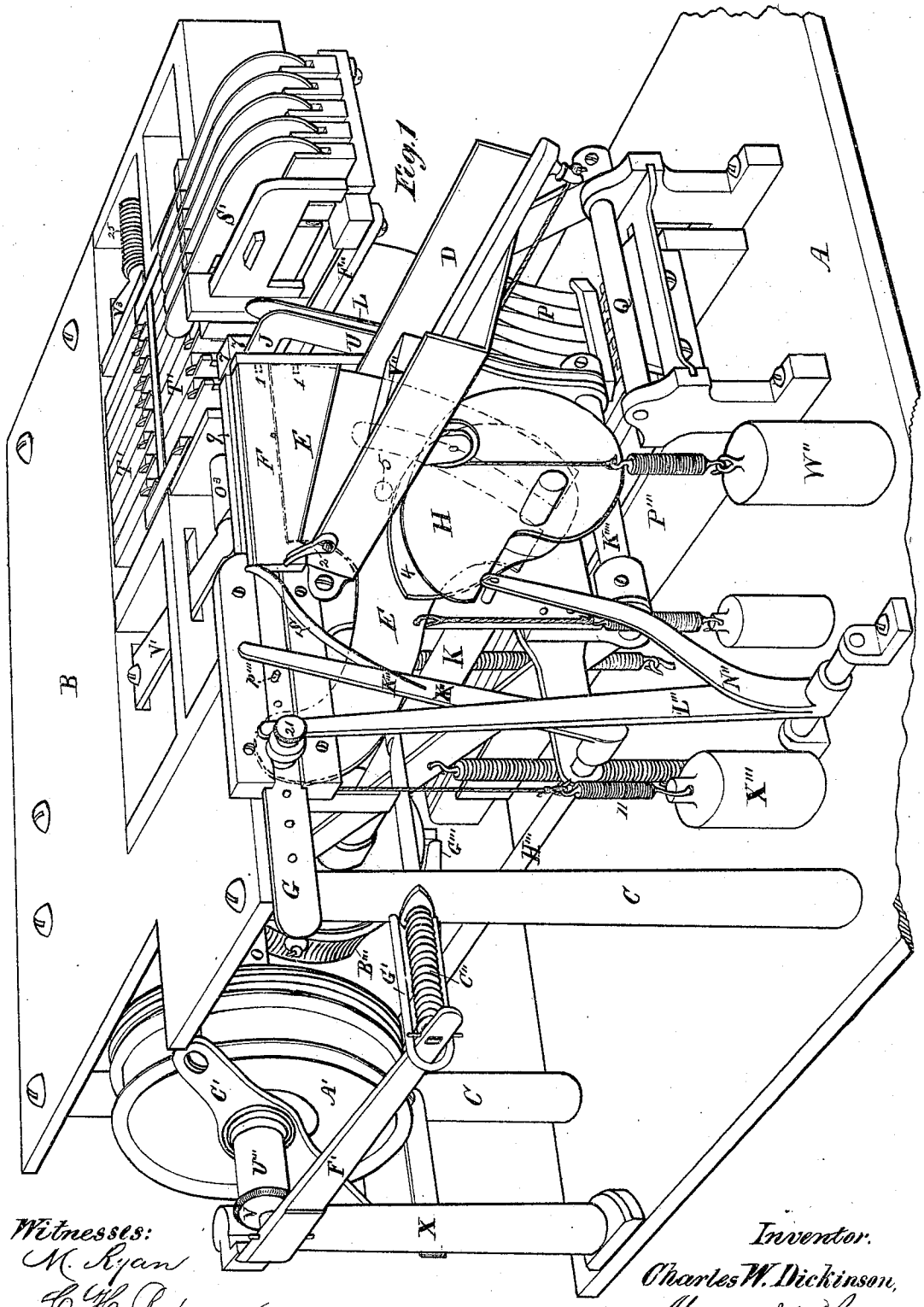
8 Sheets—Sheet 1.

C. W. DICKINSON.

TYPE DISTRIBUTING MACHINE.

No. 174,900. Patented March 21, 1876.



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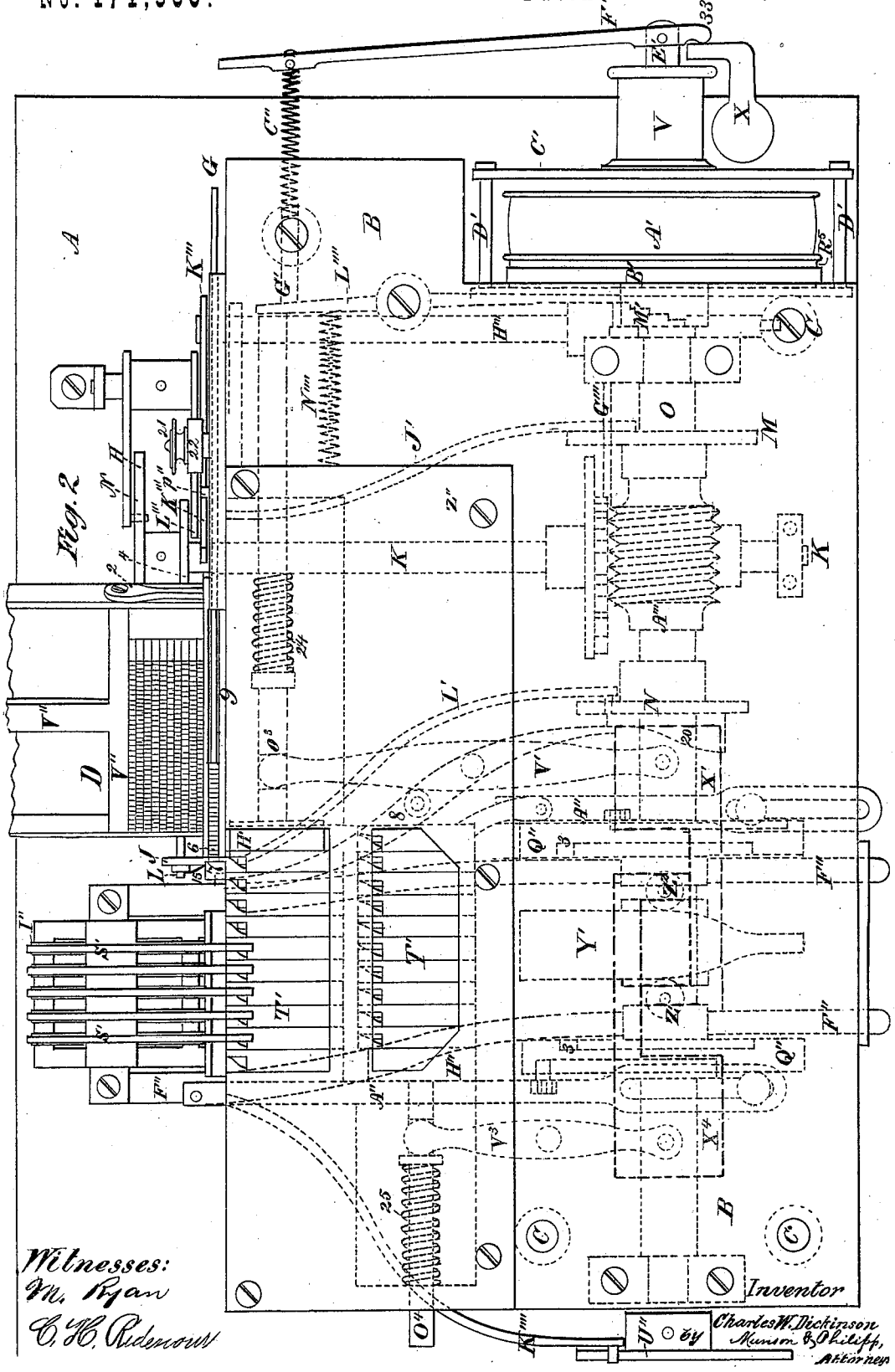

Fig. 2

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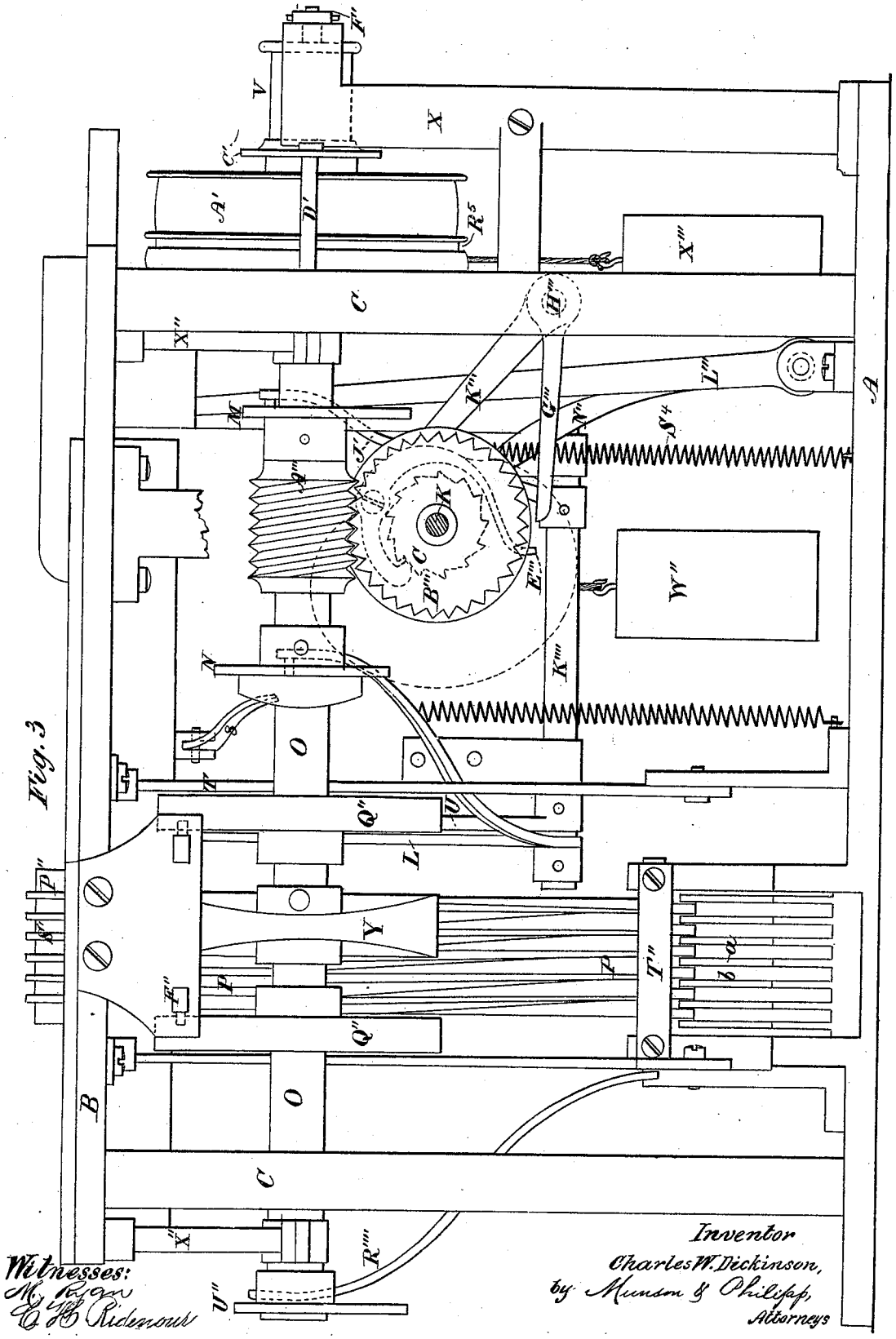

Fig. 3

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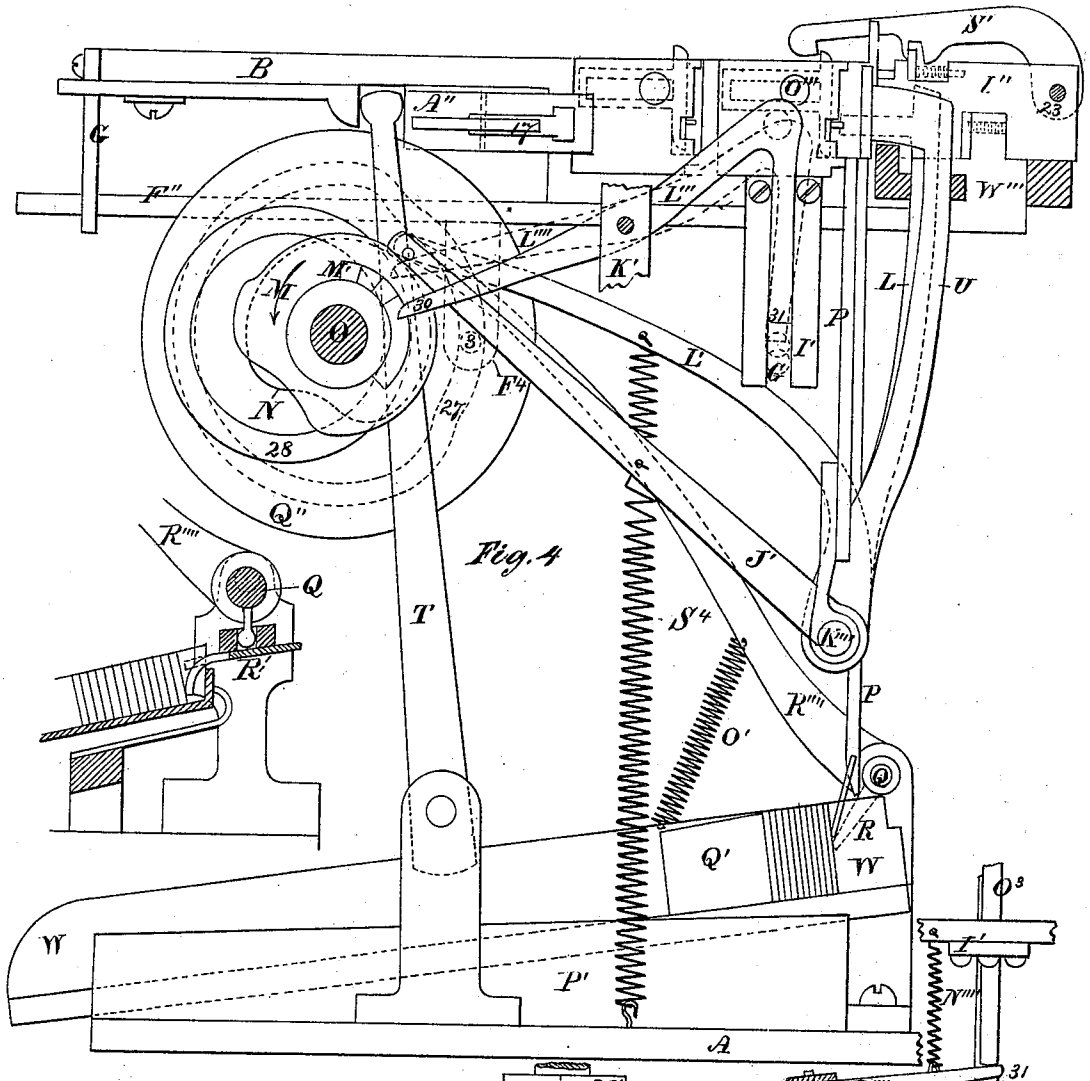

Fig. 4

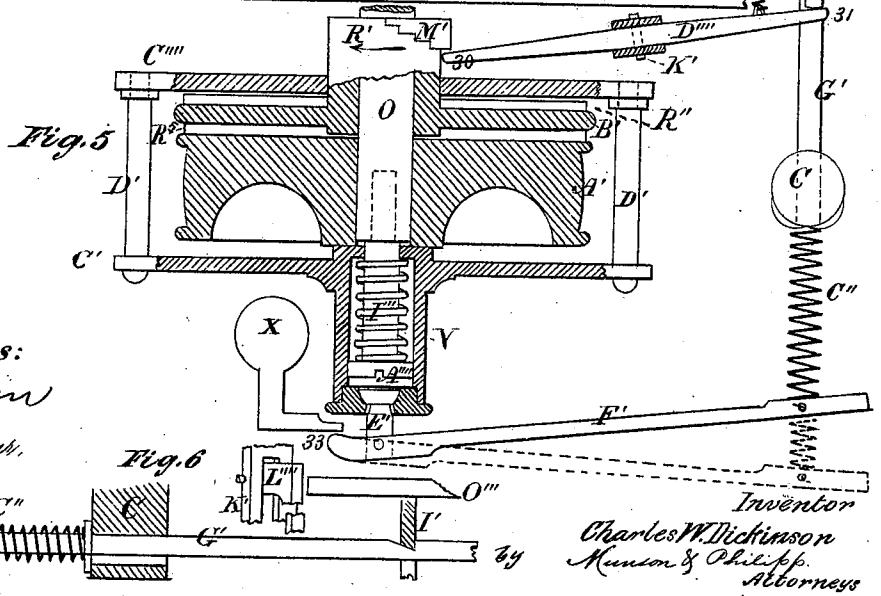

Fig. 5

Fig. 6

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8 Sheets—Sheet 5.

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TYPE DISTRIBUTING MACHINE.

No. 174,900. Patented March 21, 1876.

Fig. 11

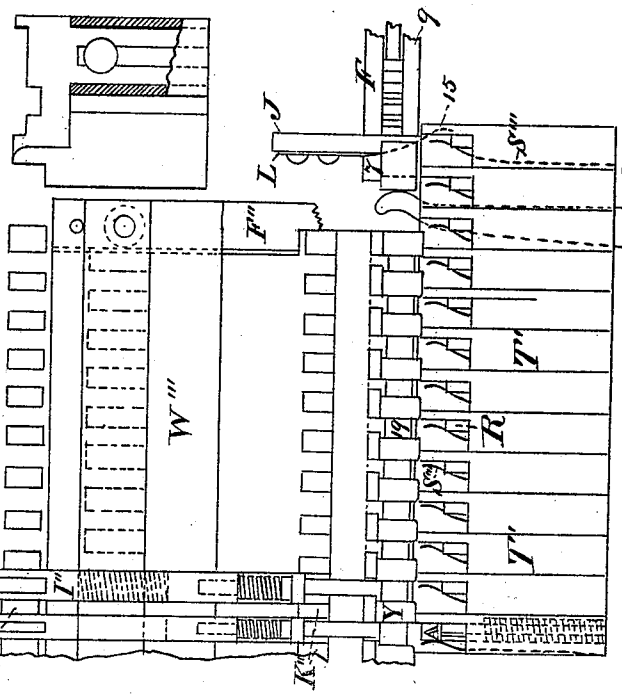


Fig. 12

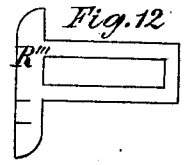


Fig. 9

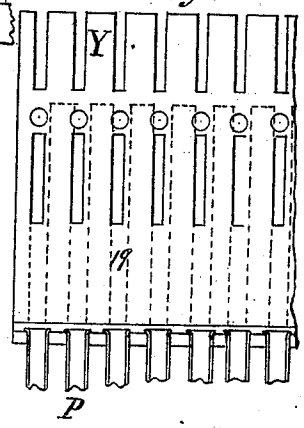


Fig. 8

Fig. 7

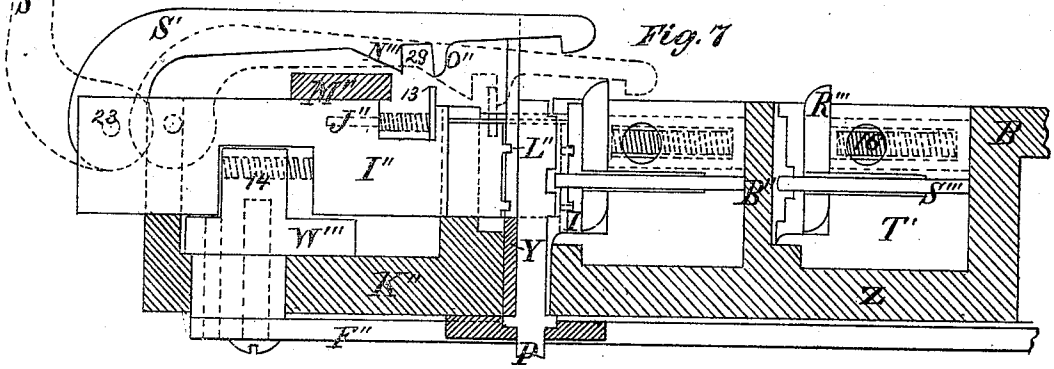


Fig. 13

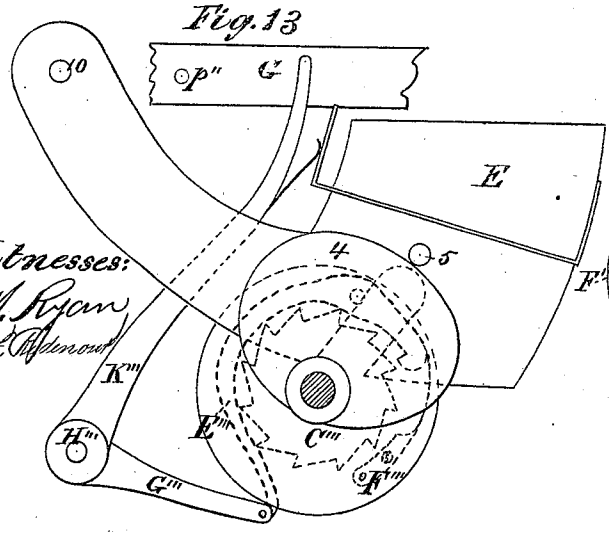


Fig. 14

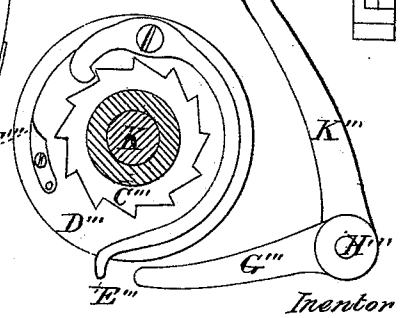
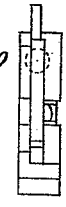


Fig. 10



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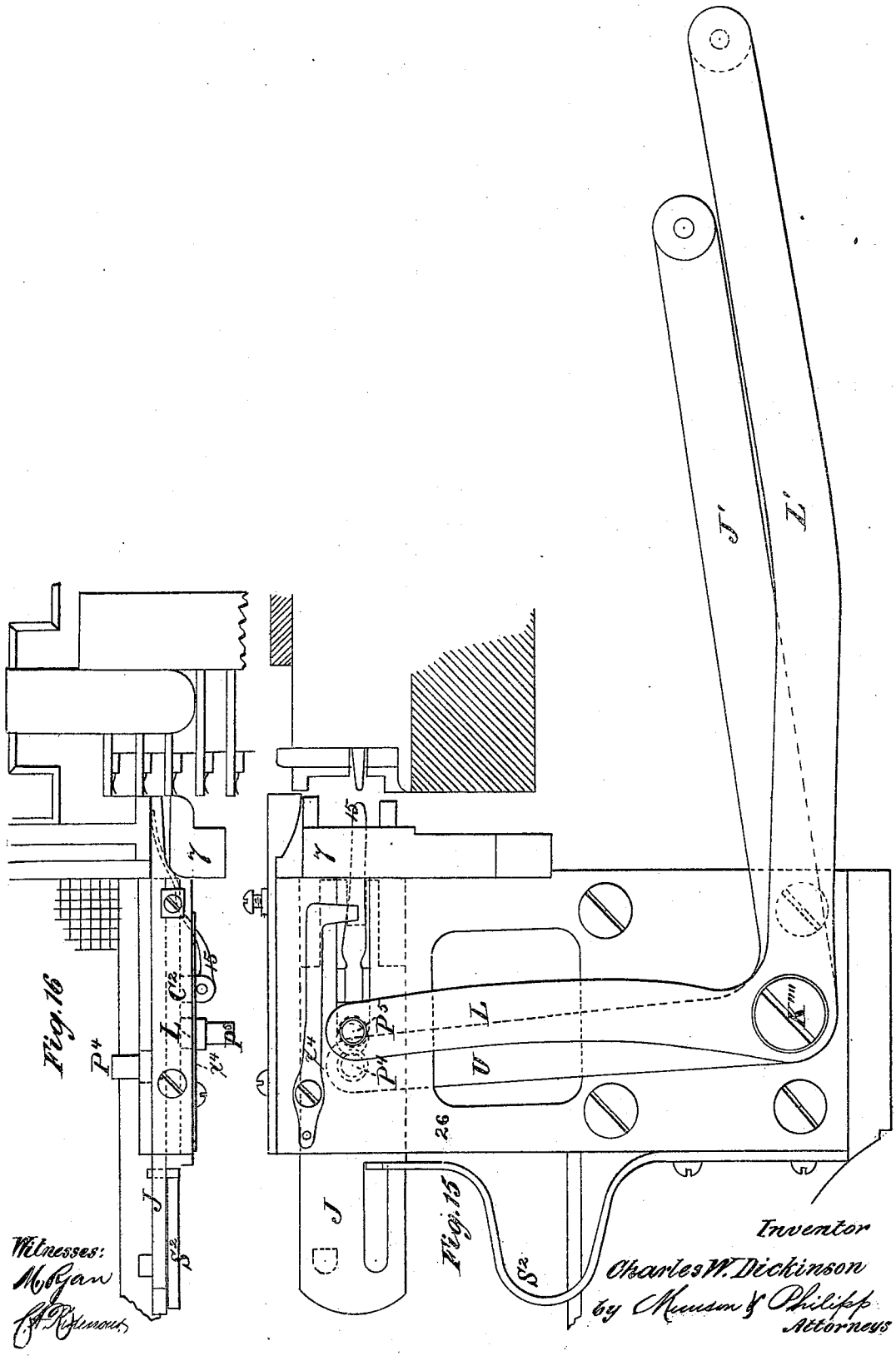
TYPE DISTRIBUTING MACHINE.

No. 174,900. Patented March 21, 1876.



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TYPE DISTRIBUTING MACHINE.

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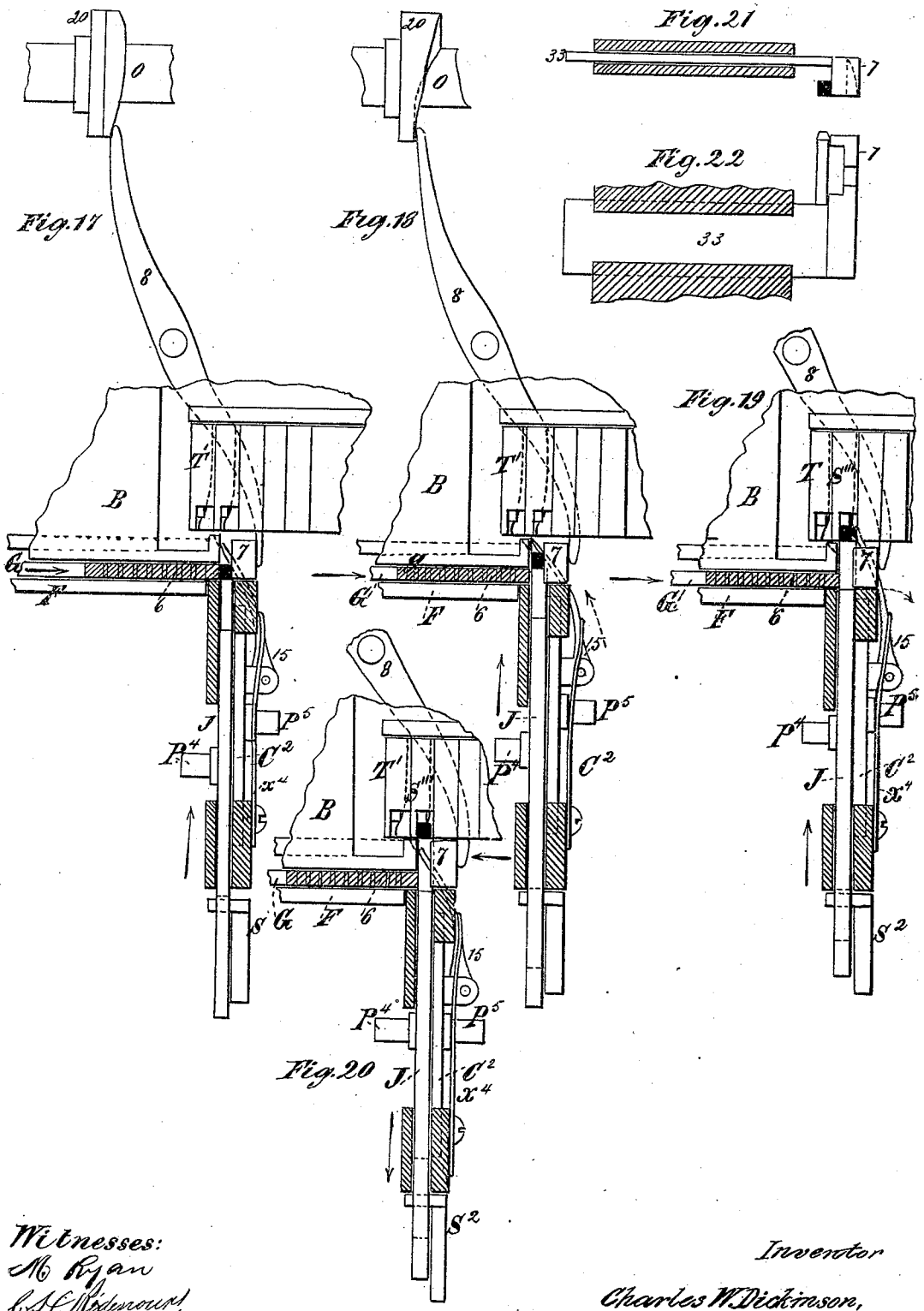

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8 Sheets—Sheet 8.

C. W. DICKINSON.

TYPE DISTRIBUTING MACHINE.

No. 174,900. Patented March 21, 1876.

Fig. 23.

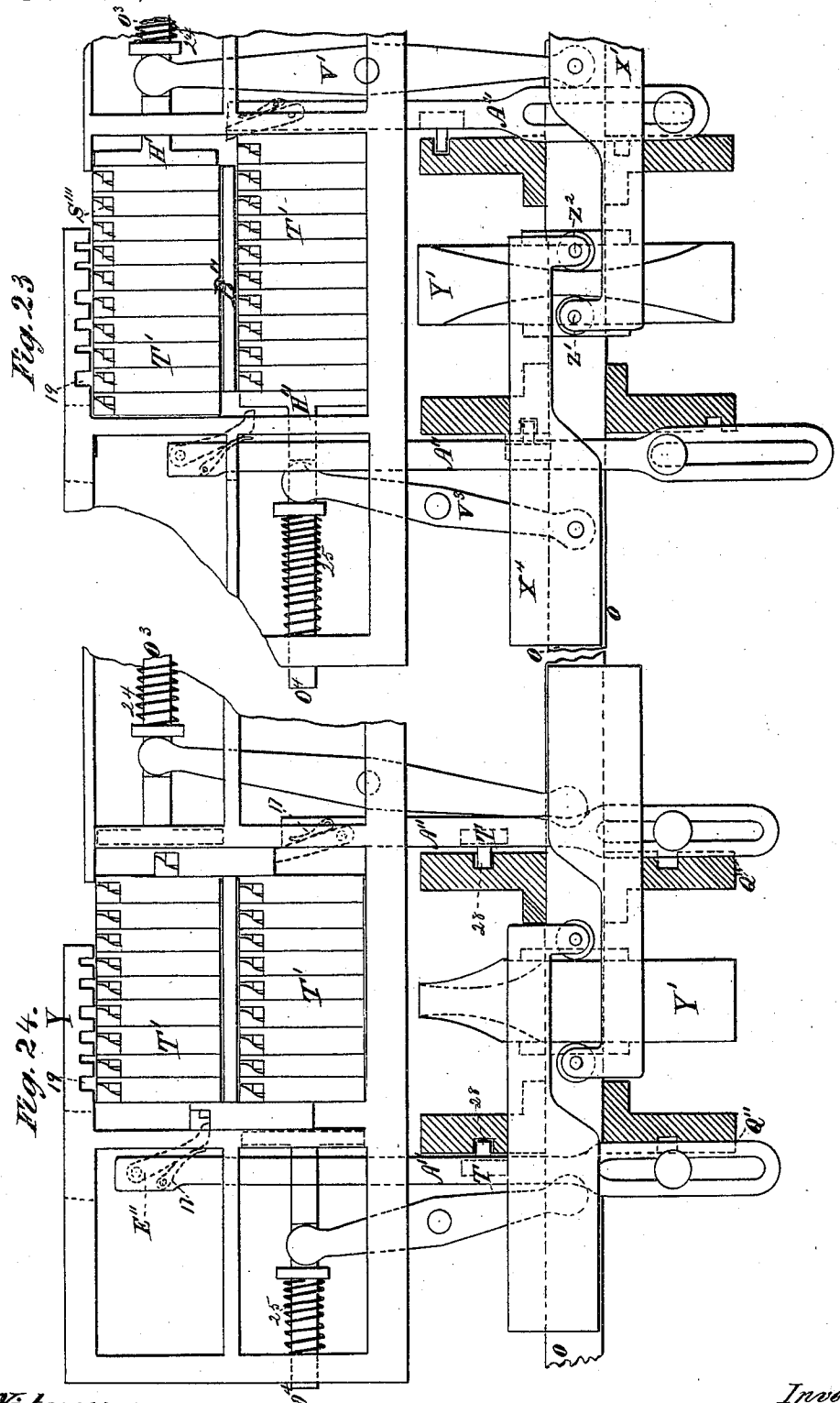

Fig. 24.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN TYPE-DISTRIBUTING MACHINES.

Specification forming part of Letters Patent No. **174,900**, dated March 21, 1876; application filed August 8, 1872.

To all whom it may concern:

Be it known that I, CHARLES W. DICKINSON, of Washington, District of Columbia, have invented a new and useful Improvement in Machinery for Distributing Printing-Types, of which the following is a description:

A column or page of printing-types having been used for printing, must be distributed into separate holders, each of which contains types of one denomination only, preparatory to a second setting of them for a new use. Ordinarily this operation is performed by hand, and, although many attempts have been made to do it by machinery, the difficulties attending it are so great that none of the machines have been sufficiently practical to supersede manual labor. My invention is designed to overcome these difficulties, and to distribute type automatically from a column into the separate channels of a case, in which they are so arranged as to be ready for use in an automatic type-setter.

The series of operations by which this result is produced is this: First, a line of types is separated from the column of which it forms a part, and by itself is presented to the action of the machine for distribution. Secondly, a single type is separated from the end of the line, and forced into the hold of a traveling carrier, which receives it and transports it away from the point of reception, giving place to another carrier, which, in its turn, repeats the movement. Thirdly, the types thus held in these carriers are moved along step by step, resting at each step, and while at rest subjected to the contact of feelers, (of which there are as many as there are denominations of types to be distributed,) which are brought against the exposed edges of the type, and which ascertain the denomination of the type by entering, or failing to enter, notches cut in the edges of the type in different positions and different combinations for different denominations of type. Fourthly, when a type is brought in front of a feeler whose projections match the notches cut in its edge, a hook moving with the feeling apparatus is allowed to fall and catch a sliding ejector in the carrier, against which the type is supported, and as the feeling apparatus is withdrawn, the hook pulls the sliding ejector forward, and thus forces the type from the carrier, and permits it to enter the mouth of a conductor, through which it drops into the appropriate one of a series of channels constituting a case placed at the bottom ends of the type-conductors. Fifthly, when in the said channel the type is pushed along far enough to make room for the next one which may drop, and as each succeeding one drops the whole row in that channel is pushed along a distance equal to the thickness of said type last entering, and there left. When the case is full, it may be removed and placed in a setting-machine.

The following is a description of the machine as constructed by me, reference being had to the accompanying drawings, forming a part of the description thereof.

Figure 1 represents a front perspective view of the machine; Fig. 2, a top view or general plan; Fig. 3, a rear view of the machine; Fig. 4, a view of one end. These four figures connected give the relative positions of the various levers, wheels, cams, shafts, carriers, hooks, &c. Fig. 5 is a transverse sectional view of the driving-pulley, friction-clutch, and starting and stopping apparatus. Fig. 6 is a vertical section of a portion of Fig. 5. Fig. 7 is an enlarged view, showing a section of the bed or bearing for the type chairs or carriers; also the bearing or guide for the feeler-bars, and appropriate attachment for giving motion to the same. Fig. 8 serves more fully to illustrate Fig. 7, being a top view of said figure, and, in connection with Figs. 4, 9, and 10, intended to show the manner of placing the type in the carriers. Fig. 9 gives a front view of the front plate P″, Fig. 7. Fig. 10 is an end view of one of the carriers. Fig. 11 is an elevation of the carrier, with a part removed to show the mortise or cavity for receiving the ejector. Fig. 12 is the type-ejector, for removing the type from the carriers. Fig. 13 is an end view of the type-galley and movable bearing for the type, and attachments for giving motion to the same. Fig. 14 is a representation of the

feed-clutch and arms or levers for regulating its action. Figs. 15 and 16 are modified forms of the apparatus for separating the individual types from the line, and forcing them into the carriers. Figs. 17, 18, 19, and 20 represent top views, showing the type-driver, the type guiding tongue and its controlling-spring, the rest-block and its governing-lever, and the carriers, in four positions of their operation in cutting off a type from the line and depositing it in a carrier. Figs. 21 and 22 are top and front views, showing the construction of the rest-block. Figs. 23 and 24 are top views showing the operation of the mechanisms which actuate the drivers which transfer the carriers from one way to the other, and the plungers which move the carriers sidewise in their ways.

The several parts of the machine are supported by stanchions or posts X C, and suitable brackets rising from the bed-plate A, and are actuated by a main shaft, O, journaled in hangers X″, depending from the bed B, and driven by a pulley, A′, in manner hereinafter explained.

The operation of the machine is as follows: A column or page of type is laid in the galley D, which is set at an inclination sufficient to prevent the type from falling apart or separating at the exposed ends of the lines. V″ represents a page-follower, fitted to slide in the galley D, which is pressed against the page of type by the weight W″, and which shoves forward the page, line by line, as the lines are successively distributed. E is a lever or swinging plate, which, in the position shown in Figs. 1 and 13, shuts the inside end of the galley D, and prevents the type from being shoved by the page-follower any farther than into contact with its face. This lever E is a plate of thin metal, somewhat thinner than the thickness of a line of type, and is capable of vibrating around a center, 10, so as to fall below the lower edge of the page of type in the galley D. When it does fall into that position, the page of type is then pushed forward by the page-follower V″, and the upper edge of the swinging plate E is under the forward line of type, and when the swinging plate E is raised again into the position shown, it elevates that line of type into a channel formed by the parallel plates F and 9, Figs. 2 and 18, where it stands upon the edge of the swinging plate E in a level position. The plate 9 is rigidly secured to the bed B, and the plate F is removable, being held in place by tenons 1 entering one of its ends, while its opposite end rests upon the upper edge of one side of the galley, where it is held by a locking-arm, 2, whose shoulder bears against it. This plate can thus be removed when access to the type under or behind it is desired. The line-follower G is pressed up against the outer end of this line of type by the weight X‴, which is connected with that follower by a cord running over a pulley, and this follower shoves forward the line of type as fast as the machine takes away the single types from the inner end of the line. The cord is attached to the weight by an intervening spring, 11, which causes the line-follower to press forward without jarring against the type. When a line of type has been exhausted, and it becomes necessary to supply another in its place, the line-follower G is withdrawn, the swinging plate E drops down below the bottom of the next line of type in the page, the page of type is pushed forward by the page-follower V″, the swinging plate E is raised to its original position, and the line-follower G again permitted to press upon the end of the new line of type, repeating the operation just described. This compound effect is produced by the cooperation of the transverse shaft K, the ratchet C‴, the pawl E‴, the levers K‴ and G‴, (shown in detail in Figs. 3, 13, and 14,) and the cam H, the levers N″ and L″. (Shown in Fig. 1.) The mode of their operation is this: A pin, *p*″, on the line-follower G comes in contact with the upper end of the lever K‴, Fig. 1, as seen in Fig. 2, when the line-follower G has traveled near the extreme end of its motion in pushing forward the line of type, and presses the lever K‴ over toward the plate F. As a consequence, the shaft H‴ vibrates a little, and the lever G‴, which is upon the shaft H‴, is carried away from the end of the pawl E‴, which otherwise rests against the end of the lever G‴. The pawl, being thus released, is forced by the spring F‴, Fig. 14, into contact with the ratchet, whereby the clutch-wheel D‴ is for the moment connected with the ratchet C‴, which is in constant rotation imparted to it through a worm on the main driving-shaft O of the machine and the worm-wheel B‴. The clutch-wheel D‴ is secured to the transverse shaft K, and when it is carried around by the ratchet, the shaft K also rotates, and with it the two cams H, Fig. 1, and 4, Fig. 13. The cam H operates upon the pin at the end of the lever N″, which vibrates around the shaft M‴, and which thereby causes the lever L‴ to move away from the plate F. A pin, 21, on the line-follower G carries a friction-roller, 22, which projects across the plane in which the lever L‴ moves, and is outside of the lever, and, as a consequence, when the lever is driven back by the cam H, it withdraws the line-follower G from its advanced position, and makes room for the new line of type to be raised into the position from which the last of line type has been pushed; at the same time the cam 4, operating upon the swinging-plate E through the pin 5, Fig. 13, allows it to come down below the line of type, and again elevates it when the type have been pushed forward in the galley D across its upper edge. The lever K‴, being relieved from the pressure of the pin on the line-follower G by the withdrawal of the said follower, is pressed outward again by the spring S to its original position, bringing again the lever G‴ into a position in which the end of the pawl E‴ must come in contact with it, as in

Fig. 13, as the shaft K rotates; and, as a consequence, at the end of one revolution the pawl E''' is disengaged from the ratchet, and the shaft K ceases to rotate, leaving the cams in the position shown in Fig. 1 until the pawl E''' is again allowed to engage with the ratchet by the withdrawal of the lever G''' when the line-follower G has again shoved the last type of the line into the machine.

The next step in the operation is the separation of a single type from the end of the line of type 6 which is being pushed forward by the line-follower G. At the end of the type-channel there is a movable rest, 7, Figs. 2 and 17 to 22, which in one position closes up the end of the channel, and so prevents any type from being forced from it by the line-follower G. This movable rest 7 rises from one end of a supporting-plate, 33, which slides freely in suitable bearings, in which it has a motion equal to the thickness of the thickest type, and is held in position by the lever 8, the other end of which is controlled by a cam, 20, on the main shaft of the machine. This cam gives a reciprocating movement to the power-end of the lever in the direction of the main shaft of the machine, and is so shaped that when the type presses against the movable rest 7, (which is supported by the end of the lever 8,) as the shaft O revolves, the lever 8 permits the movable rest 7 to gradually yield under the pressure given to the type by the line-follower G. The rest 7 is cut away, as in Fig. 23, to admit the passage of the type-driver J through it, and also to accommodate in like manner the spring-tongue 15. When the movable rest 7 has thus been permitted to move far enough to allow the thickness of one type to pass beyond the end of the type-channel, the type-driver J, which has been pressing upon the edge of the type, drives the type before it, as in Fig. 18, cutting it off from the line of type of which it was the advanced one, and the type-driver J closes the end of the channel, and so prevents any further movement of the line of type.

This type-driver J is at the end of a lever, U, Fig. 3, vibrating on the shaft K'''', and connected, through that shaft, with the lever J', whose end is operated upon by the cam M on the main shaft O. A spring, S^4, forces the lever J' into contact with the cam M, and as the cam permits it the spring causes the shaft K'''' to vibrate, and with it the type-driver J, whose function has been already described. Another lever, L, hung loosely on the end of the shaft K'''', is close alongside of the lever U, and is operated through the lever L' by the cam N. (Shown in dotted lines behind the cam M, in Fig. 4, and in full lines, Fig. 3.) This lever L has a spring-tongue, 15, projecting inward near its upper end, as in Figs. 2 and 8. In these figures the tongue is shown composed of a spring. In Figs. 15 to 20 the tongue is rigid in itself, vibrating upon a center, and controlled by an independent spring. The operations of these forms are identical. The object of this spring-tongue 15 is to guide the type into the carrier T', where it is held when driven forward by the type-driver J; and for that purpose the spring-tongue at the end of the lever L moves in advance of the lever U, passes behind the spring S''', and assumes the position shown in Figs. 8 and 18. The type I is then driven forward by the type-driver J, and forces sidewise the spring-tongue at the end of the lever L, and at the same time through it moves sidewise the spring S''' (which rests upon the spring-tongue in the lever L) in the carrier T', as in Fig. 19, and so permits the type I to be caught under the spring S''' fixed upon the side of the carrier T'. The lever L is then withdrawn, and with it the spring-tongue, leaving the type caught and held in the carrier, as in Fig. 20; and then the type-driver J is withdrawn, and the lever 8 presses up the movable rest 7 against the line of type, ready for a repetition of the operation.

Figs. 15 to 20 present a modified form of the apparatus for detaching a type from the end of the line and driving it into the carrier. The object of this modification is to apply a less degree of force to the type which is to be detached while the line is moving forward under the pressure of the weight or spring which is pushing it into the machine, and at the same time, as each type is detached from the line, to apply to it the pressure necessary to carry it into the carrier. In this modification the type-driver J is separated from the lever U and made to slide in a channel or groove in the frame for that purpose, and is moved backward and forward in a straight line instead of in a curve, as shown in Fig. 4. This type-driver is operated on by the lever U, through the pin P^4, and the hole in the lever elongated in the direction of the motion, so as to permit either the pin or the lever to move without moving the other. A spring, S^2, presses against the back end of the type-driver and tends to force it forward. The shape of the cam M on the driving-shaft is such that when the lever U is carried backward, so as to withdraw the type-driver from contact with the type and out of the way of the line of type, the spring S^2 is compressed, and as the cam revolves and the lever J', which operates the lever U, is drawn forward by the spring S^4, which holds its end in contact with the cam, the elongated opening in the end of the lever U, through which the pin P^4 passes, permits the lever U to come forward without necessarily moving the type-driver with it, the effect of which is that the type-driver, during that time, is driven by the spring S^2, which is strong enough to detach the forward type in the line and drive it forward, without putting upon it any more pressure than is necessary for that purpose, thereby diminishing the friction resulting from the movement of the line of type which would be produced by the application of a pressure greater than necessary to detach a single

type. When the spring S^2 has detached the type and carried it forward a short distance, then the shape of the cam permits the lever U to overtake the type-driver J, and to drive the type into the carriers with the greater power applied to that lever by the coiled spring S^4, or substituted weight used for that purpose. This modification makes the machine work more easily, and renders less power necessary upon the line-follower G, which shoves the line of type endwise into the machine.

Figs. 15 to 20 show also the tongue 15 constructed to operate in a right line. It is swung at its rear end on hangers forming a part of the right-line slide C^2, which is operated on by the lever L through the pin P^5. The tongue 15 is pressed inward by a spring, x^4, fast upon the side plate 26, and extending through an elongated slot in said plate into engagement with said tongue. More precision is gained by the straight-line movement and by separating the parts at the pin P^5.

These modifications of detail are exhibited as the best which have occurred to the inventor; but the principle of action is capable of a variety of arrangements without substantial alteration.

The next instrument in the operation is the carrier, whose office it is to carry the type from the place where it is received to the place where it is finally withdrawn from it and dropped through a conductor into its appropriate channel in the case. In Figs. 8, 23, and 24 several of these carriers are shown in plan, and are marked T'. In Fig. 7 two of these carriers are exhibited in elevation, and as they are actually used in the machine. Fig. 11 is an elevation of one of these carriers partly in section. Fig. 10 is a front end view of the same thing. Fig. 12 is the ejector, and is marked R'''. This carrier is made of hard metal, and needs to be accurately shaped, so as to insure uniformity in the size and bearings of the entire series which are used in the machine. These carriers are cored out to permit the ejector R''' to work in them, as shown in Fig. 11. A spiral spring, 16, is so inserted in the longitudinal slot in the ejector as to force it back in the carrier to give room for the type I, as shown in Fig. 7, where one of the type is represented in front of the ejector and held fast by the spring S'''. This ejector can be drawn forward, compressing the spiral spring 16, and moving far enough to push the type I out of the hold of spring S'''. The spring S''' is fixed in the side of the carrier, and when the type is inserted under it holds it there until the ejector is brought into action to detach the type. There are as many of these carriers needed as at least twice the number of denomination of type which are to be used in the machine.

In the bed B of the machine there are two ways, Z, separated from each other by a partition B'', Fig. 7, in which ways the carriers move step by step in opposite directions. In Figs. 2, 23, and 24 these carriers T' are shown in plan arranged in rows in the two ways When the machine is at rest these two ways are filled with the carriers, except space for one carrier at the entrance end of each way At the entrance end of the front way one of these carriers is in the position shown in Fig. 8, ready to receive a type. When the type has been inserted in the manner already described, both rows of carriers are moved lengthwise in opposite directions. This operation is performed by plungers H' H'', Figs. 2, 23, and 24, the motion of one of which will now be described: A double-faced cam, Y', constantly revolved by the main shaft O, bears on one side against a friction-roller, Z', pivoted in the end of a slide, X', to the opposite end of which the plunger-actuating lever V' is hung. This lever V' is thus vibrated, and imparts short reciprocations to the plunger H' through the plunger-shaft O^3, with which the end of the lever engages. When the swell of the cam Y' passes the friction-roller Z', the slide thus relieved from it is moved in the opsite direction by a spring, 24, on the plunger-shaft O^3, and the front row of the carriers T' is thus moved lengthwise a distance equal to the thickness of a single carrier. The plunger H'', which moves the rear row of carriers, is actuated by precisely the same means, namely, a plunger-shaft, O^4, lever V^3, slide X^4, and friction-roller Z^2, actuated from the opposite side or face of the cam Y', their position and motions being the counterpart of those just described with reference to the plunger H'. Though this mechanism is arranged to move the rows of carriers onward by the motion derived from the springs O^3 O^4, and to retract the plungers by motion derived from the cam, the reverse operation may be accomplished by reverse movements of the same mechanism—that is, by permitting the cam to drive the plungers and the springs to withdraw them. But the first method is preferable, since in case of any sticking of the carriers there is less liability to injure the mechanism.

When these plungers are withdrawn space is left between the faces of each plunger and the end of its row of carriers wide enough for another carrier, and into these spaces one of the carriers from the rear row is forced forward, and one of the carriers from the front row is forced backward, as in Fig. 24. This operation is performed by drivers A'', Figs. 2, 4, 23, and 24, which are bars moved forward and backward by the grooves 28 of cams Q'' on the main shaft, operating through studs or rollers the two levers, one of which, T, is seen in Fig. 4. These drivers A'' are each fitted at its front end with a latch, E'', pressed by a spring, 17, into a position for engaging with the carrier. The latch upon the driver which forces the carriers of the rear row forward is shown in Fig. 4 as springing in behind the carrier, and as this driver A'' is moved forward the latch retains that position, forcing the carrier before it, as in Fig. 24, but as the

driver is withdrawn, the latch E″ is pressed out of the way by the carrier which has been moved into position by its plunger until it passes the extreme end of that carrier, when it springs across its end, and is in position to force it forward. The latch upon the other driver A″, which forces backward a carrier from the front row, is operated in a similar manner, but springs inward in front of the carrier instead of behind it. The effect produced by these two drivers is that they simultaneously transfer one carrier each from the opposite ways, thus filling up the space in each way left by the last movement sidewise of the end carrier of each row by the plungers H′ H″, and leaving a vacant space into which one from each of the rows of carriers can be forced, as before described. The effect of the operation of the plungers H′ H″ and the drivers A″ is, that at each revolution of the main shaft O of the machine every carrier is moved one step onward—that is, each carrier in the front row is moved one step to the right, each carrier in the rear row is moved one step to the left, the advanced carrier in the front row is moved backward to the beginning of the rear row, and the advanced carrier in the rear row is moved forward to the beginning of the front row.

The object of this movement of the carriers step by step is to bring the type that are held in them successively into positions where they can be selected by the automatic selecting apparatus, which constitutes the next important part of the machine, and which will now be described.

This apparatus consists of a series of hooks, S′, pivoted at 23 to reciprocating slides I″, which are guided between division-plates K″, and vibrate forward and backward in a line at right angles to the ways in which the carriers move. There are at least as many of these hooks as there are denominations of type used in the machine, and their office is to withdraw the type from the carriers at the proper time. Figs. 7 and 8 exhibit this part of the apparatus in sectional elevation and in plan. W‴ is the vibrating frame, which is moved by two rods, F″, which rods are moved by a cam on the main shaft, operating upon them through pins 3 fixed on arms F⁴ depending from each rod, one of which is shown in Fig. 4. The cam is shown by the curved dotted groove 27, in which the pin 3 travels. This cam is so shaped as to vibrate the frame W‴ forward and backward while the carriers are at rest in their ways. In this instance this cam-groove 27 is on the inner face of the cam Q″, whose outer face actuates the lever T. But in practice these devices would be driven by separate cams. The reciprocating slide I″, which carries each of the hooks S′, is notched at 29 to fit over the frame W‴, as shown in Fig. 7, and is pressed forward toward the carriers by the spiral spring 14. This spiral spring permits the frame W‴ to move forward without carrying with it the slide I″. The inner ends of the slides I″ are provided with pins L″, which are arranged in different positions for every denomination of type, and constitute the feelers for the type, the type being nicked to correspond with the position of these pins for each denomination. Each slide I″ is also provided with a rest-block, 13, projecting over the top of the slide. This rest-block is carried on and fast to a rod, J″, moving in the slide, and actuated by a spiral spring, which tends to keep its forward end beyond the face of the slide and in alignment with the outer ends of the feeling-pins. On this rest-block the hook S′ is supported by its lug O″, so that it cannot fall low enough to catch the point of the ejector R‴, but when the rest-block is pushed backward the hook can fall and catch the point of the ejector. The front plate Y is perforated with holes in such positions as to allow the rods J″ and the feelers L″ to reach the type, as will be described. M″, Fig. 7, is a bar which holds the slides I″ in place, and also serves to elevate the hooks S′ as they are withdrawn, by means of their cam-projections N‴.

The operation of this selecting apparatus is as follows: As the slides I″ are brought forward the feelers L″ come in contact with the types in the carriers, if there are any. If the feelers L″ find nicks in the type corresponding with them, they will enter those nicks, and so the slides I″ can advance along with the movement of the frame W‴ until the feelers reach nearly or quite to the bottom of the nicks, as shown at Fig. 7, where I is a type, and where the feelers are represented in one of the slides as reaching to the bottom of the nicks. When the feelers have thus entered the nicks, the sliding-rod J″, carrying the rest-block 13, comes in contact with the type, and is arrested in its forward movement; but as the slide I″ is still advancing, it is apparent that the spiral spring on the sliding-rod J″ must be compressed, and the rest-block on that sliding-rod stand still in reference to the lug O″ on the hook which is advancing. When the lug O″ has passed forward beyond the rest-block, the hook drops and catches over the point of the ejector R‴, as shown in dotted lines in Fig. 7. When the frame W‴ returns, it carries with it the hook which is engaged with the ejector R″, and the type I in the carrier T″ is drawn out from the hold of spring S‴; and as the hook is still further withdrawn, the cam N‴ comes in contact with the bar M″, and the hook is lifted out of engagement with the ejector, which being released, is forced back by its spring 16 to its normal position in the carrier, and so makes room in the carrier for it to receive another type in front of its ejector R‴ when it shall have again reached the proper place. But if the feelers L″, as the slide I″ is brought forward, do not find nicks in the type corresponding with them, they come in contact with the smooth edge of the type, and of course arrest the further movement of the slide I″,

in which case the frame W''' still continues its movement, and compresses the spiral spring 14, without injuring the type. Under these circumstances, the sliding-rod J'' is not pushed backward, and the hook is therefore held by the lug O'', and not engaged with the ejector.

The manner in which this apparatus selects the type is very apparent. Each carrier holding a type presents it successively to the feelers of each of the slides I''. If the feelers of any slide do not find corresponding nicks in the type, they can not enter, and consequently the type is not disengaged from the carrier, but is moved on another step and presented to the feeders of the next slide, and so on until it comes to a slide whose feelers correspond with its nicks, when it is drawn into the recess or way 19 formed in the front plate Y, Figs. 9 and 23, disengaged and directed into a conductor P, which guides it downward into its appropriate groove or channel in the case W. As the presence of a type in a carrier reaching the receiving position would prevent a new type from being inserted, and thus derange the machine, the last hook is allowed to drop and engage with the ejector of the last carrier in the front row at each forward movement of the frame W''', and thus to disengage from each carrier presented to it whatever type may have passed the preceding hooks. This prevents the retention of a type by any carrier passing from the front to the rear row. As there are some characters of comparatively infrequent use, which are not nicked, and consequently will not be withdrawn by any of the slides carrying feelers, this provision is necessary.

The conductors are thin metal rectangular pipes, P, Figs. 1, 3, 4, and 9, large enough to permit the type to drop freely through them, and not large enough to permit the type to turn in them. These conductors are twisted ninety degrees, so that the types which enter them at the top with their nicks facing the front of the machine, are turned one quarter around, and when they reach the bottom of the conductor have their nicks facing one end of the machine, and are dropped into the channels of the case with their nicks all facing one side of the same.

The case W is also shown at Figs. 1, 3, and 4, and consists of a number of partitions, *a*, dividing the case into a series of grooves or channels, *b*, each wide enough for a type, into which the types are dropped from the conductors P. This case is removable from the machine, and is supported on bearing P', where it rests in an incline position which is highest at its receiving end, thus inclining the types forward upon each other, in which position they are retained by gravity, as is apparent.

In each channel is a spring-slug Q', against which the line of types rests, and which readily slides as additional types are dropped in and advanced, as will now be described. The lever R^4 is fast to the shaft Q, and its free end follows a double cam U'', see Figs. 2 and 3, on the main shaft O, in contact with which it is held by a spring O'. This shaft Q vibrates a series of levers R, each extending into its appropriate groove *b* of the case W, as in Fig. 4. Each revolution of the main shaft thus vibrates the whole series of levers R twice, pushing forward each type as it drops, and with it the whole row before it, a distance equal to the thickness of that type, thus leaving room for another type to drop in when the levers are moved rearward. There are two forms in which this apparatus for pushing the type into the groove of the case may be made, both shown at Fig. 4. In the arrangement attached to the machine the levers R have a curvilinear motion. In the detached apparatus representing the same operation the levers R have a right-line motion, thereby avoiding any tendency to lift the type in the case. Either plan will work; but the one shown detached is preferable. When the case is filled with type it may be removed, and an empty one substituted, so that the machine may be kept constantly at work.

The machine is driven by a belt which runs upon the pulley A', Figs. 2 to 5, inclusive, and it is desirable to have an apparatus which will instantly arrest the movement of the shaft O, in case of obstruction in the operation of the machine. This object is accomplished by the apparatus shown in detail at Fig. 5. The pulley A' drives the machine by means of the friction of its interior surface upon the leather disk R^5, which is between it and the metal disk B', and is pressed against the leather disk R^5 by the spiral spring I''', which is in the hub V, and which is compressed by the screw A''''. On the inner side of the disk B' is another disk, C'''', and a leather disk, R'', between them. This inner disk C'''' is connected, by two columns, D', to an outer cross-bar, C', which is mounted on the hub V. When the spring I''' is at liberty to act, it presses against the head of the screw A'''' and against the bottom of the hub V, forcing the pulley A' against the outside of the leather disk R^5, and creating a friction between the pulley and the metallic disk B' attached to the hub R', through which the shaft O is driven. But when the hub V is drawn out, so as to withdraw it from contact with the head of the pulley A', the friction on the outside of the leather disk R^5 is taken away, and if the hub V is withdrawn far enough, it will apply friction to the disk B' through the inside leather disk R'', and as the disk C'''' cannot revolve because the columns D' will come in contact with the belt, the machine must be stopped. When the machine is in operation, a lever, F', which is connected with the rod G', is in the position indicated by the solid lines in Fig. 5, and the rod G' is caught by a notch in an arm, I', fast to the frame of the machine, as shown in Fig. 6, which is another view of that part

of the apparatus. The bent lever L'''', Figs. 4 and 5, has one end 30 of it overreaching the hub R', which is fast on the shaft O, through which the machine is driven. This hub has a cam with a number of projecting steps, as seen at M', upon it, which will strike the end 30 of the lever L'''' unless it is moved sidewise out of their way; and if they do strike it, they will tilt the lever L'''' and depress its inner end 31. Its inner end 31 rests upon the rod G', on the same side of it as the notched arm I', and if that lever is tilted it will depress the rod G', and liberate it from the notched arm I'. The plunger-shaft O^3, which moves the carriers, rests against the bend of the lever L', which has a motion around its fulcrum K' at right angles to its tilting motion, as shown in Fig. 6. The spring N'''' keeps the lever L'''' in contact with the end of the plunger-shaft O^3. When the machine is in operation, if the plunger-shaft O^3 is working properly, the end 30 of the lever L'''' will recede at the time when the stepped cam M' is nearly in contact with it; and as the stepped cam M' revolves, the lever-end 30 is vibrated horizontally, and so prevents the stepped cam M' from engaging with it. But if from any cause the carriers are not moved their appropriate distance, the end 30 of the lever is not vibrated out of the way of the stepped cam M', and, as a consequence, the said cam M' engages with and raises that end of the lever, depressing its opposite end, and unhooking the rod G' from the notched arm I'. When this happens, the spiral spring C'' on the rod G' forces the end of the lever F' outward, its inner end being supported upon a fulcrum at 33, and, as a consequence, the hub V is drawn away by the ball-and-socket connections at E', and the friction between the pulley A' and the disk B' immediately suspended, while at the same time friction of rest is imposed through the disk C'''', and the machine instantly stops.

It is apparent that the new mode of operation exhibited in the mechanism herein described may be practiced by the aid of details in machinery quite different from those exhibited in the single form presented by the drawings making part of this description. As is well known to mechanics, the different movements of the working parts of this machine may be imparted to them by means of cams or gear-wheels arranged differently from those herein exhibited, and probably no two mechanics, having the new mode of operation herein described presented to them, would construct a machine in precisely the same form. When the impelling mechanism is shown as driven one way by a positive motion and the other way by a spring, it is apparent that the motion may be reversed in most cases, and it is apparent that the relative positions of the cams may be changed, in which case the levers or slides would assume different shapes and directions. The invention does not consist in the cams and levers exhibited in the single form shown by the drawings, but in the new mode of operation, by which the types are selected and distributed, which mode of operation admits of the use of a great variety of equivalent mechanical devices without changing its novel and substantial character.

What I claim as my invention is—

1. The detaching type-driver, combined with actuating means, substantially as described, whereby it is forced against the type, first by a feeble spring-pressure, sufficient only to detach the type from its connection with the line of type, and afterward, when the type has been detached, by a stronger spring-pressure, for the purpose of carrying the type into a position where it is controlled by another mechanism in the distributing-machine.

2. The combination, with a type-driver and a type-carrier, of an elastic tongue, which is moved in advance of the movement of the type-driver, and which constitutes a guide for leading the type into the carrier as it is forced in by the type-driver, and which opens the clutch of the type-carrier, substantially as described.

3. In a type-distributing machine, type-carriers, each so constructed as to receive and hold a type, each carrier being a complete independent removable instrument for that purpose by itself, substantially as described.

4. In combination with the type-carriers, two plungers, constructed substantially as described, moving in opposite directions, the one operating on the front and the other on the rear row of carriers, or other equivalent devices for moving a number of type-carriers with an intermittent motion, permitting an interval of rest for the purpose of removing the type, substantially as described.

5. In combination with the type-carriers, two drivers, constructed substantially as described, moving in opposite directions, simultaneously acting, the one forcing one carrier from the front to the rear row, and the other forcing one carrier from the rear to the front row, with an intermittent motion, substantially as described.

6. The combination of cams Q^2 and Y' with the plungers and drivers, substantially as described, for presenting a constant succession of type-carriers to the type-driver, a single one at each stroke of the type-driver, for the purpose of receiving the type, substantially as described.

7. In combination with the type-carriers, the two pairs of channel-ways for the movement of the carriers, arranged and constructed substantially as described, so that the rows of carriers in each pair will be moved in lines parallel to each other and in opposite directions, substantially as described.

8. The combination of the hook or catch,

for ejecting the type from the carrier, with a sliding detent for dropping the hook into action, and a slide armed with projecting pins for determining the denomination of the type in the carrier, substantially as described.

9. The combination of independent traveling carriers, carrying type to be distributed, with a series of hooks or catches for ejecting the type from the carrier at the appropriate places, substantially as described.

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