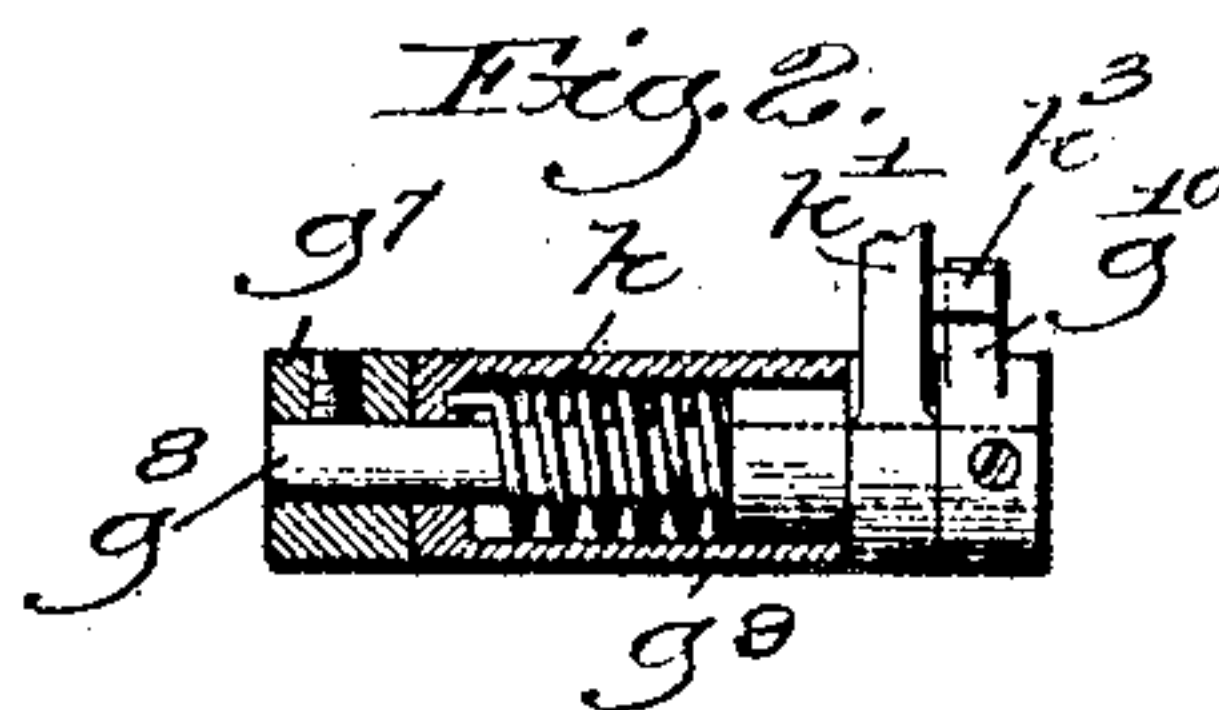
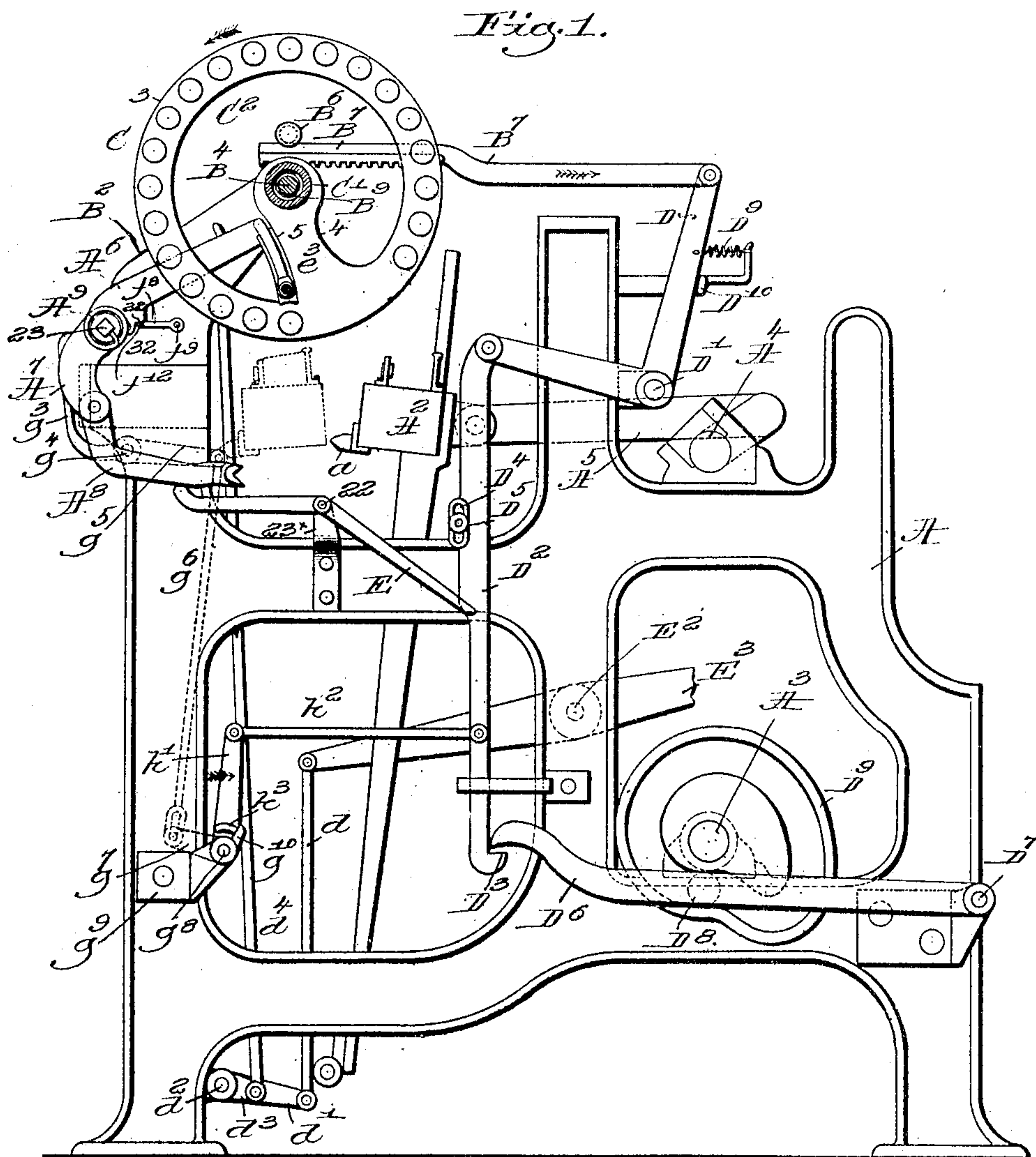


No. 887,465.

PATENTED MAY 12, 1908.

R. CROMPTON.
FILLING CHANGING LOOM.
APPLICATION FILED MAY 27, 1907.

5 SHEETS—SHEET 1.



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5 SHEETS—SHEET 2.

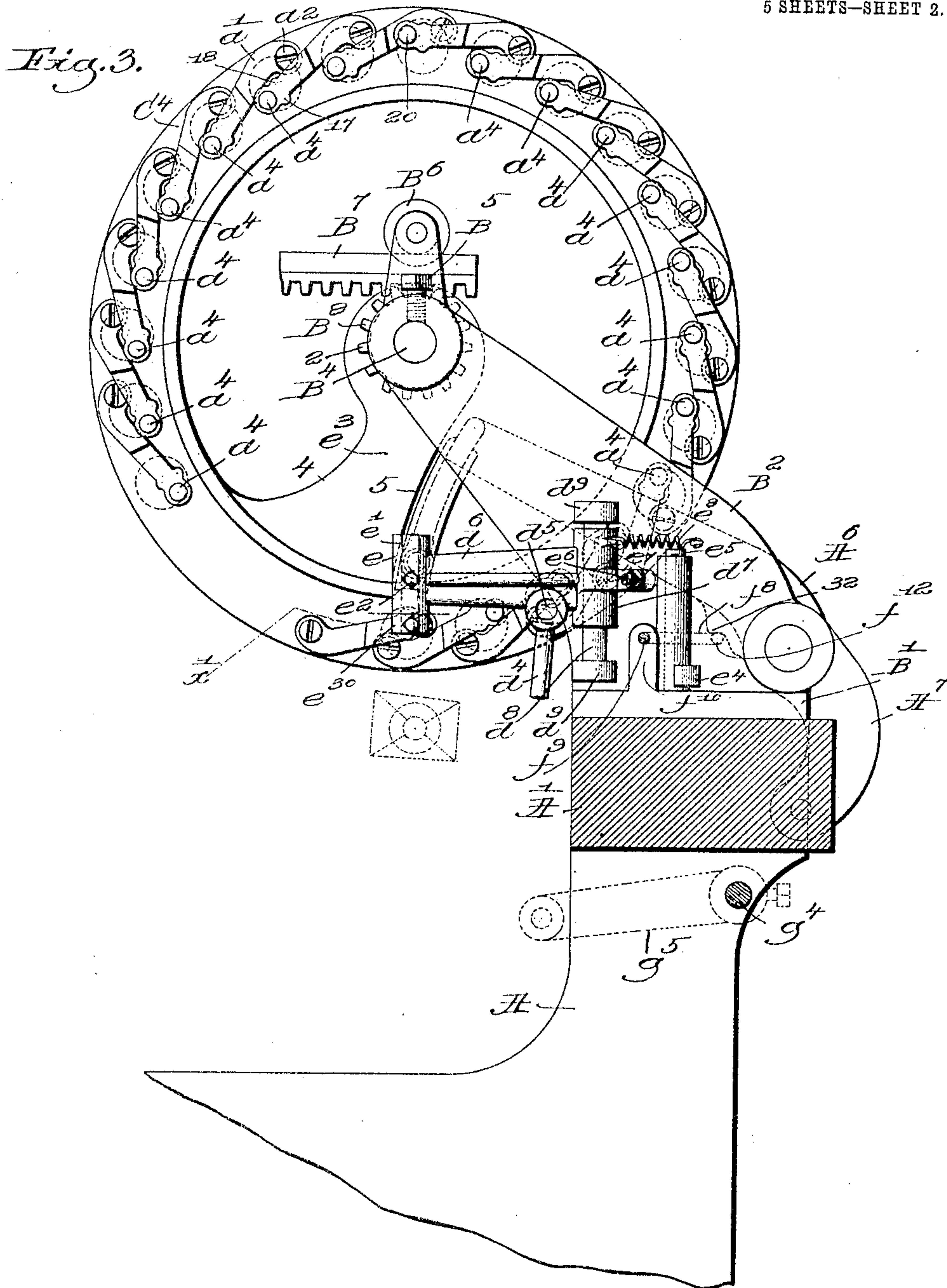


Fig. 3a



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5 SHEETS—SHEET 3.

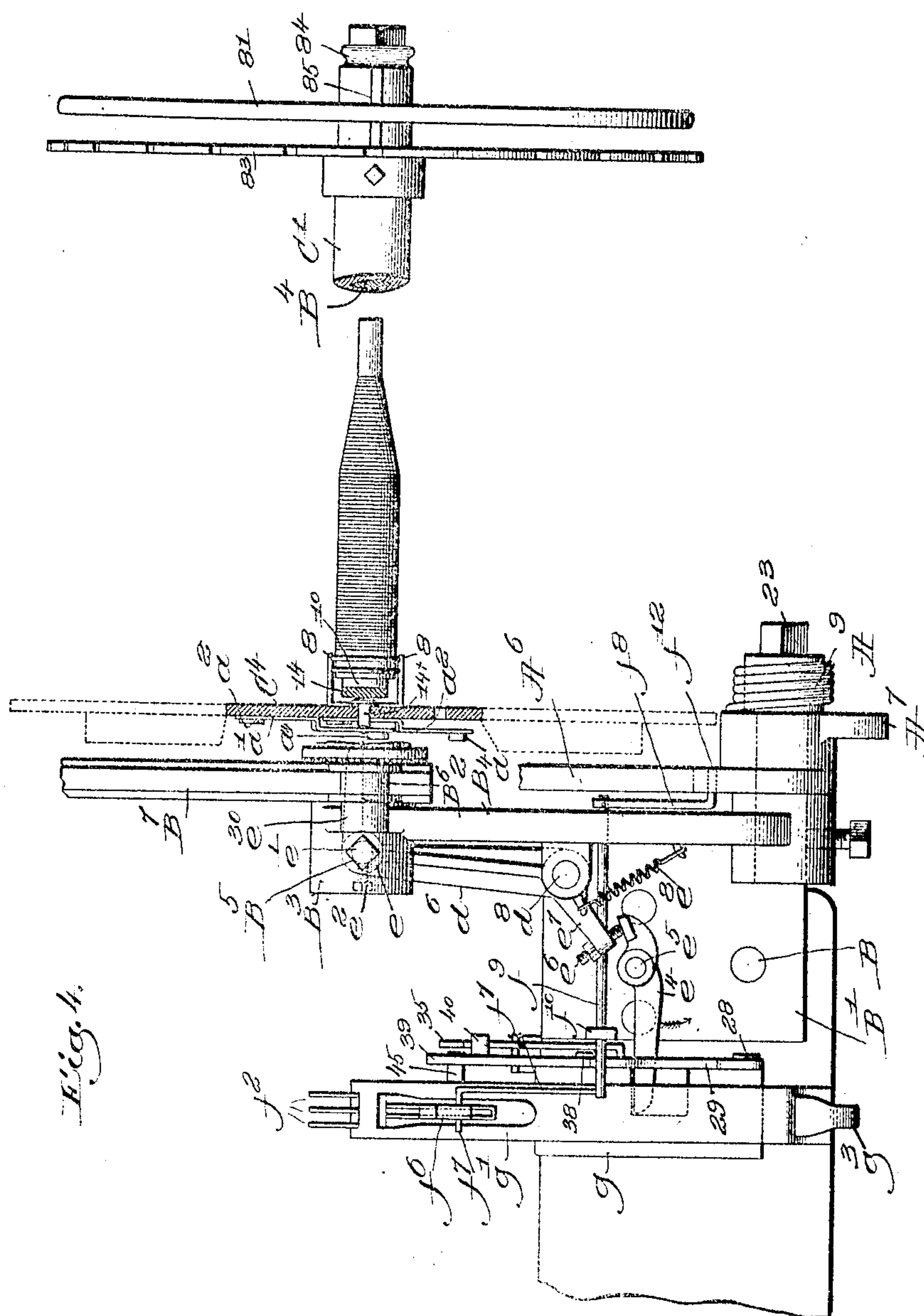


Fig. 4.

Witnesses:
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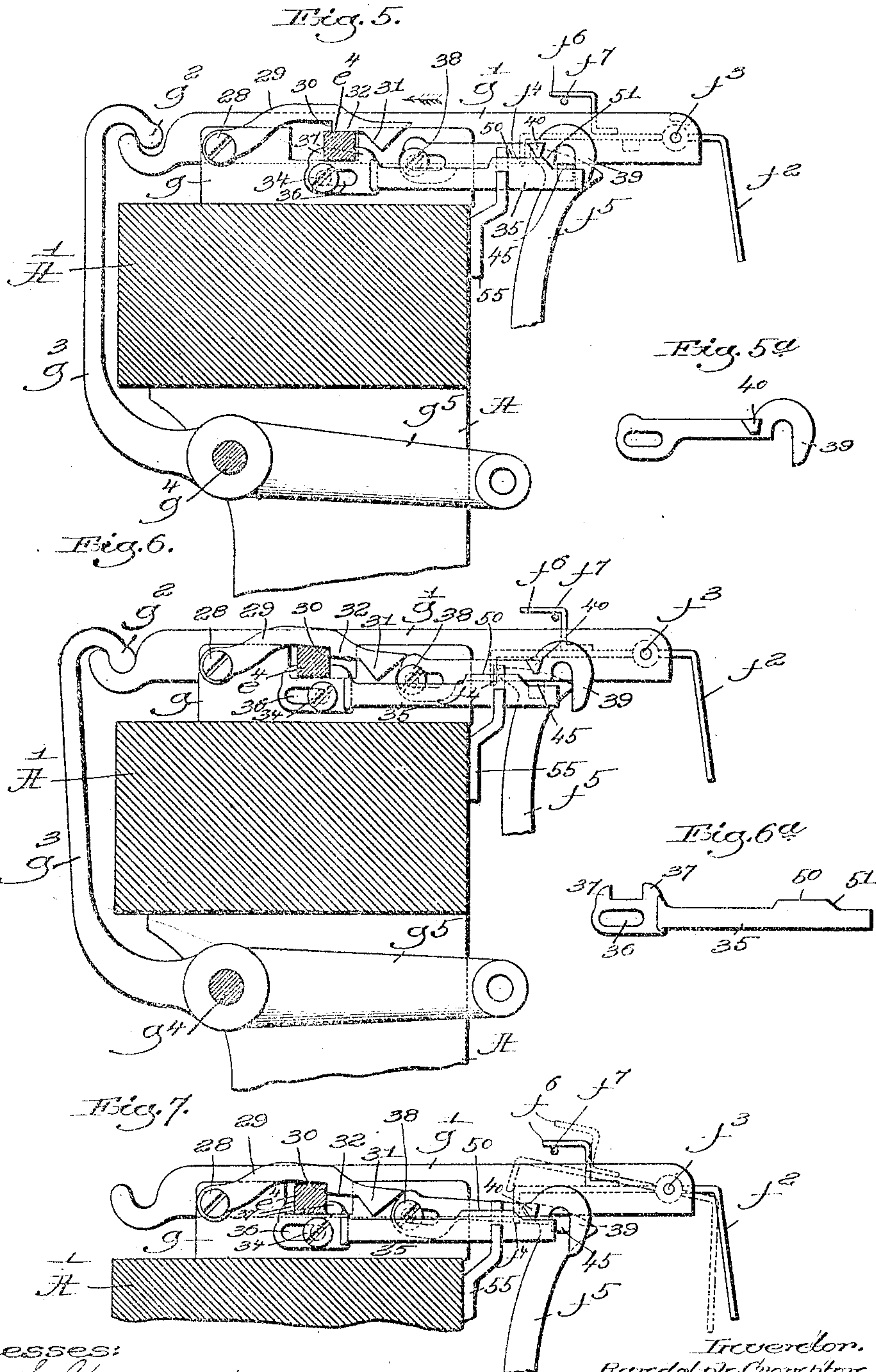
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APPLICATION FILED MAY 27, 1907.

5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

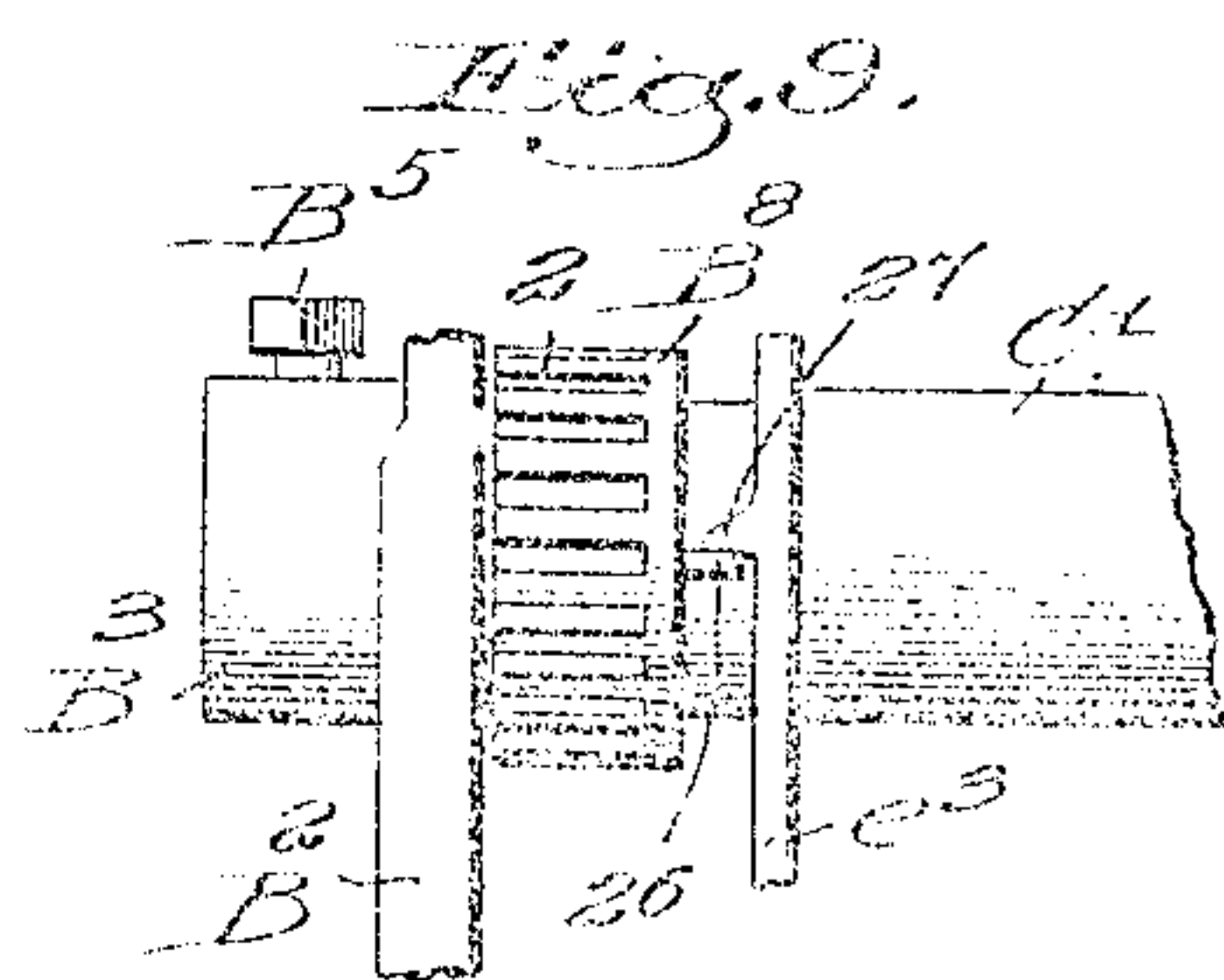
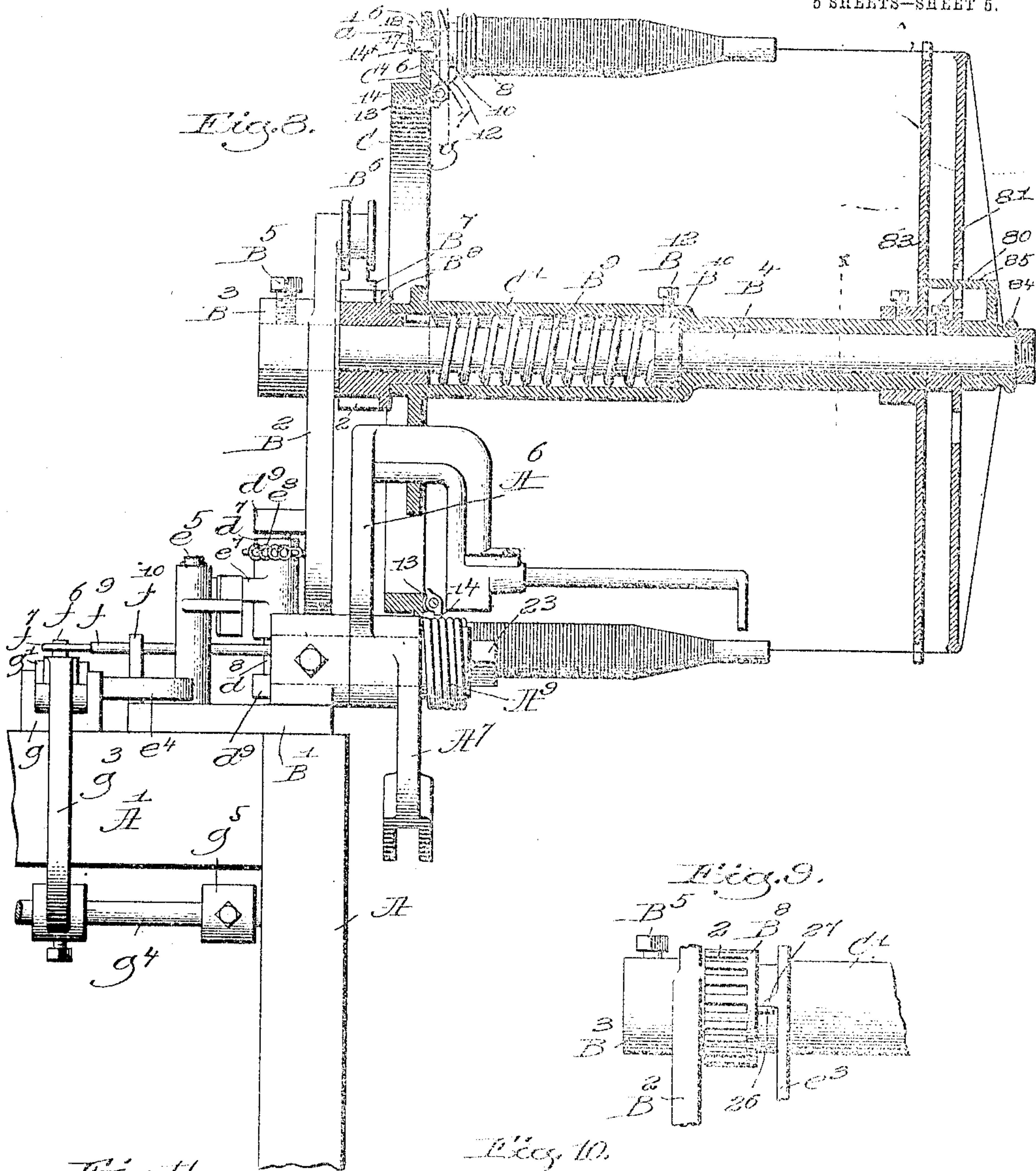


Fig. 11.

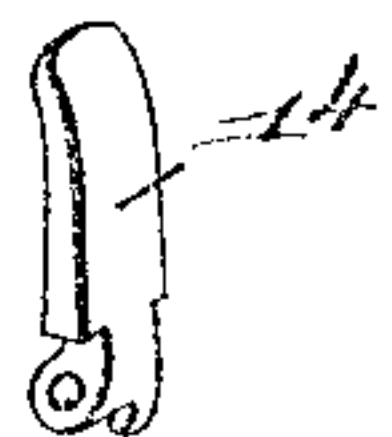


Fig. 10.

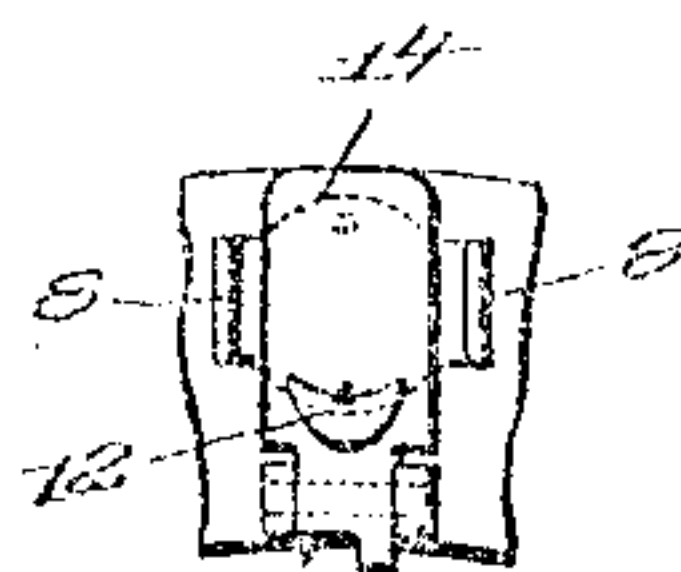


Fig. 12.



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UNITED STATES PATENT OFFICE.

RANDOLPH CROMPTON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, A CORPORATION OF MASSACHUSETTS.

FILLING-CHANGING LOOM.

No. 887,465.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed May 27, 1907. Serial No. 375,854.

To all whom it may concern:

Be it known that I, RANDOLPH CROMPTON, a citizen of the United States, residing in Worcester, county of Worcester, and State of Massachusetts, have invented an Improvement in Filling-Changing Looms, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to that class of filling-changing loom wherein a magazine is provided with filling-carriers having filling differing in color and character, the magazine being located at one end of the loom, the end of the lay at the opposite end of the loom being provided with a series of drop shuttle boxes, the loom being of the type shown in United States Patent No. 600,053, dated March 1, 1898, said loom being made to transfer automatically from said magazine to a shuttle in the single shuttle box end of the lay a filling-carrier of a particular color or character required in the running shuttle to be supplied with filling. The shuttles in the drop shuttle boxes have filling of the same color or character as the filling-carriers sustained in the magazine, and the shuttles are supplied from the magazine with filling of the same color as that carried by the shuttle.

Prior to this invention a rotatable hopper has been provided with filling-carriers having filling differing in color or character, the filling-carriers being arranged in groups, a filling-carrier of each color in each group, and said magazine has been automatically controlled through connections with shuttle-box actuating mechanism to place one group of said filling-carriers after another under the transferring arm or device keeping under said arm or device a filling-carrier of each group having filling of the color or character of the filling in the running shuttle, so that if said arm or device is moved, a filling-carrier having filling of the same color as that in the shuttle may be transferred from the magazine onto the running shuttle.

In looms where the filling-carriers are arranged in groups, each group having one filling-carrier of each color, but a single filling-carrier is removed automatically from each group, the particular color of filling-carrier so removed varying in accordance with which of the several shuttles having

filling of the same color is to be supplied with fresh filling. For instance, if but two colors are used in each group, it will be evident that but one-half of the filling-carriers sustained in the magazine can be transferred automatically without replenishing the magazine by hand; and where the filling-carriers are arranged in groups of three, but one-third of the filling-carriers, and where arranged in groups of four, but one-fourth of the number of said filling-carriers can be transferred before stopping the loom to replenish the magazine, and consequently in this class of loom very considerable time is taken for replenishing the magazine.

In my invention instead of arranging the filling-carriers in the magazine in groups, I apply the filling-carriers to the magazine indiscriminately, sustaining the butts of the filling-carriers each in a socket or holder mounted on the magazine, each of said sockets or holders being provided with an indicator that is made to occupy one or another position in different arcs between the center and periphery of the magazine according to the particular color or character of filling on each filling-carrier, said indicators being placed in one or the other position when the filling-carrier having a filling of one or another color or character is applied to the magazine.

The magazine herein shown is sustained by an inwardly directed radial arm mounted loosely on a stud, the magazine normally occupying its inoperative position of rest under the control of an actuator.

I have combined with the magazine, magazine-actuating means that may be moved from a normal starting point for a definite stroke when moving the magazine to place a filling-carrier of a particular color in the path of movement of the transferring arm or device.

I have combined with the magazine a stop to arrest the magazine at any point in its forward movement, the magazine-actuating means continuing its movement and completing its full stroke.

The stop referred to is sustained by a stop-carrier that is raised or lowered by the shuttle-box actuating means to place the same in position to meet an indicator positioned by a filling-carrier having filling of the color or character of that in the running shuttle, and the stop is moved longitudinally

to engage an indicator and arrest the magazine whenever the running shuttle is to be replenished. In my novel loom it is possible to remove automatically a large majority of if not most of the filling-carriers from the magazine without the operative taking time to resupply filling-carriers to the magazine or to fill up gaps in the magazine.

The magazine-actuating means in the form in which I have chosen to illustrate the same comprises a hooked bar, an elbow lever, and a rack, and said actuating means derives its movement from an actuator, herein shown as a cam on the cam shaft, the magazine-actuating means when operated turning the magazine forwardly or to the left, see Figure 1, from its position of rest, where it is retained normally, until one or the other indicators of the magazine, the position of which on the magazine is determined by the color or character of the filling in the running shuttle in the single box end of the loom, comes against the stop referred to which will arrest the magazine with a filling carrier of the desired color in position under the foot of the usual transferring arm or device that the latter when moved will transfer a filling-carrier having filling of the required color from the magazine into the open upper side of the shuttle then in the single shuttle box end of the lay, the incoming filling-carrier ejecting from said shuttle the bobbin which is to be changed leaving a fresh carrier in the usual grab or bobbin holder of the shuttle.

As stated the operative stroke of the rack is sufficient to always impart to the magazine its full stroke in one direction, said stroke being however always less than a full rotation, and thereafter said rack is returned automatically to its normal or starting position, but provision is made, as stated, to arrest the magazine in its forward movement whenever one of the indicators thereof controlled by a filling-carrier meets the stop referred to, as will be hereinafter further described; or in other words the rack may move and complete its full stroke after the magazine has been arrested in one or another position by an indicator meeting said stop.

Fig. 1 in side elevation partially in section on the line $x-x$ Fig. 8, shows the right hand end of a loom with which I have embodied mechanism of my own invention located at that end of the loom; Fig. 2 is a detail showing a yielding support to be described; Fig. 3 is a detail on an enlarged scale showing the inner end of the magazine together with part of the rack for moving the same, and a stop for arresting the magazine in whatever position called for by the particular color or character of filling that is to be changed; Fig. 3^a is a section below the dotted line Fig. 3 crossing the hub of arm d^6 ; Fig. 4 is a top or plan view showing part of the breast-beam, the filling-fork and part of the transferring arm,

and a portion of the hopper below the section line x' , Fig. 3; Fig. 5 shows the filling-fork slide in its normal position, the filling-fork being in the position it will occupy when not in contact with filling on the race of the lay; Fig. 6 shows the filling-fork slide as having been moved outwardly somewhat over the breast-beam by the usual fork hammer, it being supposed that at the last beat of the lay filling had not been left thereon in the path of movement of the filling-fork; Fig. 7 is a detail showing the hammer as moved forwardly into the position Fig. 5, the hammer at the same time moving certain devices to be described, said figure showing the filling-fork in dotted lines as tipped, as it will be by the transferrer, to prevent the filling-fork slide from being moved backwardly at the next pick after replenishing the shuttle; Fig. 8 is a much enlarged sectional detail looking at the front of the loom of part of the magazine, its support, and the transferrer; Fig. 9 shows a gear loose on the stud supporting the quill of the hopper, said gear being moved at times by the rack bar forming part of the magazine-moving means; Fig. 10 is a sectional detail in the line y , Fig. 8, showing one of the devices for putting into its operative position a locking device to hold an indicator in one or its other position. Fig. 11 shows the pin moving device detached from Fig. 10; and Fig. 12 is a detail showing part of the filling-mover moved by the magazine.

Referring to the drawing, A represents part of the end frame of a loom, A' the breast-beam, A² the lay provided with a bunter a , A³ the cam shaft, A⁴ the crank-shaft, said shafts deriving their motion one from the other by usual gearing (not shown), the lay pitmen A⁵, the transferring arm or pusher A⁶ having a depending end A⁷ on which is jointed a dagger A⁸, the spring A⁹ acting normally to hold the transferrer in its elevated inoperative position, are and may be all of usual construction in automatic filling replenishing looms, the transferrer being actuated whenever the dagger is lifted to be struck by the bunter a . It will be supposed that the lay of the loom herein to be described will, in practice, be provided at its left hand end, or its end opposite the place occupied by the magazine to be described, with a series of drop shuttle-boxes such as illustrated in U. S. Patent No. 600,053, dated March 1, 1898, said shuttle-boxes containing shuttles provided with filling differing in color or character, the number of colors of filling depending upon the number of shuttle-boxes employed, this latter patent showing a shuttle box containing three cells.

Herein I have illustrated my invention as adapted to control a drop-box having two cells and controlling shuttles having, let it be supposed, a red and white filling. This invention is not, however, limited to any par-

particular number of cells in the shuttle-box, or to the use of shuttles having filling of but two different colors, as I may use a drop shuttle-box containing any desired number of cells, a shuttle having filling of a different color having its home in each of said cells.

Referring now to parts of the loom invented by me in the production of the invention herein to be described, I connect to the top of the breast-beam by bolts B, see Fig. 4, the foot of a stand B' having an upright B² provided with a hub B³ that receives the magazine-sustaining stud B⁴, said stud being held in said hub by a set-screw B⁵. The upright B², see Fig. 8, has a stud on which is mounted a flanged roller b⁶ that serves as a guide for a rack bar B⁷ of the magazine-actuating means to be described, the teeth of said rack engaging the teeth 2, see Fig. 9, of a gear B⁸ loosely mounted on said stud, said gear having at its right hand end, see Fig. 8, a hub that receives loosely the open end of the hub C' of the magazine C. The hub or right hand end of the gear B⁸ has connected with it one end of a spiral spring B⁹ the opposite end of which is connected with a collar B¹⁰ which surrounds said stud loosely, said collar being connected with the quill or hub of the magazine by a set-screw B¹².

The magazine consists essentially of a ring, the shape of which is shown best in Figs. 1 and 3, it comprising a casting presenting a narrow rim 3 left by the formation of an arc-shaped opening C², the ends of which are terminated by the edges 4, 5, of a radial arm e³ extended from the center of and forming part of the magazine and its central hub C'. Application Serial Number 352,911 filed January 18, 1907, shows a magazine having a radial sustaining arm, and said magazine is claimed broadly in said application.

The rim or periphery of the magazine herein shown differs however slightly in shape from the rim of the magazine shown in my said application Serial No. 352,911; that is, the rim herein shown, instead of being notched as in said application, has a projecting flange C⁴ provided with a series of holes that receive screws 6 that are extended through a plate 7, see Fig. 8, that sustains grabs 8 grooved at their inner sides to receive between them and hold the ringed butt of each filling-carrier, said carriers, as herein shown, having each a projection 10 that meets an abutment 12 of a series of pin-moving devices or levers 14 pivoted at 13 on the magazine, these abutments sustaining the butt ends of the filling-carriers, all in the same circular path.

As the levers 14 are moved toward the left, Fig. 8, in placing the butts of the filling-carriers between said grabs, said levers each move outwardly a locking device 14^x, shown as a headed pin, said device when moved outwardly engaging one or another of a series of

notches of a series of indicator carriers a' shown as spring arms connected at one end with the flange C⁴ of the magazine by a stud-screw a², each indicator-carrier sustaining at its free end an indicator a⁴, and as I have herein chosen to illustrate my invention for handling filling-carriers of but two different colors, I have provided each arm or indicator-carrier a' with but two notches 17, 18, shown more clearly in Fig. 8, the notch 17 being engaged to lock the indicator-carrier in its outer position, as illustrated by the indicator 20, Fig. 3, when, for instance, a red filling occupies that particular position in the magazine. The arms or indicator-carriers are turned by hand about their pivots as the filling-carriers are placed in the magazine.

I have shown the remaining indicators a⁴ as occupying such a position as to permit the locking devices 14^x to engage the recesses 18, when, let it be supposed, the filling-carrier has white filling, so it will be understood that when the indicators occupy the positions a⁴, the filling-carriers used to lock said indicators in that position have filling differing in color from the filling on the filling-carrier controlling the indicator 20. Of course it will be understood that should the loom be set up to use three different colors of filling, or four different colors of filling, then in such case the indicator-carriers a' will have three or four notches.

In Fig. 3 an indicator a⁴ shown as controlled by a filling carrier provided with white filling, occupies its operative position to meet the magazine-stopping means to be described to arrest a filling-carrier, having white filling, in the path of movement of the transferrer.

In Fig. 1 I have shown the single shuttle-box end of the lay, and it will be understood that the front wall of said shuttle-box will, in practice, be provided with a binder of usual construction, and in said figure I have shown by dotted lines the lay occupying its forward position, the position it will occupy when the transferrer is actuated to transfer the filling-carrier then under it from the magazine into the open upper side of the shuttle, it at the same time ejecting the filling-carrier then in the shuttle through the open lower side of the shuttle and through the lay which is open underneath said shuttle, as provided for in U. S. Patent No. 600,053.

As the pins or locking devices 14^x are pushed out by placing the butt of a filling-carrier in the magazine, the ends of the pins besides locking the indicator-carriers a', which are of spring metal, also pushes the free ends of said indicator-carriers outwardly away from the side of the magazine thus placing the indicators mounted on said indicator carriers in such position as to meet a stop e²⁰ to be described, and whenever a filling-carrier is removed from the magazine the pin 14^x previously held out by the filling-

carrier is moved to the right by the indicator-carrier, said carrier approaching and contacting preferably with the magazine, in which position the indicator is not projected sufficiently from the end of the magazine to strike the stop e^{30} . In other words the indicators are maintained in their operative position by the filling-carriers, and when a filling-carrier is removed the indicator is immediately moved automatically to occupy its inoperative position.

I will now describe the magazine-actuating means, and referring to the rack-bar B^7 before referred to, it will be seen that the inner end of said bar is jointed to the upper end of an elbow lever D having its fulcrum at D' , the opposite end of said lever having jointed thereto a leg D^2 provided at its lower end with a hook D^3 , that is engaged and depressed by an actuator D^6 shown as a radius bar having its fulcrum at D^7 and provided with a roller stud D^8 entering an irregular groove in a cam plate D^9 fast on the crank-shaft, said cam groove being of a shape to move said radius bar up and down once during each complete revolution of the cam-shaft, thus moving said radius bar in one or the other direction during each complete forward and backward movement of the lay. As the leg D^2 is depressed, a roller D^5 adjustable in a slot D^4 of the leg will meet the end of a dagger-moving device E pivoted at 22 on a stand 23^x erected on the loom side and move upwardly the outer end of said lever on which rests the dagger A^8 , putting said dagger in the path of movement of the bunter a so that said bunter will meet said dagger as the lay moves forwardly, push the dagger to the left, Fig. 1, and through it turn the transferring arm A^6 about its supporting stud 23 in usual manner.

The arm D has connected with it a spring D^9 constituting a return actuator that acts normally to move the rack B^7 in the direction of the arrow thereon, Fig. 1, the movement of said arm to restore the magazine to its starting position being arrested by an arresting device D^{10} .

Referring to the drawing Fig. 1, E^2 represents the fulcrum for the shuttle-box lever E^3 , a lever that may be in all particulars the same as the shuttle-box lever employed in United States Patent No. 600,053, to move a series of drop shuttle boxes, not herein shown. This lever E^3 , however, has connected with it a link d jointed to an arm d' connected with a shaft d^2 at the drop shuttle-box end of the loom, said shaft at its end under the magazine having connected with it a second arm d^3 that has jointed to it a rod d^4 , said rod at its upper end being jointed to a stud d^5 of a stop-carrying arm d^6 having a hub d^7 fitted to be moved vertically on an upright stud d^8 , said stud being held at its opposite ends in suitable ears d^9 of the upright B^2 .

The stop-carrying arm d^6 is moved verti-

cally by the shuttle-box-actuating means, and is also capable of being swung horizontally about the stud d^8 . The outer end of the arm d^6 has a hub e that receives a pin e' , see Fig. 3^a, held in said hub by a set-screw e^2 . This pin has connected with it a stop e^{30} , shown by dotted lines in Fig. 4. The vertical movement of the arm is simultaneous with the shuttle-boxes, and until the moving parts of the loom indicate that a filling-carrier should be changed in a shuttle, the stop e^{30} occupies its inoperative position, but when whatever means is employed to indicate a change of filling is operated, the lever d^6 is turned to the right, Fig. 4, by a lever e^4 pivoted at e^5 and under the control of the weft-fork mechanism or other suitable feeling or detecting means, and the stop e^{30} is placed in the path of movement of one of the indicators before described.

By moving the stop-carrying arm vertically and horizontally, as described, the stop may be put into its operative position to be met by one of said indicators whenever the weft-fork slide or other feeling or detecting means is moved after the absence of filling on the race of the lay, or after the practical or complete exhaustion of the filling from the filling-carrier in the single shuttle-box end of the lay.

Fig. 4 shows the stop in its inoperative position but when the lever e^4 is turned in the direction of the arrow thereon, Fig. 4, the short arm of said lever, acting on the end of the adjusting device e^6 carried by an extension e^7 of the arm d^6 , will turn said arm to project the stop in the path of the indicator next to be brought against said stop after said lever e^4 is moved. A spring e^8 connected with the hub of said arm d^6 , acts normally to maintain the adjusting device e^6 in contact with the short arm of the lever e^4 .

It has been stated that the movement of the magazine may be less than a full stroke by the magazine-moving means, this being necessary to place in position under the transfer the first or any following filling-carrier in the magazine containing filling of the desired color or character. To provide for this, while the effective stroke of the rack B^7 is always for the same distance, I have interposed the spring B^9 , it permitting the magazine to be arrested in any position and held by the stop e^{30} while the rack-bar completes its full stroke. I have fixed to the outer end of the stud B^4 by a set-screw 80 the hub of a filling-thread rest 81, and I have fixed to the outer end of the quill C' a filling-mover 83, it comprising a disk having a series of notched arms, see Fig. 12 where part of the disk is shown, each notch in each arm receiving a filling as the same is led from a filling-carrier over the edge of the rest 81, the rotation of the arms causing their slotted portions to act on the filling and move the same over said

rest, the slots of said arms not sustaining in any way the filling. The filling thread rest has a segmental part corresponding in shape with the space in the magazine, see Fig. 3, and I have mounted loosely on the end of the stud B^4 a filling end holder 84 and have connected the same by a stud 85 with the filling mover 83, so that said filling end holder is moved to and fro with the magazine and the rest.

When the spring B^9 acts as described on the arm of the elbow lever D to move the rack B^7 in the direction of the arrow thereon, a pin 26 extended from one side of the gear B^8 acts upon a projection 27 extended from the hub of the radial arm e^3 forming part of the magazine to turn the magazine backwardly into its starting position.

Referring now to the weft-fork, the upper side of the breast beam has mounted thereon a guide g in which may be moved transversely of the breast-beam the weft-fork slide bar g' , having its outer end notched to receive a projection g^2 at the upper end of an arm g^3 pivoted at g^4 so that when said slide-bar is moved outwardly in the direction of the arrow thereabove in Fig. 5, which movement will take place in usual manner when the filling is absent on the race of the lay, the extension g^5 of said arm will rise and through a rod g^6 , see Fig. 1, connected with an arm g^7 of a rock-shaft g^8 supported in a stand g^9 connected with the end of the lay, will turn said rock-shaft and with it a toe g^{10} connected with the opposite end of said rock-shaft, the movement of the toe being to the right, viewing Fig. 1, thus letting a spring h surrounding said rock-shaft, one end of which spring is connected with the stand g^9 , act and turn in the direction of the arrow crossing the same, Fig. 1, an arm h' connected at its upper end by a link h^2 with the leg D^2 , before described, such movement of said arm placing the hook D^3 of said leg in such position that when the actuator D^6 descends, it will meet said hook, depress the leg and actuate the magazine as described. The arm h' has at its side a projection h^3 that is normally held in contact with the toe g^{10} by the spring h so that when the actuator D^6 is raised, after having depressed the leg D^2 , the rounded end of the actuator may meet the lower rounded end of the leg and push the leg to the left, Fig. 1.

The weft-fork slide sustains at its inner end a fork f^2 , pivoted at f^3 in usual manner and having next the breast-beam the usual tail f^4 that may be engaged by the usual weft-hammer f^5 as the latter is moved toward the breast-beam after every other pick of the shuttle, said hammer moving to the left from the position Fig. 5 into the position Fig. 6 when the lay is forward, at which time, if there is filling on the raceway of the lay, the weft-fork will be tilted into its dotted line position, Fig. 7, so that the hammer will

not engage the weft-fork and move the slide g' outwardly.

The guide g has a stud-screw 28 upon which is mounted a locking device 29 that coacts with the lever e^4 before described. The locking device has a notch 30, a tapering nose 31, and a neck 32, said neck resting normally on the top of the lever e^4 when the latter occupies its full line or inoperative position Fig. 4, the loom then running regularly.

The rear end of the weft-fork is provided with a finger f^6 under which is extended part of an auxiliary weft-fork-tipping device normally occupying the position shown in Figs. 5 and 6, said device being shown best in Fig. 4 as comprising a rock-shaft f^9 , and two arms f^7 , f^8 , the arms f^7 being extended under said finger f^6 .

The rock-shaft f^9 is situated near one end in an ear f^{10} forming part of the casting B' , and at its opposite end in the upright portion B^2 thereof, the arm f^8 being bent or inclined at f^{12} to engage a shoulder 32 at the lower side of the transferrer arm A^6 so that when said transferrer is moved to transfer a filling-carrier from the magazine into the shuttle in the single box end of the lay, said rock-shaft is turned causing the portion f^7 thereof, acting on the finger f^6 , to tip the weft-fork from its full into its dotted line position, Fig. 7, so that as the lay is moved backwardly after the shuttle has been provided with a filling-carrier, the filling-fork will be put into such position that the hammer, as it next comes forward after a filling-carrier has been supplied to the running shuttle, will not strike the tail of the weft-fork and again move the same to again actuate the transferrer in an inopportune time.

When the hammer is moved forwardly from the position Fig. 5 and the weft-fork is not tipped, its tail will be engaged by the hammer and the weft-fork slide will be moved to the left, a notch in the slide acting on one end of the lever e^4 , turning said lever and causing its short arm, acting on the adjusting device d^6 , to turn the arm and put the stop e^{30} in its operative position.

As the filling-fork slide is moved backwardly from the position Fig. 5 into the position Fig. 6, the portion 32 of the locking device is permitted to drop so that its shoulder 30 engages the corner or edge of the lever e^4 nearest the crank shaft, thus lowering the nose 31 into the position Fig. 6, the weft-fork slide occupying such position during the time that the transferrer is operating to transfer a filling-carrier from the magazine into the shuttle.

The guide g has connected therewith loosely by a stud-screw 34 a slide-bar 35, said stud-screw entering a slot 36 in said slide-bar. The slide-bar has two projections 37 that embrace the lower side of the

lever e^4 , and when said lever is moved backwardly by the slide-bar g' , the lever e^4 is also moved backwardly over said stud-screw, the slide 35 putting the same in the position Fig.

6. The guide g is also provided with a second stud-screw 38 that receives the slotted end of a hook 39 provided at one side with a projection 40, said hook resting normally in the positions Figs. 5 and 6 on the raised part 50 of the slide-bar 35, shown separately in Fig. 6^a.

Should a shuttle enter the shuttle-box at the filling receiving end of the lay and not leave filling on the race of the lay, the weft-fork will not be tipped, and consequently as the upper end of the weft-hammer f^5 is moved toward the breast-beam it engages the tail of the weft-fork and moves the weft-fork slide g' from the position Fig. 5 into the position Fig. 6. During this movement one wall in the notch in the slide g' meets one side of the lever e^4 and turns the same in the direction of the arrow crossing said lever, see Fig. 4, under the locking device 29 mounted on the stud-screw 28 held in the guide g , letting said locking device drop from the position Fig. 5 into the position Fig. 6 so that the shoulder 30 engages and holds said lever e^4 in position to retain the stop e^3 carried by the arm d^6 in its operative position to be struck by that one of the indicators a^4 held in its operative position by a filling-carrier having filling of the particular color or character that is to be fed from the magazine into the shuttle then in the single shuttle-box.

As the slide g' is moved from the position Fig. 5 into the position Fig. 6, it acts against the shoulder 37 of the auxiliary slide bar 35 slotted at 36 that it may slide over the stud-screw 34 held by the guide g . The upper side of the auxiliary slide 35, see Fig. 6^a, has a raised portion 50 one edge of which is inclined as shown at 51.

The slide bar g' has a stud screw 38 that receives and guides the slotted end of a hook 39 having at one side a projection 40 that normally rests on the top portion 50 of the slide 35, when the slide bar occupies the position Fig. 5 before the weft hammer meets the tail of the weft-fork. As the weft hammer is moved toward the left from the position Fig. 5 into the position Fig. 6 the auxiliary slide is also moved and the high part 50 thereof is withdrawn from under the projection 40, but the hook 39 does not drop because at that time its under side is sustained by the hook rest 45 carried by the weft hammer.

As soon as the locking device 29 drops from the position Fig. 5 into the position Fig. 6 to lock the lever e^4 , the V-shaped portion 31 of the locking device drops behind the left hand end see Fig. 6 of the hook 39, thus preventing the friction of the auxiliary slide 35 from dragging with it the hook over its stud-

screw 38. The right hand ends of the slide 35 and hook are sustained by a guide 55 connected with the inner side of the breast-beam. As the weft hammer is moved toward the right from the position Fig. 6 into the position Fig. 7, the hook rest 48 is moved under the stationary hook, and when said rest comes opposite the throat of the hook the hook drops and engages said rest, as shown in Fig. 7. This is done while the lay again comes forward toward the breast-beam during the operation of laying the filling from the filling-carrier just inserted in the shuttle, and the weft-fork at such time is tipped automatically by the fork tipping means before described, as at this stroke of the lay, there would be no filling on the race of the lay and the transferrer would be again operated a second time which would immediately eject from the shuttle the filling-carrier but just put therein by the transferrer. As the weft-hammer is again moved to the left from the position Fig. 7 while the hook engages the rest 45 and the tail of the weft-fork is lifted as shown, the rest pushes the hook to the left so that its rear end meets the nose 31 of the locking device 29, turning said device on its stud 28, releasing the lever e^4 that the spring e^8 may act and turn said lever and place the stop e^{30} in its inoperative position, and as the hook is so moved by the rest 45, the underside of the projection 40 acting on the incline 51 disengages the hook from the rest and leaves the locking device resting on the top of the lever e^4 in its inoperative position, in which position it will remain until such time as the filling is absent from the race of the lay at which time the filling-fork will not be turned but will occupy the position Fig. 5.

The lever g^3 acted upon by the end of the weft-fork slide, and the devices connecting said link and lever constitute what I shall in the claim designate as controlling means intermediate the weft-fork and the magazine-actuating means, the spring h constituting a yielding medium forming part of said controlling means.

I have stated that the magazine-actuating means is under the control of the weft-fork mechanism or other suitable means.

Where the filling is to be changed after complete exhaustion, or when the filling breaks, the weft-fork mechanism will be used to control the movement of the magazine-actuating means, but when it is desired to change the filling in a running shuttle prior to complete exhaustion and thus provide for weaving perfect cloth, then in such instances I may employ instead of a weft-fork and its slide, any usual feeler or detector mechanism co-acting with the shuttle and adapted to feel through the shuttle on to the filling-carrier in the running shuttle, the absence of filling on the filling-carrier in the shuttle to a

predetermined point causing the detector mechanism to turn the lever e^4 and through it move the stop carrier d^6 about its fulcrum to place the stop e^{30} in the path of movement of the indicator carried by the magazine.

Believing that I am the first to control automatically a stop and place the same in one or another position to be met by an indicator mounted on a filling-carrier magazine, I desire it to be understood that my invention is not limited to moving this stop solely by filling-fork mechanism, as it will be obvious that the same may be moved by any usual detector or feeler mechanism commonly employed in connection with loom shuttles to feel for the quantity of weft thereon, and this without departing from the gist of the invention. So that I consider as within the gist of my invention operating the stop either after complete exhaustion, or after the breaking of the filling, or prior to complete exhaustion, according to whichever device is employed for moving the lever e^4 .

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

1. In a filling changing loom, a magazine for sustaining a series of filling-carriers, magazine-actuating means, means for placing said actuating means in its abnormal position, an actuator and means to engage and move said actuating means that the latter may turn said magazine always in the same direction from its normal position.

2. In a filling changing loom, a magazine for sustaining a series of filling-carriers, a filling-transferring arm, and means for moving the same to discharge a filling-carrier from said magazine, combined with magazine-actuating means, means to place said actuating means in its abnormal position, and independent actuating means to thereafter engage said actuating means and effect the movement automatically of said magazine from its normal position.

3. In a filling changing loom, shuttle-box-actuating means, a stop the position of which may be changed simultaneously with change of position of said shuttle-box-actuating means, a magazine for sustaining a series of filling-carriers, a series of indicators held in their operative positions by said filling-carriers when present in the magazine, magazine-actuating means, means for placing said actuating means in its abnormal position, and devices to engage and move said actuating means that the latter may turn said magazine from its normal position forwardly until an indicator carried thereby meets said stop.

4. In a filling changing loom, shuttle-box actuating means, a stop the position of which may be changed simultaneously with change of position of said shuttle-box-actuating means, a magazine for sustaining a series of

filling carriers, a series of indicators held in their operative positions by said filling carriers when present in the magazine, magazine-actuating means, means for placing said actuating means in its abnormal position, and an actuator to engage and move said actuating means that the latter may turn said magazine until an indicator carried thereby meets said stop, a filling-transferring arm, and means to move said arm to eject from said magazine a filling-carrier.

5. In a filling-changing loom, the combination with a magazine for sustaining a series of filling-carriers, a series of indicators, shuttle-box-moving means, magazine-actuating means, an actuator for moving said actuating means, and a stop movable into one or another position by change of position of the shuttle boxes, of a transferrer and filling-controlling means.

6. In a filling-changing loom, a filling-carrying magazine having a series of indicators, shuttle-box-actuating means, a stop moved simultaneously with said shuttle-box-actuating means, said stop serving to arrest the magazine in its forward movement, and means to move said magazine forwardly until one of its indicators meets said stop.

7. In a filling-changing loom, a magazine having a series of adjustable indicators, a series of holders to sustain a series of filling-carriers, and means moved by a filling-carrier when seated in its holder to place automatically its coacting indicator in its operative position.

8. In a filling-changing loom, a magazine having an inwardly-directed radial arm, means to sustain the hub of said arm in the longitudinal axis of the magazine, a transferrer or device extended from the outside of said magazine within said magazine, means to move automatically said magazine from a normal starting position forwardly for any desired distance less than a full rotation, and means to actuate said transferrer or device to eject a filling-carrier from said magazine.

9. In a filling changing loom, a magazine having an inwardly directed radial arm, means to sustain said arm loosely in the longitudinal axis of said magazine, a series of holders carried by said magazine to hold a series of bobbins solely by their butts, a filling end holder, a stationary circular thread rest, and means moving with the magazine to cause the filling to travel to and fro over said rest.

10. In a filling changing loom, a lay having a bunter, a filling-carrier transferring arm or device, a connected dagger, magazine-actuating means, and means actuated thereby to lift the dagger that the bunter may strike the dagger and actuate said transferring arm.

11. In a filling changing loom, a filling-carrying magazine, a stationary rest, a filling-end holder, means embracing the filling be-

tween the ends of the filling-carriers and said rest, and means for turning said magazine to and fro, the means embracing the filling moving with said magazine and moving the filling to and fro over said rest.

12. In a filling changing loom, a magazine to hold filling carriers, a series of indicators movable with said magazine, one for each filling-carrier, and means acted upon by a filling-carrier in the magazine to place said indicator in its operative position, the indicator assuming automatically its inoperative position after the discharge from the magazine of the filling-carrier that held said indicator in its operative position.

13. In a filling-changing loom, a filling-carrier-transferring arm or device, a filling-carrier-sustaining magazine having an inwardly extended radial arm, means to sustain said arm in line with the longitudinal axis of said magazine with the magazine normally at rest in its starting position, combined with magazine-actuating means to turn said magazine forwardly from the same starting position preparatory to placing a filling-carrier in position to be transferred, and means for moving said transferring arm or device.

14. In a filling-changing loom, a filling-carrier sustaining magazine having an inwardly extended radial arm, means to sustain said arm in the longitudinal axis of said magazine, magazine-actuated means to turn said magazine forwardly in one direction of its movement, and means to turn said magazine backwardly to its starting position after each forward movement thereof.

15. In a filling-changing loom, a stop-carrier provided with a stop, a filling-carrier-sustaining magazine having a series of indicators maintained in their operative positions by said filling-carriers, filling-carrier actuating means engaging normally said magazine when in its backward or starting position, means to move said stop, and means to move said filling-carrier-actuating means to move said magazine automatically forward until one of said indicators meets said stop when the forward movement of said magazine is arrested, said actuating means completing its full stroke.

16. In a filling-changing loom, a stop carrier provided with a stop, a filling-carrier-sustaining magazine having a series of indicators maintained in their operative positions by said filling-carriers, filling-carrier-actuating means engaging said magazine in its backward or starting position, means to move said stop, and means to move said filling-carrier-actuating means to move said magazine automatically forward until one of said indicators meets said stop when the forward movement of said magazine is arrested, combined with filling-carrier-transferring means, and means to actuate the same.

17. In a filling-changing loom, a magazine to sustain a series of filling-carriers by the engagement of only the butts of said filling-carriers, drop shuttle-box-actuating means, a series of indicators carried by said magazine, a stop deriving its movements from said shuttle-box-actuating means, and means to move said magazine forwardly for a greater or less distance to cause the first one of said indicators occupying its operative position to meet said stop, combined with filling-carrier transferring means, and means to actuate the same to remove a filling-carrier from said magazine.

18. In a filling-changing loom, a filling-carrier transferring arm or device, a filling-carrier magazine provided with means for holding the butts of a series of bobbins, a series of indicators carried by said magazine and occupying positions in different arcs, a stop, means to change the position of said stop to place it in the path of movement of either of said series of indicators, and magazine-actuating means to move said magazine from its normal position of rest forwardly until an indicator carried by said magazine meets said stop, combined with means to move said transferring arm, the stop coacting with said indicator locking the magazine while the transferring arm acts to remove a filling-carrier therefrom.

19. In a filling-changing loom, a stop, means to raise and lower said stop, a filling-carrying magazine provided with means for grasping and holding a series of filling-carriers, a series of indicators on said magazine filling-carrier-actuating means, an actuator for moving said actuating means to turn the same forwardly until one of said indicators meets said stop, a transferring arm or device, means to move the same to transfer a filling-carrier, and a return actuator to move said actuating means in an opposite direction, thus turning said magazine backwardly into its normal starting position from any point where it was arrested by said stop.

20. In a filling-changing loom, a stop, means to raise and lower said stop, a filling-carrying magazine having an inwardly directed radial arm, means to sustain said arm at the axial center of said magazine, a series of spring arms having indicators, said arms being attached to said magazine, means sustained by said magazine and moved by the filling-carrier inserted in said magazine, each filling-carrier moving outwardly away from the end of the magazine, one of said arms and its indicator, the filling-carriers maintaining said actuators in their operative positions in arcs of different circles from the center of movement of said magazine, combined with a filling-carrier transferring arm or device, magazine-actuating means to turn said magazine forwardly until one of said indicators meets said stop, which serves to

arrest the forward movement of said magazine, means to move said transferring arm while the magazine is at rest to remove a filling-carrier therefrom, the movement of each filling-carrier in succession permitting the indicator-carrying arm to move automatically toward the end of the magazine, thus placing each indicator in succession in its inoperative position, whereby, by successive operations of the filling-carrier-transferring arm and change of position of the filling-carrying magazine, one after another of the entire series of filling-carriers may be automatically discharged from said magazine.

21. In a loom, a movable magazine for filling-carriers, actuating means to move said magazine to bring any desired filling-carrier into position to be transferred, and actuating means to return said magazine into its normal position after said transfer has been effected.

22. In a loom, a rotary magazine for filling carriers having filling of different color or character, actuating means to move said magazine to bring any desired filling carrier into position to be transferred, and a device combined with said actuating means to return said magazine into its normal position, after said transfer has been effected.

23. In a filling-changing loom, a magazine adapted to receive a series of filling-carriers having filling differing in color or character and indiscriminately arranged in said magazine, a series of arms mounted on said magazine, one for each filling-carrier, each of said arms having an indicator, and a series of arm-locking devices, one for each arm, said locking devices serving to hold said arms in one or another position according to the color of filling on the filling-carrier.

24. In a filling-changing loom, a magazine adapted to receive a series of filling-carriers having filling differing in color or character and indiscriminately arranged in said magazine, a series of arms mounted on said magazine, one for each filling-carrier, each of said arms having an indicator, and a series of arm-locking devices, one for each arm, said locking devices serving to hold said arms in one or another position according to the color of filling on the filling-carrier, combined with a stop, and means to change the position of said stop, to place the same in position to be met by one or the other of said indicators.

25. In a filling-changing loom, a magazine adapted to receive a series of filling-carriers having filling differing in color or character and indiscriminately arranged in said magazine, a series of arms mounted on said magazine, one for each filling-carrier, each of said arms having an indicator, and a series of arm-locking devices, one for each arm, said locking devices serving to hold said arms in one or another position according to the color of

filling on the filling-carrier, combined with a stop, means to change the position of said stop to place the same in position to be met by one or the other of said indicators, and magazine-actuating means.

26. In a filling-changing loom, a magazine to sustain a series of filling-carriers provided with filling differing in color or character, and a series of arms provided each with an indicator, the indicators coacting with all the different filling-carriers of the same color being held in one arc, while the indicators coacting with filling-carriers having filling of a different color are sustained in another arc, combined with a stop, and means to move said stop to place it in the arc occupied by one or the other of said indicators according to the color of filling on the filling-carrier it is desired to select.

27. In a filling-changing loom, a magazine to sustain a series of filling-carriers provided with filling differing in color or character, and a series of arms provided each with an indicator, the indicators co-acting with all the different filling-carriers of the same color being held in one arc, while the indicators co-acting with the filling-carriers having filling of a different color are sustained in another arc, combined with a stop, means to move said stop to place it in the arc occupied by one or the other of said indicators according to the color of filling on the filling-carrier it is desired to select, a lay having a shuttle-box containing a shuttle, filling-carrier transferring means, and means to actuate the latter.

28. In a loom, in combination, a movable magazine to contain filling carriers having filling differing in color or character, actuating means to effect movement of the magazine to place any desired filling carrier into position to be transferred, and means to return the magazine to normal inoperative position after said transfer has been effected.

29. In a filling-changing loom, a magazine to sustain a series of filling-carriers, a series of adjustable indicators connected with said magazine, an indicator for each filling-carrier, a stop and a filling-fork, combined with a lever moved by said filling-fork, said lever moving said stop into its operative position.

30. In a filling-changing loom, a magazine to sustain a series of filling-carriers, a series of adjustable indicators connected with said magazine, an indicator for each filling-carrier, a stop, and a filling-fork, combined with a lever moved by said filling-fork, said lever moving said stop into its operative position filling-transferring means, and a locking device to hold said lever in position while the transferring means is being actuated to transfer a filling-carrier from said magazine.

31. In a filling-changing loom, a weft-hammer having a projection, combined with a weft-fork slide-bar, a hook mounted on said slide-bar, and means to effect the engage-

ment of said hook with the projection of said weft-hammer.

32. In a filling-changing loom, a magazine, a series of holders for engaging the butts of a series of filling-carriers, a series of pins one for each filling-carrier, and a device acted upon by each of said filling-carriers to move said pins into their operative position.

33. In a filling-changing loom, a magazine provided with a series of pivoted arms each having an indicator, a series of holders for engaging the butts of a series of filling-carriers a series of pins sustained by said magazine one for each filling-carrier, and a device acted upon by each of said filling-carriers to move said pins outwardly to engage and hold in their adjusted positions the arms provided with the indicators.

34. In a filling-changing loom, filling-transferring mechanism, actuating means therefor, a filling-fork mechanism, means to slide the same when the filling is absent, means to lock the filling-fork mechanism while the transferring mechanism is being operated, and means to release the filling-fork mechanism after the first pick of a shuttle that has just been supplied with a fresh filling-carrier.

35. In a filling-changing loom, a filling-fork having an auxiliary finger, a magazine to sustain a series of filling-carriers, a series of indicators carried by said magazine, a filling-carrier transferring arm, and means actuated by said arm to tip said fork and render the same inoperative as and for the purpose described.

36. In a filling-changing loom, a magazine having a series of indicators, shuttle-box-moving mechanism, a stop, the position of which is changed by the position of the shuttle-box mechanism, a filling fork, means moved by said filling fork to move said stop horizontally, a weft hammer, and means to sustain said filling fork in its backward position after said weft fork has been actuated by said weft hammer due to absence of filling.

37. In a filling-changing loom, a weft-fork, its carrying slide, a hook connected with said slide, a weft-hammer having a projection to be engaged by said hook, and means to move said weft-hammer to cause said hook to move said slide forwardly.

38. In a filling-changing loom, a weft-fork, its carrying slide, a hook connected with said slide, a weft-hammer having a projection to be engaged by said hook, and means to move said weft-hammer to cause said hook to move said slide forwardly, combined with means for disengaging said hook from the projection of said weft-hammer.

39. In a filling-changing loom, a filling-fork, a filling-fork-carrying slide, an elbow lever moved by said slide, means to lock said elbow lever in the position where left by moving said slide outwardly, and a slide-bar coupled with said elbow lever and moved

thereby, said slide-bar having a high part and an inclined surface, combined with a hook connected with said slide-bar loosely and provided with a projection, and a weft-hammer having a projection to be engaged by said hook.

40. In a filling-changing loom, a filling-carrying magazine normally in its inoperative position and at rest, a series of indicators carried by said magazine, drop shuttle-box-actuating means, a stop, means under the control of the drop-box-actuating means to move said stop and place the same in position to be met by one or another of said indicators, that depending upon the color of filling in the running shuttle, and means to start said magazine from its normal position of rest and move the same forwardly until arrested by the contact of one of said indicators with said stop.

41. In a filling-changing loom, a filling-carrier magazine occupying normally its starting position and at rest, a series of indicators carried by said magazine, a stop-carrier having a stop, detecting means controlled by the absence of filling to move said stop-carrier toward said magazine that said stop may be met by one or the other indicators of the magazine to stop said magazine, and filling-carrier transferring means, combined with means to move the said stop-carrier vertically, and means to actuate the filling-transferring means to discharge a carrier from said magazine.

42. In a filling-changing loom, a magazine normally in its inoperative position, means sustained by said carrier for holding a series of filling-carriers having filling differing in color or character, a series of indicators under the control of said filling-carriers, said indicators occupying different positions on said magazine, according to the color or character of the filling, shuttle-box-actuating means, a stop carrier, and means moved by the shuttle-box-actuating means for simultaneously moving said stop-carrier into one or another position according to the color or character of the filling desired to be taken from the magazine, means to move the stop on said stop-carrier into its operative position automatically preparatory to a change of filling, a filling-transferring device, and means to start said magazine from its normal inoperative position, move the same forwardly, and place one or the other of said indicators against said stop, and means to actuate said filling-transferring device.

43. In a filling-changing loom, a lay, a shuttle-box at one end thereof to receive a shuttle open for the passage of a filling carrier thereinto and therethrough, a filling-carrier-transferring arm, a magazine to contain a filling-carrier, a filling-fork, means intermediate said filling-carrier-transferring arm and filling-fork, means to move said magazine,

and means to move said transferring arm, the latter tipping the filling-fork when transferring the filling-carrier from the magazine into the shuttle in said shuttle box.

- 5 44. In a filling-changing loom, a lay, a magazine, a series of indicators, means to hold said indicators in one or another position according to the color of filling on a filling-carrier sustained on said magazine, shuttle-box-moving mechanism, a stop the position of which is determined by the particular cell of the shuttle box occupying its operative position at the level of the race of the lay, and

means to move the magazine until an indicator positioned to correspond with the color 15 of filling on the filling-carrier thereon and of the color of the filling on the shuttle to be replenished meets said stop.

In testimony whereof, I have signed my name to this specification, in the presence of 20 two subscribing witnesses.

RANDOLPH CROMPTON.

Witnesses:

BERTEA F. HEUSER,
MARGARET A. DUNN.