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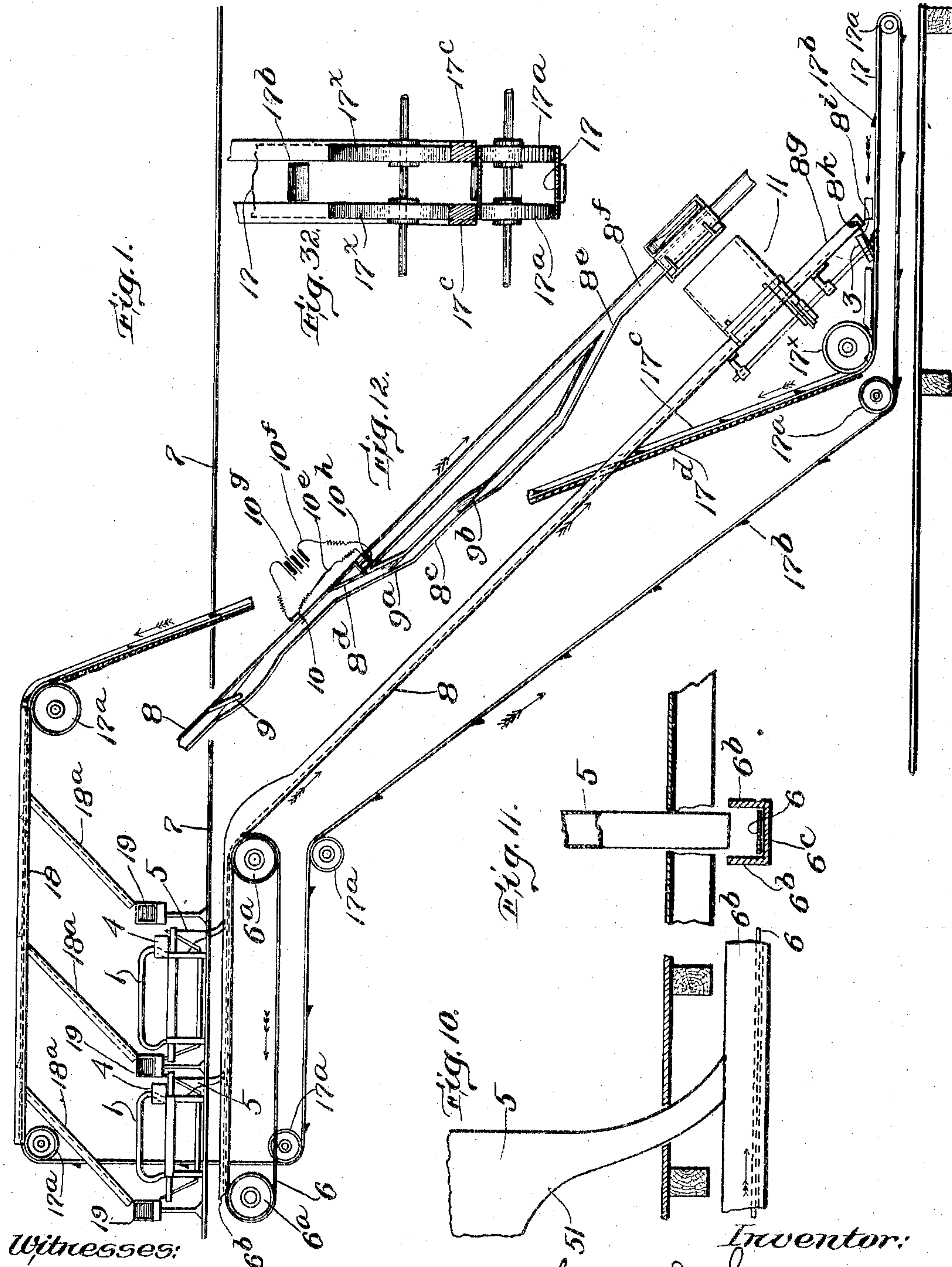
PATENTED AUG. 9, 1904.

H. I. HARRIMAN.
WEFT FURNISHING, &c., MECHANISM FOR LOOMS.

APPLICATION FILED FEB. 6, 1902.

NO MODEL.

9 SHEETS—SHEET 1.



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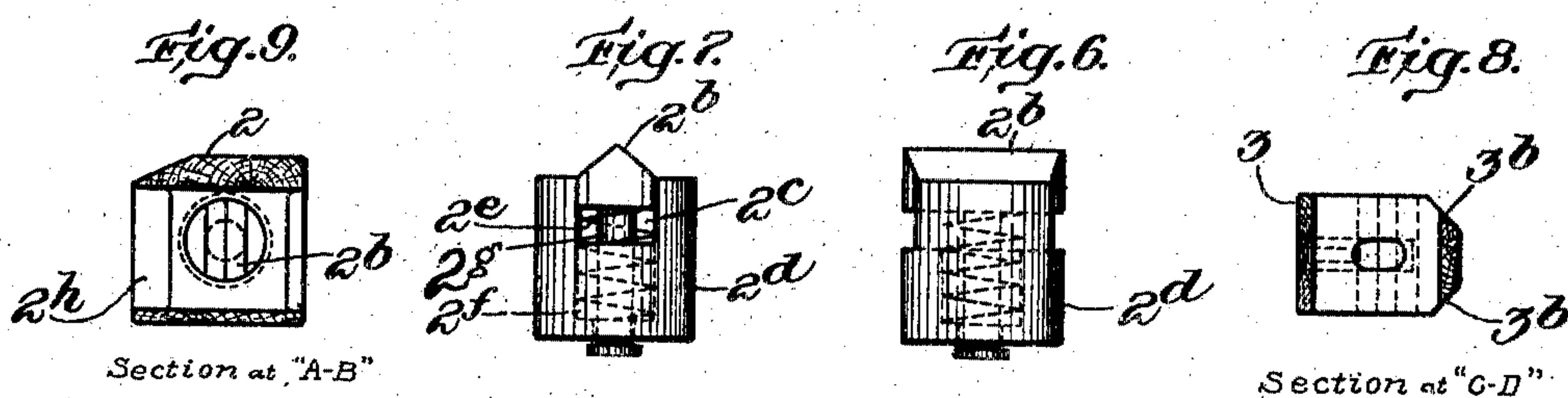
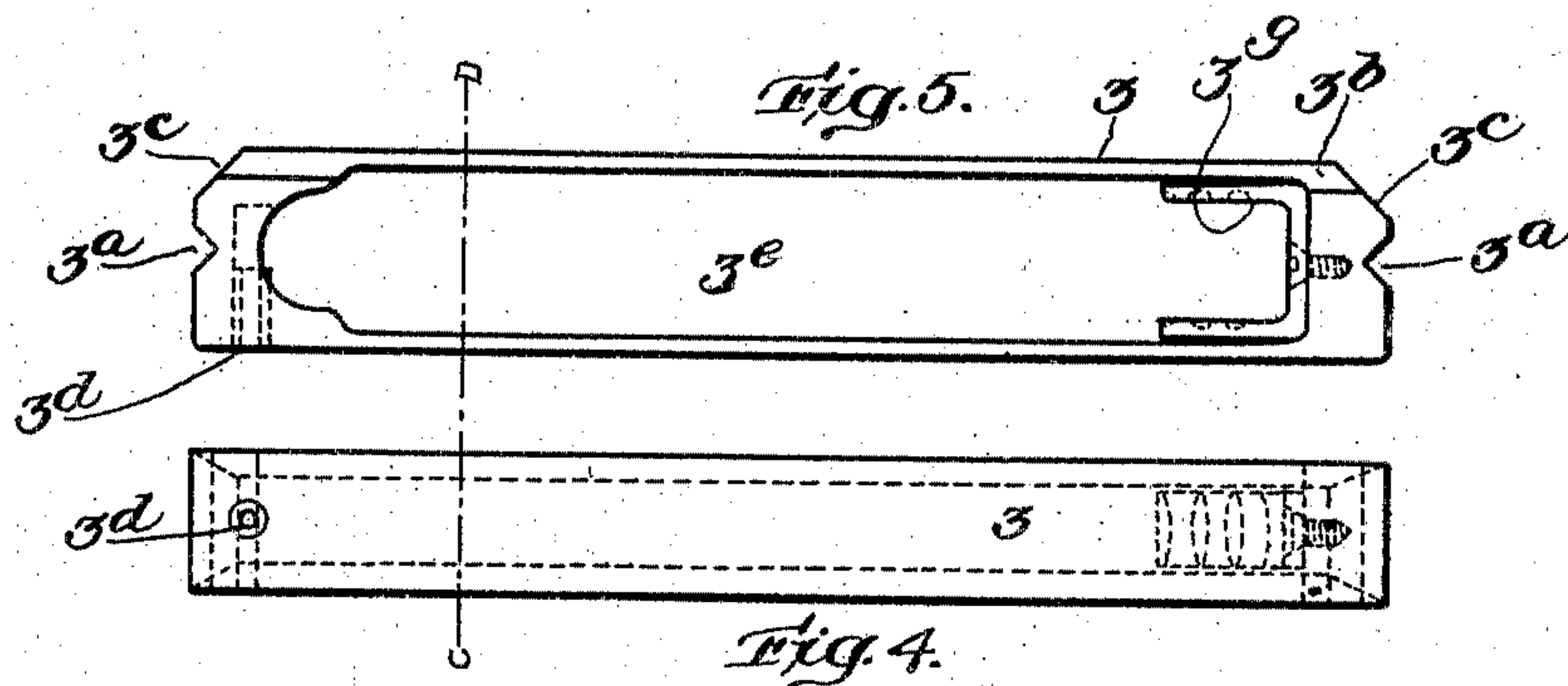
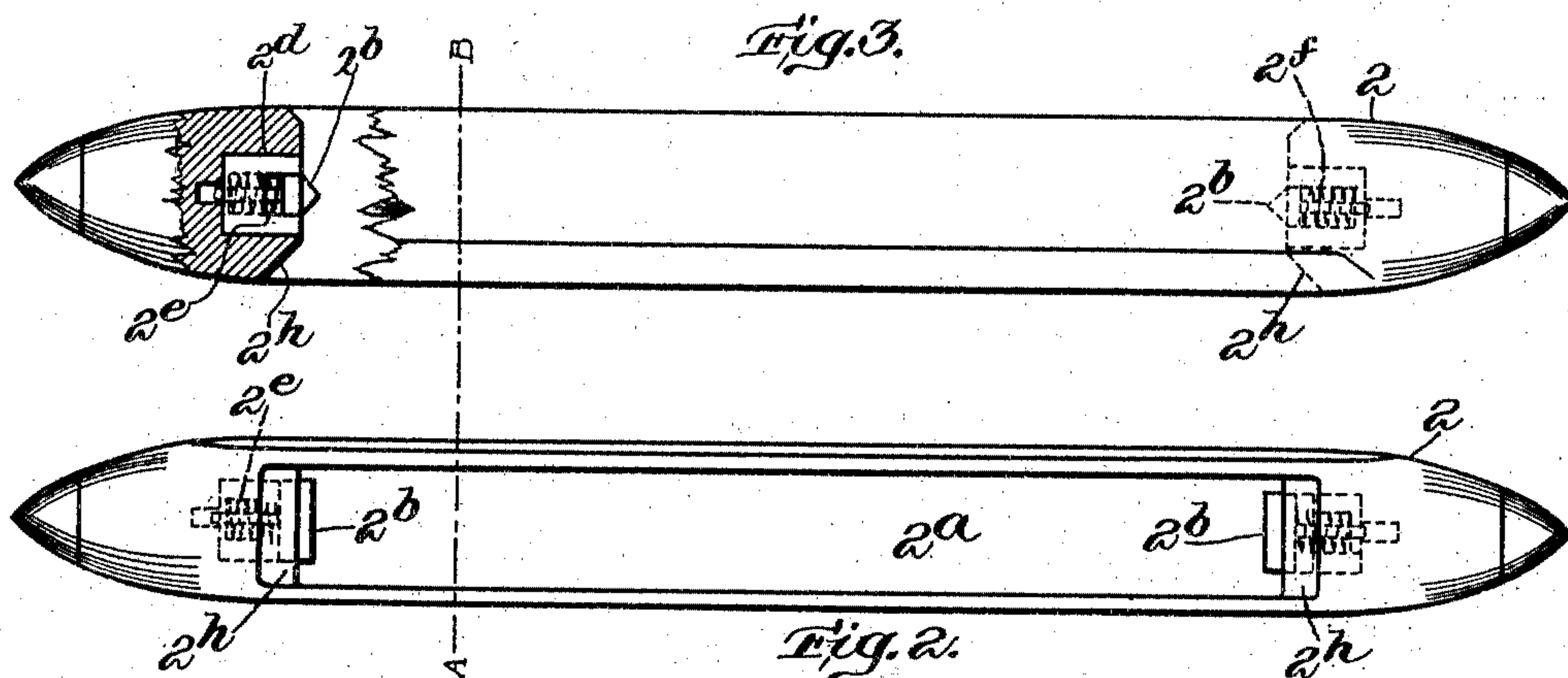
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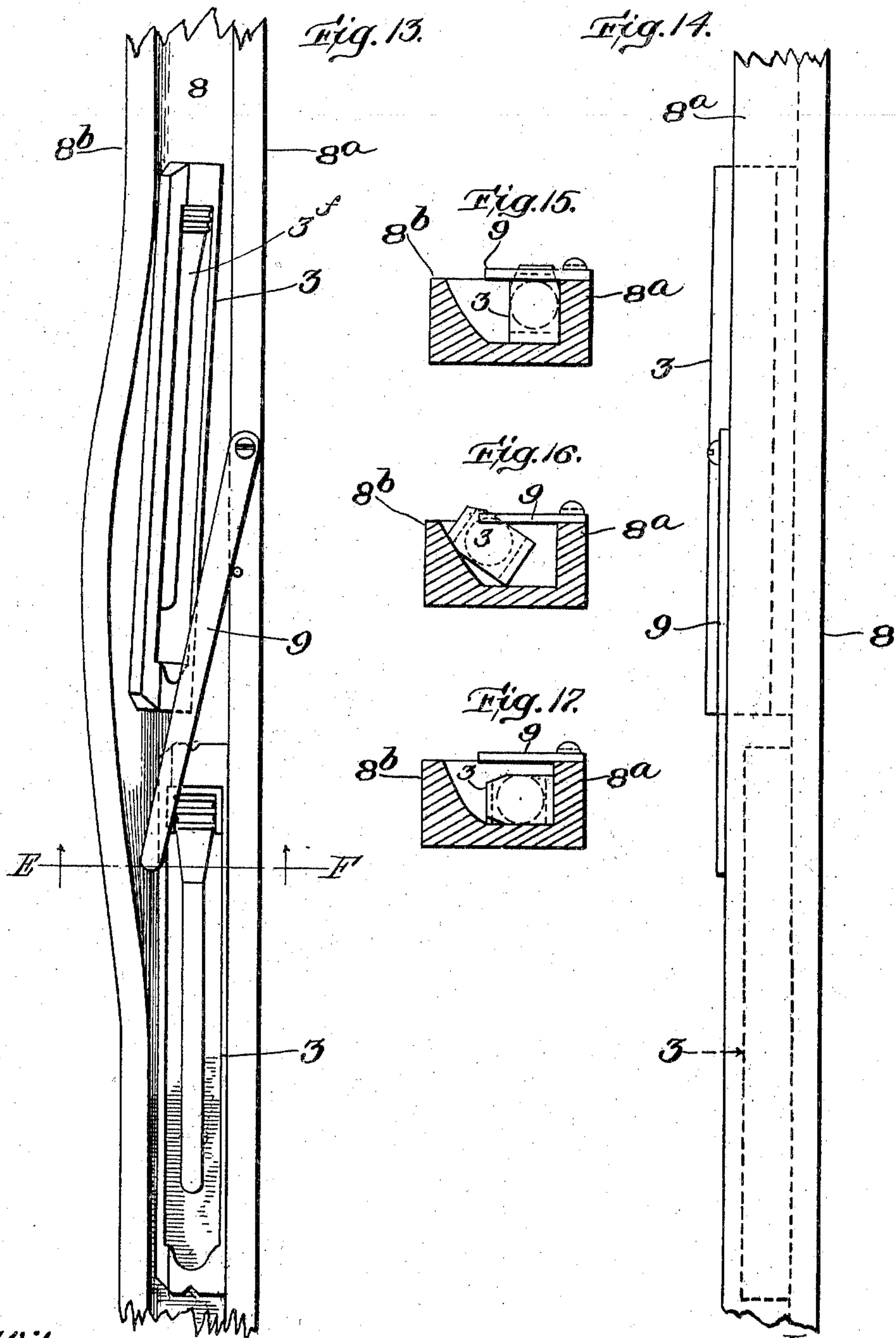
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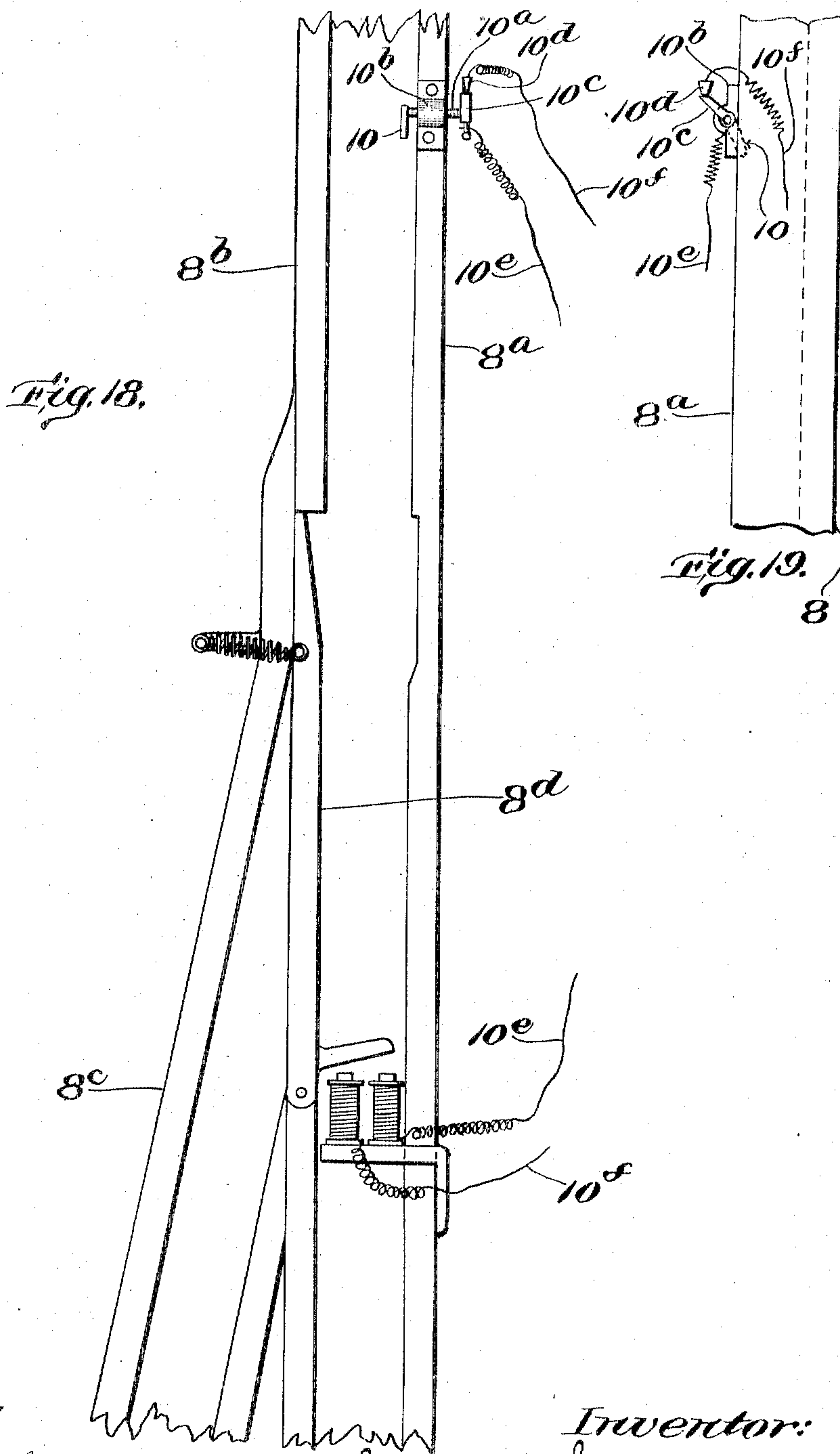
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NO MODEL.

9 SHEETS—SHEET 4.



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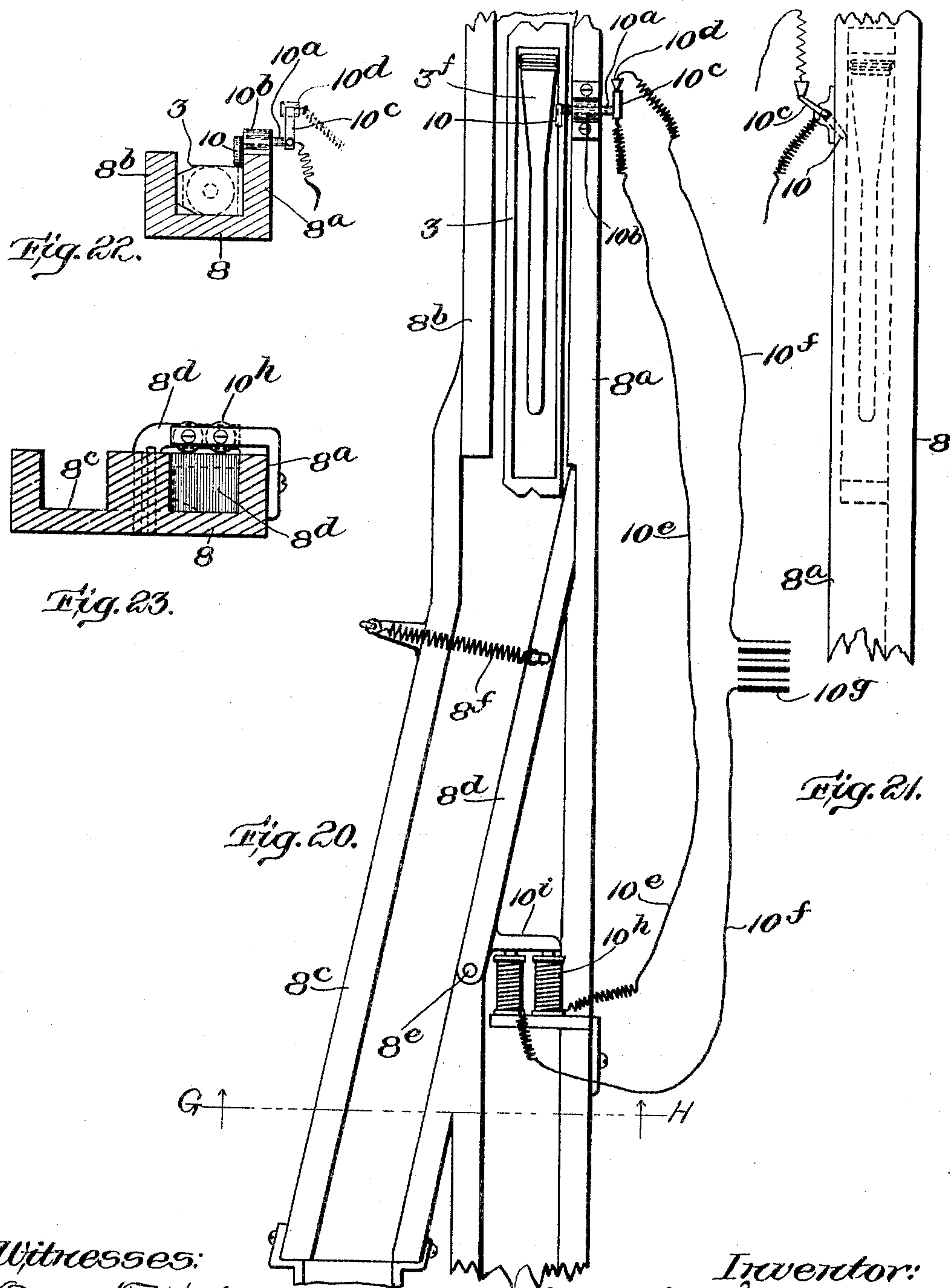
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9 SHEETS—SHEET 5.



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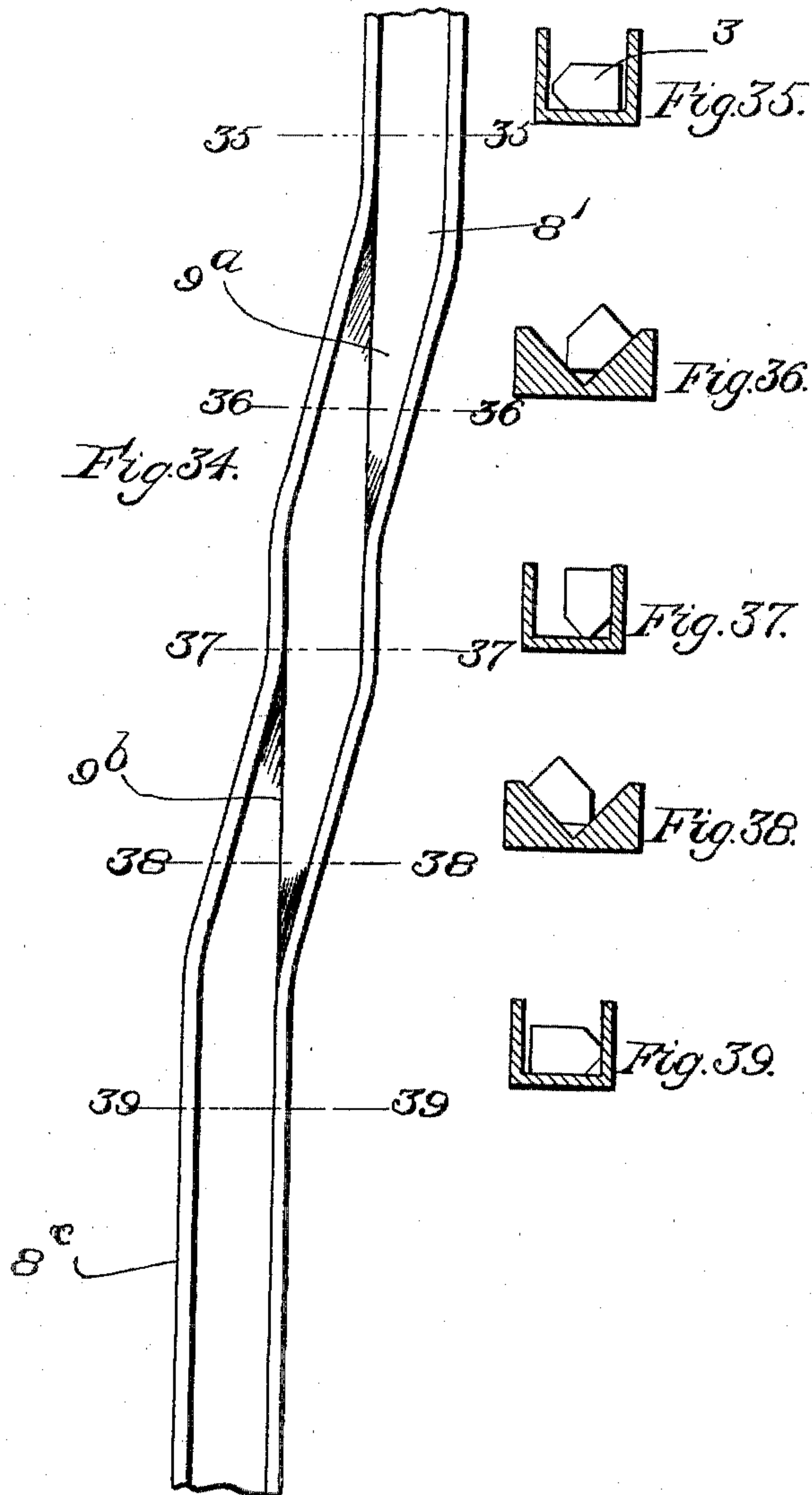
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9 SHEETS—SHEET 6.



Fig. 24.



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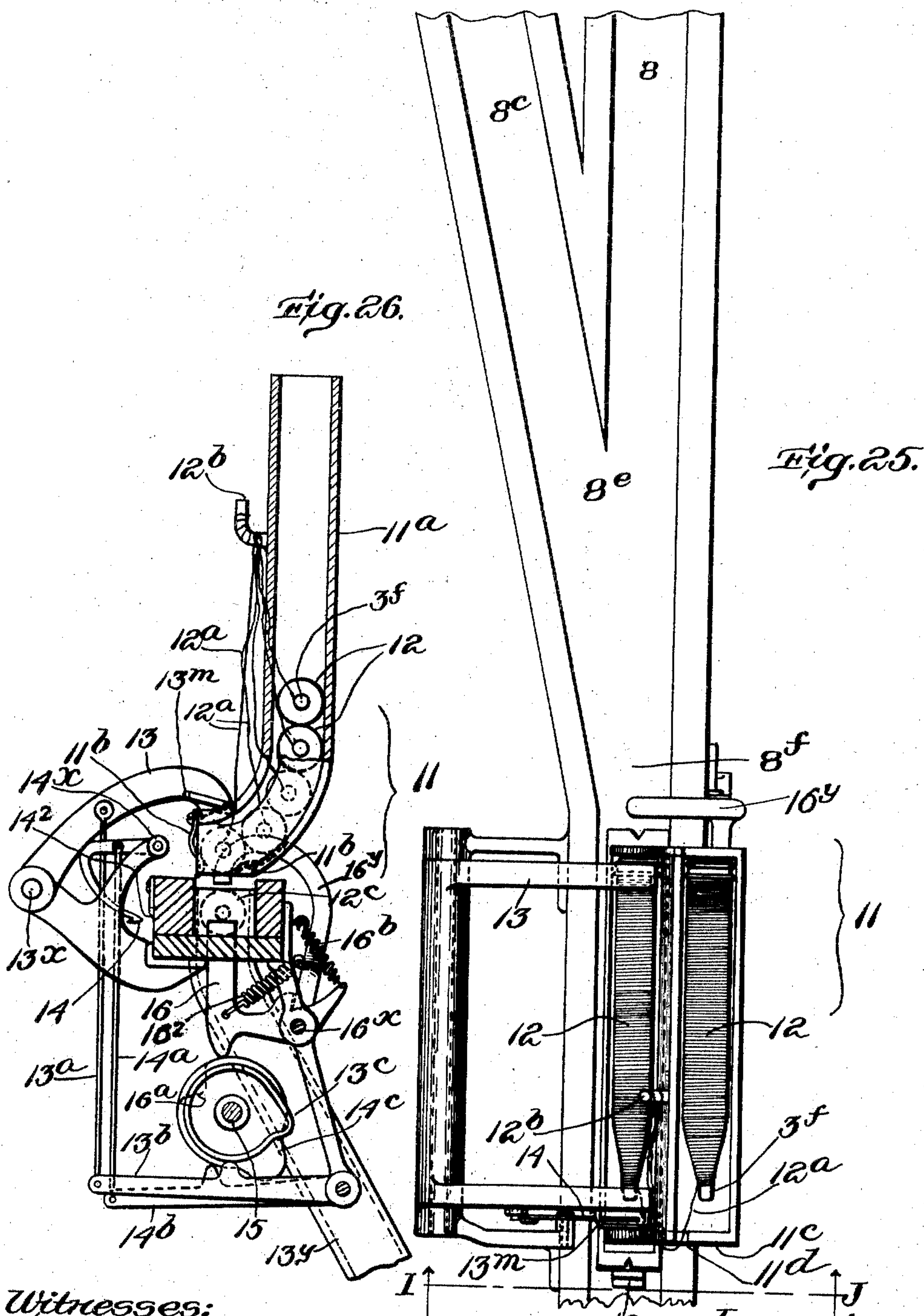
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WEFT FURNISHING, &c., MECHANISM FOR LOOMS.

NO MODEL.

APPLICATION FILED FEB. 6, 1902.

9 SHEETS—SHEET 7.



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PATENTED AUG. 9, 1904.

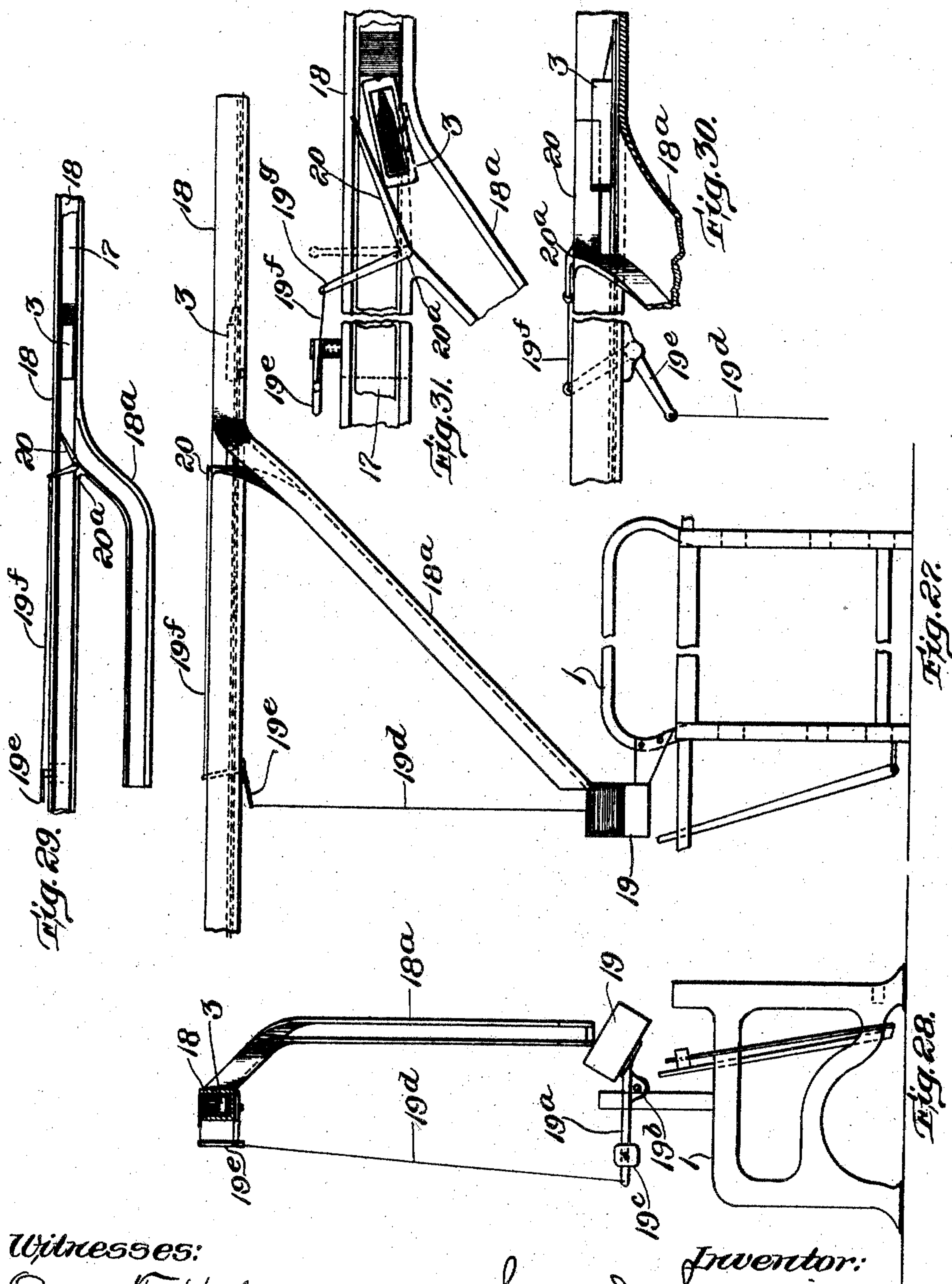
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NO MODEL.

APPLICATION FILED FEB. 6, 1902.

9 SHEETS—SHEET 8.



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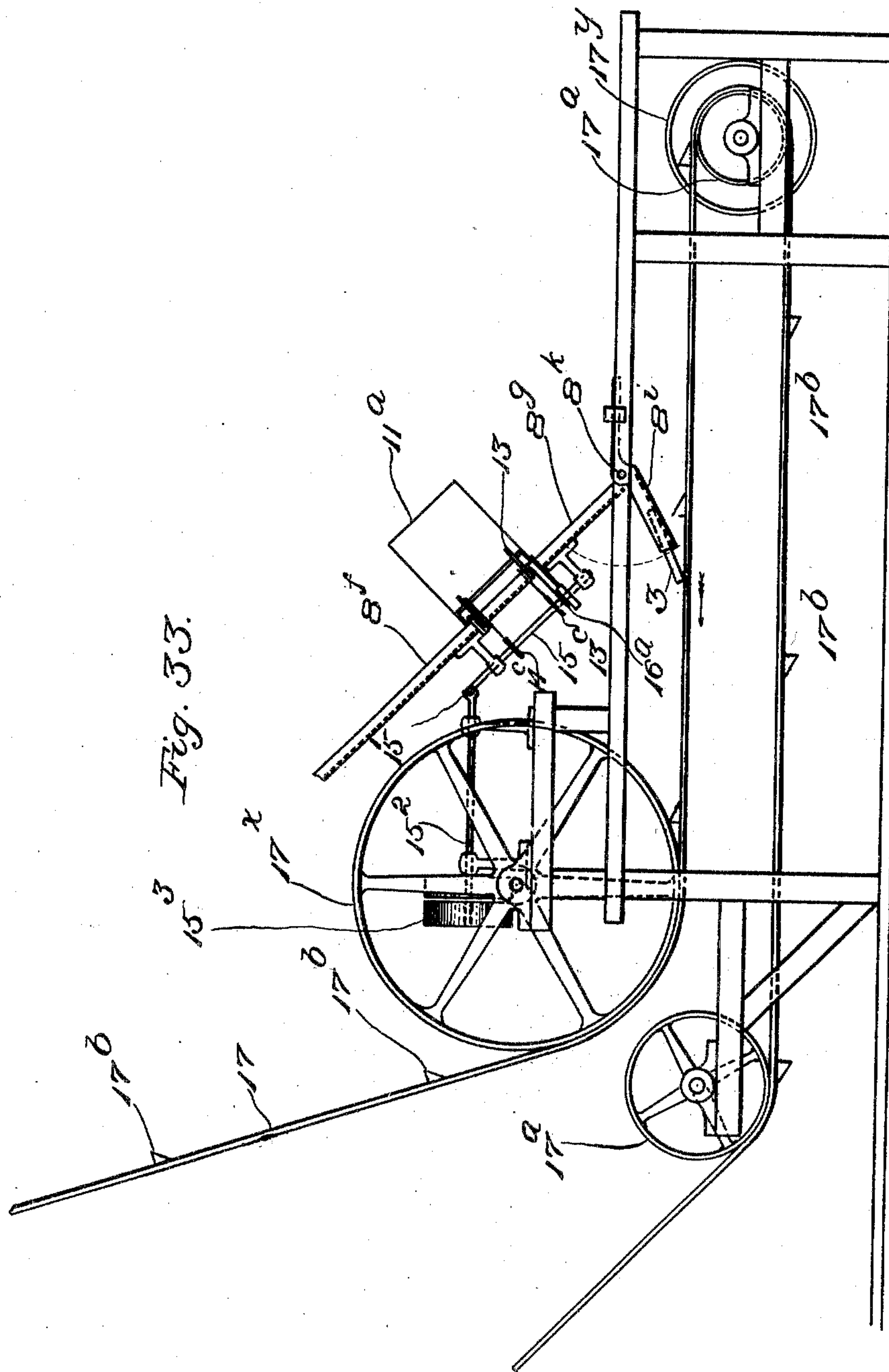
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NO MODEL.

APPLICATION FILED FEB. 6, 1902.

9 SHEETS—SHEET 9.



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY I. HARRIMAN, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN LOOM COMPANY, OF READVILLE, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

WEFT-FURNISHING, &c., MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 767,056, dated August 9, 1904.

Application filed February 6, 1902. Serial No. 92,776. (No model.)

To all whom it may concern:

Be it known that I, HENRY I. HARRIMAN, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented a certain new and useful Improvement in Weft-Furnishing, &c., Mechanism for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention has been designed for use more especially in combination with looms in which replenishment of the working weft-supply is effected automatically when occasion therefor arises, although certain features of the invention are capable of being used separately and others are capable of being used in combination with looms which are not equipped with automatic weft-replenishing instrumentalities.

A general aim of the invention is to relieve a weaver from certain duties in connection with the supplies of weft or filling which are used in the looms under his charge and by reducing the demands upon his attention in connection with such supplies and lessening the amount of labor required to be expended thereon to afford him opportunity to confine his attention more closely to other matters connected with the general progress of the weaving in each loom and also render it possible for him to take care of an increased number of looms.

Various types or classes of looms effecting replenishment of the working weft-supply therein automatically are known. In some instances in practice the replenishment is effected by replacing automatically the bobbin which is contained within the working shuttle on the lay by a reserve bobbin loaded with weft or filling, the yarn-delivery eye or educt of the said shuttle being contrived so as to cause the yarn from the said bobbin to become threaded therethrough without manual intervention. It has been proposed to use filling-cases adapted for removable application to the body of a loom-shuttle, each carrying a load of weft or filling, and to effect the desired replenishment by ejecting the filling-case from the working shuttle on the lay and introduc-

ing in its place a reserve filling-case loaded with weft or filling and properly threaded in readiness to be utilized in continuation of the weaving operation. In practice, also, replenishment is effected by ejecting the working shuttle from the lay and substituting a reserve shuttle properly loaded with weft or filling and all threaded up in readiness to begin weaving.

In the particular form in which the invention is shown embodied in the present case the features thereof in general are adapted for employment in combination with looms in which weft replenishment is effected by replacement of a filling-receptacle in the shape of either a filling-case or a shuttle, although the present embodiment in its entirety has been designed with more especial reference to dealing with filling-cases.

Generally speaking, regarded in its entirety the said embodiment comprises among its main features means for receiving or collecting and conveying the filling-receptacles ejected from a loom, or usually a plurality or series of looms, means for reloading the said filling-receptacles with weft or filling, means for causing the filling-receptacles to occupy the desired position in being presented for reloading, and means for conveying and distributing the loaded filling-receptacles to the loom or looms in which further use thereof is to be made.

The various features of the invention are treated of in detail hereinafter.

To a certain extent the invention is capable of being utilized in connection with a single loom; but it has been designed more especially for use in combination with a group or series of looms.

In the drawings, Figure 1 is a view somewhat on the order of a diagram and partly in section, illustrating the said embodiment of the invention. Fig. 2, Sheet 2, shows in side elevation a shuttle of the kind which I employ in one variety of weft-replenishing loom in connection with which the present invention is utilized. Fig. 3, Sheet 2, shows the said shuttle in plan with a certain part broken out.

Fig. 4, Sheet 2, shows in elevation a filling-case such as is employed in the shuttle shown in Figs. 2 and 3. Fig. 5, Sheet 2, shows the said filling-case in plan. Figs. 6 and 7, Sheet 2, are views of one of the arrangements with which the shuttle of Figs. 2 and 3 is provided for the purpose of holding in place within the said shuttle the filling-case of Figs. 4 and 5. Fig. 8, Sheet 2, is a view showing the filling-case in vertical section on the plane that is indicated by the dotted line CD, Figs. 4 and 5. Fig. 9, Sheet 2, is a view showing the shuttle in vertical section on the plane that is indicated by the dotted line AB, Figs. 2 and 3. Fig. 10, Sheet 1, is a partly-sectional detail showing mainly the means of delivering the filling-receptacle that is ejected from a loom to the railway-belt. Fig. 11, Sheet 1, is a similar view from one side in Fig. 10. Fig. 12, Sheet 1, shows in plan a portion of the conveyer devices and the loading mechanism in connection therewith. Fig. 13, Sheet 3, shows in plan a detail of the said conveyer devices, illustrating mainly the means whereby all of the filling-receptacles in advancing are caused to assume the same plane. Fig. 14, same sheet, shows in side elevation the features of Fig. 13. Figs. 15, 16, and 17, Sheet 3, are detail views in section on the vertical plane indicated by the dotted line EF of Fig. 13, showing the action of the device of Fig. 13. Fig. 18, Sheet 4, shows in plan another portion of the conveyer, it illustrating mainly the devices which are employed for separating the filling-receptacles which occupy a given or predetermined position from those which do not occupy the said position. Fig. 19, Sheet 4, shows in side elevation a portion of the devices of Fig. 18. Fig. 20, Sheet 5, is a view corresponding somewhat with Fig. 18 and illustrating the action of the devices. Fig. 21, Sheet 5, is a view corresponding somewhat with Fig. 19 and illustrating more particularly the action of the detector. Fig. 22, Sheet 5, is a view of the conveyer of Figs. 18 to 21 in section, on a vertical plane, adjacent the detector device. Fig. 23, Sheet 5, is a view in vertical section on the plane indicated by the dotted line GH, Fig. 20. Fig. 24, Sheet 6, is a view showing a modification of the means for inverting certain of the filling-receptacles. Fig. 25, Sheet 7, shows in plan a portion of the conveyer and the loading mechanism in connection therewith. Fig. 26, Sheet 7, is a view in section on the vertical plane indicated by the dotted line IJ, Fig. 25. Fig. 27, Sheet 8, shows in front elevation portion of the conveying and distributing arrangement and the frame of a loom. Fig. 28, Sheet 8, is a view of the features of Fig. 27 looking from the left in Fig. 27. Fig. 29, Sheet 8, shows in plan the conveying and distributing devices of Figs. 27 and 28, the loom-frame being omitted. Fig. 30, Sheet 8, is a partly sectional elevation showing details of the switch-

ing devices. Fig. 31, Sheet 8, shows in plan the features of Fig. 30. Fig. 32, Sheet 1, is a sectional detail of the conveying and distributing arrangement. Fig. 33, Sheet 9, is a detail view of the loading mechanism and certain parts which are adjacent the same. Fig. 34, Sheet 6, is a plan view of portion of the conveyer, showing one means of inverting the filling-receptacles which pass there-through. Figs. 35, 36, 37, 38, and 39 are views in section on the planes indicated by the correspondingly-numbered lines in Fig. 34, illustrating the action of the inverting device in connection with an advancing filling-receptacle, which arrives at the same upside down.

In illustrating in Fig. 1 of the drawings the general relations of the various parts and instrumentalities pertaining to the illustrated embodiment of the invention I have for convenience shown only two looms, as at 1 1; but in practice any convenient and approved number of looms may be embraced in the group or series with which my invention is combined. The looms at 1 1 are supposed to be of the well-known type of looms in which automatic replenishment of the working weft-supply is effected by making a change of filling-cases—that is to say, by ejecting from the working shuttle on the lay the spent or failed filling-case that is contained within the same and introducing instead into the said shuttle a reserve filling-case which is in condition to enable the weaving to be continued. Various arrangements of automatic weft-replenishing instrumentalities operating on this principle are presented in prior patents. A shuttle 2 of the character that may be employed in the said looms 1 1 in order to facilitate the change or substitution of filling-cases is shown in Figs. 2 and 3, Sheet 2, and a filling-case 3, adapted for use in connection with such shuttle, is shown separately in Figs. 4 and 5, Sheet 2. Reference to the illustrations of the said shuttle and filling-case will render clear the general character thereof and perhaps aid in acquiring an understanding of the purposes and mode of operation of certain features of the invention. The features of the shuttle and filling-case are not themselves involved in the invention claimed in the present case, nor is the invention in any respect limited to use in connection with the precise form, &c., of shuttle and filling-case shown in the drawings. For the purposes of this case the said features may be briefly described as follows: The shuttle-body is formed with an opening 2^a of a size to contain the filling-case 3, Figs. 4 and 5, the said opening extending entirely through the shuttle-body, as indicated in Figs. 2, 3, and 9, so as to enable the filling-case to be introduced at one side of the shuttle into the chamber which is constituted by such opening and to be expelled at the opposite side. When in position within the opening

or chamber 2^a, the filling-case 3 is retained in place therein by detents, which in the present case are constituted by V-shaped blocks 2^b 2^b, Figs. 2, 3, 6, and 7, that enter correspondingly-shaped notches 3^a 3^a in the ends of the filling-case. The said blocks are fitted within the vertical slots 2^c 2^c of plugs 2^d 2^d, (see more especially Figs. 6 and 7,) which are inserted into the shuttle-body at the opposite ends of the opening or chamber 2^a. They are held projected normally into position to engage with the ends of the filling-case by means of spiral springs 2^e 2^e. The said springs surround the stems 2^f 2^f of the blocks 2^b 2^b and are confined within the longitudinal chambers 2^f 2^f of said plugs between the blocks and the inner ends of the chambers. When a filling-case is first pressed into the opening or chamber 2^a of the shuttle, the blocks 2^b 2^b yield to the pressure of the end portions of the same against their oblique faces, so as to permit the said filling-case to be forced into position within the opening or chamber 2^a; but when said blocks have entered into the notches 3^a 3^a they serve to hold the filling-case in place during the movements of the shuttle. They yield and recede also to allow the spent or failed filling-case to be expelled from said chamber when the reserve filling-case which is being substituted therefor is pressed laterally against the former. In order to facilitate the entrance of a filling-case into the opening or chamber 2^a of a shuttle, the upper and lower edges of the side thereof which enters first are beveled off longitudinally, as at 3^b 3^b, Figs. 5 and 8, and the ends of said side are also beveled off, as at 3^c 3^c, Fig. 5, and in addition the shuttle-body is beveled off at 2^h 2^h, Figs. 2, 3, and 9, at the opposite ends of the opening or chamber 2^a on the side of the shuttle at which the filling-case enters. The various beveled surfaces tend to deflect the entering filling-case into the opening or chamber 2^a in case the shuttle should be slightly misplaced with respect to its proper position at the time of making a change of filling-cases. The weft or filling in wound form which is carried by the filling-case is contained within the chamber or cavity 3^e of the filling-case. The manner of applying the said weft or filling to the filling-case and retaining it in place therein is not material to the invention. In the present instance the filling-case is adapted to receive weft or filling wound upon bobbins, as at 3^f, Fig. 13, Sheet 3, Fig. 20, Sheet 5, and Figs. 25 and 26, Sheet 7, and is provided with a U-shaped clasp 3^g, Fig. 5, Sheet 2, to receive and engage with the head of a bobbin. This is similar to the well-known arrangement for securing a bobbin within the chamber or cavity of loom-shuttles in one well-known form of weft-replenishing looms and enables the bobbin to be inserted at one side of the filling case or loom-shuttle and to be expelled at the other side. The expulsion of the old

or spent bobbin and the introduction of a fresh bobbin admits of being effected simultaneously merely by pressing the latter into place, it pushing the old or spent bobbin ahead of it, and thereby ejecting the same.

I have not shown the actual weft-replenishing instrumentalities which are employed in the looms 1 1; but in Fig. 1 the hoppers or magazines in which are contained the reserve supplies of filling-cases for the respective looms are shown at 4 4, mounted upon the breast-beams of the latter.

One action involved in the weft replenishment in looms in which weft replenishment is effected automatically is the ejection or discharge of the spent or failed filling-carrier. Thus in looms in which a reserve bobbin or the like is introduced into the working shuttle on the lay the bobbin or the like first contained within said shuttle is expelled therefrom. So, likewise, in looms in which a filling-case is removably combined with the working shuttle on the lay such filling-case is expelled when a reserve filling-case is introduced into the shuttle. When weft replenishment is effected by making change of shuttles, it is the spent or failed shuttle which is discharged from the lay. In all these cases a spent or failed filling-carrier constituted by, it may be a bobbin, or a filling-case, or a shuttle, is ejected or discharged from the parts with which it previously had working relations. In conformity with one feature of my invention I provide means for collecting and conveying or delivering the ejected filling-carriers to the desired station. This means may in practice vary more or less in construction and arrangement, according to the exigencies of use and the views of builders and users of the invention. In the illustrated embodiment of the invention one characteristic feature of the said means is an endless traveling apron or railway-belt extending conveniently with relation to the loom or looms in connection with which it serves. The position of this railway-belt relative to the looms and other objects may vary in practice. So, also, a variety of means may be employed for delivering the spent or failed filling-carriers thereto from the looms. Such a railway-belt is shown at 6 in the drawings. (See more especially Figs. 1, 10, and 11.) Suitable supporting and actuating pulleys are provided in connection with said railway-belt, as at 6^a 6^a, Fig. 1, and in practice power is applied to said pulleys to actuate the railway-belt in any convenient manner not necessary to be shown. Preferably in connection with the upper portion or run, at least, of the railway-belt upright fixed side guides, as 6^b 6^b, are provided to prevent escape of the filling-carriers laterally from the railway-belt, and beneath said portion is located the horizontal bottom 6^c of a trough of which the said side guides constitute the side walls. The said bot-

tom 6^c supports the said run of the railway-belt. Preferably the railway-belt is extended beneath the series of looms 1 1, although it is not essential in all cases that the railway-belt should be beneath the said looms, and preferably, also, although not necessarily in all embodiments of the invention it is located beneath the floor 7, on which the said looms stand, and immediately beneath the ceiling of the room below. For the purpose of receiving the spent or failed filling-carriers as they are expelled or ejected from the looms 1 1 and delivering the same to the railway-belt 6 I provide means which in practice will be adapted in character, arrangement, &c., to the location, arrangement, &c., of the said railway-belt. In the present embodiment of my invention with the railway-belt located below the looms each loom is furnished with a chute 5, (see Figs. 1, 10, and 11,) the lower end of which extends into proximity to the upper surface of the upper run of the railway-belt 6 and is arranged to deposit the said filling-carriers upon the same. The filling-carriers fall through the respective chutes to the railway-belt. Should the railway-belt be arranged above the looms, as in some cases is practicable, suitable arrangements for hoisting the expelled or ejected filling-carriers to the same will be provided in obvious manner.

For some purposes it is necessary or desirable that the expelled or ejected filling-carriers should reach the conveying or delivering means in a given position. Thus, as will presently appear, certain subsequent operations in connection with such filling-carriers are thereby facilitated. In the present instance I have contrived means of causing the filling-carriers to be deposited lengthwise of the railway-belt—that is to say, the inside diameter of each chute from front to rear corresponds closely with the width of a filling-carrier, and the delivery portion of the chute is bent or curved forwardly in the direction of the movement of the upper run of the railway-belt. Thereby each filling-carrier on reaching the latter is laid lengthwise upon the same.

It is desired in some cases, especially in order to facilitate the expulsion of a spent bobbin or the like from a filling-receptacle constituted by a filling case or shuttle and the introduction of a fresh one, that the same end of every filling-carrier shall lead upon the railway-belt. In order to secure this result, one side, as 51, Figs. 1 and 10, of each chute is arranged to deflect the filling-carriers as the latter fall, so as to cause the required end of each thereof to proceed first. A collecting and delivering means constituted, for example, by a railway-belt like that which has just been described, may be employed to advantage in connection with a series of looms that are unprovided with automatic weft-replenishing instrumentalities. In this case spent or failed filling-carriers—for instance,

bobbins or the like removed by the weaver from the shuttles employed in the said loom—may be dropped by him into chutes corresponding with those at 5 5 or otherwise delivered to the conveyer and will be delivered by the latter at the desired station.

In the present embodiment of the invention the railway-belt delivers the filling-receptacles to a slideway 8, Figs. 1 and 12, leading to automatic reloading mechanism at 11 in said figures. The filling-receptacles are permitted to pass down the said slideway under the influence of gravity. It is necessary that all the filling-receptacles which are presented to the reloading mechanism should reach the latter with the respective sides thereof in the proper position in order that the operations which are incident to reloading and rethreading may be performed properly. As deposited upon the upper run of the railway-belt 6 from the chutes 5 5 some of the filling-cases may be right side up, others may be bottom side up, and others may be standing edgewise on either of the lateral sides thereof upon the said railway-belt. If desired, in the case of some embodiments of certain features of my invention the duty of observing the filling-receptacles and giving the required position to all that are not properly positioned may devolve upon an attendant, but preferably I arrange for performing this duty mechanically. The particular construction and arrangement employed for the purpose may vary in practice without involving departure from the principle of my invention. In the illustrated embodiment of the invention the slideway 8 is provided with raised sides 8^a 8^b, between which the filling-cases from the looms 1 1 are guided. As the filling-cases proceed down the slideway between the said raised sides 8^a 8^b I arrange first to cause any thereof which may be standing on edge, as in Fig. 15, to be turned down flat, as in Fig. 17. Thus I apply to side 8^a a turning-over device, which is shown constituted by a finger 9, Figs. 1 and 13 to 17, which extends obliquely across the slideway toward the side 8^b in such fashion that a filling-case descending the slideway in the on-edge position (represented in Fig. 15) will make contact by its most elevated portion with the obliquely-disposed working edge of the turning-over finger 9. Thereby the said filling-case will be deflected laterally over toward the side 8^b (see Fig. 13) as it continues its advancing movement until its under edge, as in Fig. 16, makes contact with the lower portion of the side 8^b, which side is bowed outward adjacent the turning-over finger 9. The filling-case will then turn or roll over, as in Fig. 16, until it has gone over far enough to slide down under the turning-over finger 9 into the position represented in Fig. 17, when it will be free to pass on down the slideway 8. After passing the turning-over finger 9 the filling-cases all lie upon their

sides, as in Fig. 17; but part thereof may lie right side up while part thereof lie in reversed position—that is to say, bottom side up. I provide inverting means whereby these latter are turned right side up. Preferably for the purpose of ascertaining which filling-cases require to be inverted I employ a detecting device, which I will now proceed to explain. I mount upon or adjacent the slideway 8, as found most convenient in practice, a detector which is arranged to cooperate with filling-cases as they pass onward to the reloading mechanism and so that filling-cases which are right side up will pass such detector without actuating the latter, but those which are bottom side up will actuate the same. Thus at 10, Figs. 18 to 22, is one form of detector, the same being fast on a short shaft 10^a , mounted in a bearing 10^b , that is provided on the side 8^a of the slideway 8. This detector 10 projects into the path of the filling-cases between sides 8^a and 8^b of slideway 8 and stands fairly close to the side 8^a . When a filling-case is right side up within the slideway, the bevels $3^b 3^b$, Fig. 8, thereof are turned toward the side 8^a of the slideway. In this position the lateral side of the filling-case which is reduced in height will come next the detector and the upturned beveled portion of said side will pass freely beneath the detector without engaging therewith; but when the filling-case is in reversed position, as in Figs. 20 and 21, the lateral side of the same which is of full height will pass under the detector and by engagement therewith, as in Figs. 20 and 21, will move the same around the axis of its shaft 10^a . In the present construction and arrangement of parts detector 10 is combined with devices whereby the filling-cases which are wrong side up are sorted out and separated from those which are right side up. Thus the slideway 8 is furnished with a branch, as 8^c , and also with a switch-point, as 8^d , the said switch-point being under the operative control of said detector. The means and manner of operatively combining the detector and switch-point may vary in practice and such means may be either electrical or mechanical; but in the present embodiment of the invention I employ electromagnetic controlling and operating connections, which are shown best in Figs. 18 to 23. Thus with the shaft 10^a is connected a contact-piece 10^c , coacting with a fixed contact-piece 10^d . At $10^c 10^f$ are conducting-wires which are connected electrically with the contact-pieces $10^c 10^d$, respectively, and which form part of an electric circuit embracing also a source of electric energy, as at 10^g , and an electromagnet, as at 10^h . The switch-point 8^d is pivoted, as at 8^e , and an armature, as 10^i , is connected or attached thereto. A spring 8^f , connected with said switch-point, acts to hold said switch-point normally in one position—as, for instance, in the position which leaves the main way of the

slideway 8 open and closes the branch way. (See Fig. 18.) When the switch-point is in this position, which will be the case so long as the contact between 10^c and 10^d is interrupted or broken, the filling-cases will pass in along the main way of the slideway; but when the contact-pieces at $10^c 10^d$ are brought together, as by the passage of a filling-case bottom side up beneath detector 10, as in Figs. 20, 21, and 22, the electromagnet will operate to swing the switch-point over, so as to close the main way and divert such filling-case into the branch way, as in Fig. 20. In connection with branch 8^c of the slideway 8 provision is made for reversing those filling-cases which are caused to enter the same. Thus at 9^a and 9^b , Figs. 12, Sheet 1, and 34, Sheet 6, are intended to be indicated two turning-over devices each contrived to impart to the filling-case which passes the same a quarter-turn upon its longitudinal axis, as indicated in Figs. 35 to 39, Sheet 6, or the branch may be formed as a closed tube having a half-turn or twist upon its longitudinal axis, as indicated diagrammatically in Fig. 24, so as thereby to occasion the required inversion of the filling-case which passes through the same. The branch 8^c opens into the main way at 8^e below the inverting devices, so that all the filling-cases slide down in regular succession, one after the other, through the lower portion 8^f of the slideway. In some cases the inverting devices may be omitted, and when this is the fact the branch 8^c will be arranged to discharge into a convenient receptacle, from which last the filling-cases will subsequently be taken and properly applied by hand to the feeding arrangements for the reloading mechanism in the proper position.

The reloading mechanism 11 is combined with the portion 8^f of the slideway. The said reloading mechanism has for its functions to introduce a fresh load or supply of weft or filling into each filling-receptacle reaching the same, and preferably, also, to thread the free end of such weft or filling through the yarn-delivery eye or educt 3^d , Figs. 4 and 5, although the threading operation may, if preferred, be performed separately and subsequently as by hand. The character and construction of the reloading mechanism will vary more or less in practice. In the present instance it has been contrived with especial reference for operating in connection with yarn wound upon bobbins and has been constructed and arranged to operate to eject the spent or failed bobbin from a filling-case, introduce a loaded bobbin into the latter, and effect the threading as aforesaid. A convenient construction thereof is shown in the drawings, in which latter, having reference more especially to Figs. 25 and 26, 11^a is a hopper or magazine in the form of an upright chute adapted to receive a series of bobbins loaded with weft or filling, as at 12 12, the

said magazine being supported in convenient manner with the lower or delivery end adjacent and immediately above the passage within the portion 8^f of the slideway 8. The said delivery end of the magazine is furnished with yielding detents 11^b 11^b, preferably constituted by spring-fingers projecting across the delivery-mouth of the magazine sufficiently far to prevent the bottom bobbin in said magazine from escaping prematurely. The said detents give way before sufficient force acting to expel said bobbin from the hopper or magazine, as will presently be explained, and then resume their normal position so as to engage and retain the next succeeding bobbin. One end of said hopper or magazine, as 11^c, is slotted vertically, as at 11^d, and through the said slot the free ends of the yarns 12^a 12^a, which are wound upon the bobbins 12, are drawn, the said ends being attached to a pin or the like, as at 12^b, Figs. 25 and 26. For the purpose of effecting the expulsion of the spent or failed bobbin 12^c in the filling-case, which is in position beneath the lower end of magazine 11^a, and the introduction of a loaded bobbin into the same I employ a pusher, as 13, mounted to swing vertically upon a rod, as 13^x, and adapted to make contact in its movement against the lowest bobbin in the magazine, so as to press said bobbin down into the filling-case, the said bobbin driving the spent or failed bobbin contained in the filling-case ahead of it out of the filling-case through the open bottom of the slideway and into the delivery-chute at 13^y. For the automatic performance of the threading operation a threading-hook 14 is provided, it being pivotally mounted, as at 14^a, and in practice being caused to pass from the outside through the delivery-eye or yarn-educt 3^d of the filling-case, engage with the portion of yarn 12^a, extending to the pin 12^b from the bobbin, which has just been introduced into the filling-case, and then withdrawn, drawing such portion out through the said delivery-eye or educt with it. For the purpose of insuring the engagement of the threading device with the portion of weft or filling which extends from the bobbin that is being forced into the filling-case by the pusher 13 to the pin 12^b a loop 13^m is applied to the pusher, as shown in Figs. 25 and 26. This loop bears down upon the said portion of yarn when the pusher is depressed, and thereby holds the same within the path of movement of the threading-hook. For the purpose of disconnecting the end of weft or filling leading to the pin 12^b after the threading of the filling-case has been effected the stationary shear-blade 14^z, Fig. 26, is attached to one side of the portion 8^f of the slideway in position to coact with the threading-hook as the latter approaches its most retracted position. For the convenient actuation of the pusher 13 and threading device 14 I have shown them connected, respectively, by rods 13^a 14^a to

levers 13^b 14^b, which are actuated by cams 13^c 14^c on a rotating shaft 15 and suitable springs (not shown) acting in opposition to said cams. In practice shaft 15 may be actuated by any suitable means. Fig. 33, Sheet 9, shows the same connected by a universal-joint coupling 15' with an operating-shaft 15², provided with fast and loose band-pulleys 15³. For the purpose of arresting the filling-case in proper position beneath the mouth of the magazine 11^a I provide a stop, as 16, which is mounted on the axis 16^x and is adapted to be projected into the path of the said filling-case to stop the same, as in Fig. 26, and is withdrawn after the performance of the reloading and threading operations to permit the filling-case to pass on the said stop being again projected into the path of the following filling-case in season to arrest the latter in proper position to permit the same operations to be performed in connection therewith. The stop 16 is operated by the conjoint action of a cam 16^a on the shaft 15 and spring 16^b or any other suitable means for the purpose. On the withdrawal of stop 16 the loaded or loaded and threaded filling-case passes onward from the loading mechanism, and a succeeding filling-case takes its place. For the purpose of holding back the latter during the time of the withdrawal of stop 16 until the said stop has been returned into position in which it will serve to arrest the said succeeding filling-case in proper position with relation to the loading mechanism I provide in the present instance a detent-finger 16^y, Figs. 25 and 26, which is mounted loosely upon the axis 16^x and connected with a suitable portion of stop 16 by a spring 16^z. When the stop 16 is withdrawn to release the loaded filling-case, yielding force is transmitted through the spring 16^z to the said detent-finger, and thereby the latter is caused to hold the said succeeding filling-case back until stop 16 is returned to operative position. The spring 16^z is intended to enable the detent-finger to yield to obviate injury to a filling-case when the detent-finger descends upon the same.

The loading mechanism is adapted to be used as an independent machine in some cases, in which event the filling-receptacles may be fed thereto with or without the intervention of means for positioning and righting the filling-receptacles.

In the complete embodiment of my invention herein presented the loaded and threaded filling-case passes from the loading mechanism down upon the lowest part 8^g of the slideway and is delivered therefrom by means for conveying the same back to the looms 11. Herein the said means is constituted by an endless traveling belt 17, although I do not limit myself to the use of the latter in all cases. For convenience in delivering the filling-case to the said belt the said lowest part 8^g of the slideway is formed with an opening

in its bottom which is closed normally by the lightly-balanced swinging door or gate 8ⁱ, Fig. 1, Sheet 1, and Fig. 33, Sheet 9. The said door or gate is pivoted at 8^k and is adapted to swing downwardly with a loaded filling-case 3 resting thereon and deposit said filling-case onto the upper surface of the belt 17. The belt 17 passes around suitable guide and supporting pulleys at 17^a 17^x, Figs. 1 and 32, Sheet 1, and Fig. 33, Sheet 9, and is actuated by means of suitable driving arrangements—as, for instance, by means of power applied to the band-pulley 17^g, Fig. 33. Said belt 17 is provided with projections at 17^b 17^b, which by their engagement with the filling-cases 3 or other filling-receptacles serve to carry the latter up the ascending portion of the belt 17 into the room above, where the looms are located, on the way to be distributed at the places where such filling-cases are again to be brought into service. At 17^c 17^c are fixed or stationary side rails at opposite sides of the ascending portion of the belt 17 to prevent the filling-receptacles from falling laterally off the said belt. 17^d is an inclined surface along which the said ascending portion of belt 17 is guided. The guide-pulleys 17^x 17^x at the upper side of belt 17 are spaced apart, as shown in Fig. 32, Sheet 1, widely enough to permit the projections 17^b 17^b of said belt and the filling-receptacles resting on said belt and carried thereby to pass between them. The advancing portion or run of the conveyer-belt 17 is conducted above the series of looms 1 1 within a guideway 18, Fig. 1, Sheet 1, and Figs. 27 to 30, Sheet 8, having raised sides which confine the loaded filling-cases 3 against lateral displacement, the said guideway having a bottom 18^a, which supports the conveyer-belt as it travels along above the series of looms. At intervals the guideway 18 is provided with branches 18^a 18^a, which lead downward to places of deposit for the loaded filling-cases. Herein I have shown a receiver 19 adjacent each loom, although in some cases the branches 18^a 18^a may deliver to the hoppers 4 4 on the respective looms. For the purpose of diverting the filling-cases 3 from the guideway 18 into the respective branches 18^a 18^a in order that they may pass thence to the respective receivers switch-points 20 of suitable character may be employed. (See Figs. 27 to 31.) Each switch-point 20 is pivoted, as at 20^a, in position to extend normally across the entrance to the corresponding branch 18^a, as indicated in dotted lines in Fig. 31, so as to close the said entrance, or to be swung across the main guideway 18, as shown in full lines in the said figure, into position to divert the filling-cases into the desired branch, as aforesaid. The switch-points 20 may, if desired, be provided with means for enabling them to be operated manually by the weaver when required. Preferably, however, they are arranged to be op-

erated automatically, so as to be shifted into the full-line position of Fig. 31 on the corresponding receptacles becoming emptied to the predetermined extent, so as to cause the said receptacles to become again charged with filling-cases and so as to become shifted into the dotted-line position of Fig. 31 when the said receptacles have become filled to the predetermined extent. To this end the receptacles 19 may be mounted upon supporting-frames 19^a, which are pivoted, as at 19^b, upon the frames of the corresponding looms 1, the said frames being counterweighted, as at 19^c, and being connected, as by a wire or rod 19^d, with a bell-crank, as 19^e, and a second wire or rod, as 19^f, with an arm, as 19^g, on the switch 20. Thereby movement will be transmitted from the frame 19^a to the corresponding switch 20 as the receiver or receptacle 19 becomes emptied or filled, which will insure a constant supply of filling-cases within the receiver-receptacle 19. From the receivers or receptacles 19 19 the loaded filling-cases will be transferred to the hoppers or magazines 4 4 of the adjacent looms by the weaver.

The conveying and distributing means may be employed for carrying and distributing supplies of weft or filling to the respective looms 1 1 in cases in which the loading mechanism, &c., is dispensed with.

I claim as my invention—

1. In combination with a plurality of looms respectively operating to effect weft replenishment automatically by bringing reserve filling-carriers into action and ejecting those which are indicated for replacement, means for delivering the ejected filling-carriers from the various looms at a receiving-station.

2. In combination with a plurality of looms respectively operating to effect weft replenishment automatically by bringing reserve filling-carriers into action and ejecting those which are indicated for replacement, means, including a railway-belt, whereby the ejected filling-carriers from the various looms are conveyed away from the latter, and means for delivering the said filling-carriers to said railway-belt after being ejected from the respective looms.

3. In combination with a plurality of looms having in connection therewith receivers or receptacles, mechanism for conveying reserve filling supplies to the respective receivers or receptacles for use in the various looms.

4. In combination with a plurality of looms respectively operating to effect weft replenishment automatically by bringing reserve filling-carriers into action and ejecting those which are indicated for replacement, said looms having in connection therewith receivers for reserve filling-carriers, means whereby filling-carriers are conveyed to the respective receivers.

5. In combination with a plurality of looms respectively operating to effect weft replen-

ishment automatically by bringing reserve filling-carriers into action and ejecting those which are indicated for replacement, means for delivering the ejected filling-carrier from the various looms at a receiving-station, and means for conveying and distributing reserve filling-carriers for use in the various looms.

6. In combination with a plurality of looms respectively operating to effect weft replenishment automatically by bringing reserve filling-carriers into action and ejecting those which are indicated for replacement, means for delivering the ejected filling-carriers from the various looms at a receiving-station, a moving-belt for conveying reserve filling-carriers, and means for distributing the latter to receivers in connection with the respective looms.

7. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, an organized mechanism apart from said loom for reloading the ejected filling-receptacle, and means for conveying the said ejected filling-receptacle from said loom to said reloading mechanism.

8. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, an organized mechanism apart from said loom for reloading the ejected filling-receptacle, means for conveying the said ejected filling-receptacle from said loom to said reloading mechanism and for returning the reloaded filling-receptacle, and a receiver in connection with said loom to which the said loaded filling-receptacle is delivered from said conveying means.

9. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, means for conveying the ejected filling-receptacle away from the loom, and an organized mechanism apart from said loom to which the said filling-receptacle is conveyed by the said means operating to introduce a fresh load of filling into the filling-receptacle and to automatically thread the latter.

10. In combination with a plurality of looms respectively operating to effect weft replenishment automatically by bringing reserve filling-receptacles into action and ejecting those which are indicated for replacement, and having receivers for reserve filling-receptacles in connection therewith, a reloading mechanism, means for conveying the ejected filling-receptacles from said looms to said reloading mechanism, and means for returning the reloaded filling-receptacles and distributing them to the respective looms.

11. In combination with a loom operating to effect weft replenishment by automatically

bringing a reserve filling-receptacle into action and ejecting the spent or failed one, a reloading mechanism apart from such loom, and means for conveying the ejected filling-receptacle from said loom to said reloading mechanism, arranged to present the said filling-receptacle with the respective ends thereof in predetermined position relative to the said reloading mechanism.

12. In combination with a plurality of looms respectively operating to effect weft replenishment automatically by bringing reserve filling-receptacles into action and ejecting those which are indicated for replacement, a railway-belt for collecting and conveying away the filling-receptacles which are ejected from the said looms, and chutes conducting the said filling-receptacles from the respective looms to the said railway-belt.

13. In combination with a plurality of looms, a railway-belt extending past the same and adapted to collect and convey away the spent or failed filling-carriers from said looms, and means to deliver said filling-carriers to the said railway-belt.

14. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, a railway-belt receiving and conveying away the filling-receptacles which are ejected from the said loom, and a chute conducting the said filling-receptacles from the loom to the railway-belt and provided with means to deflect the respective filling-receptacles so as to cause a given end of each to proceed foremost in being delivered to the said railway-belt.

15. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, means for collecting and conveying away the ejected filling-receptacles, and means for turning the said filling-receptacles to present a given side of each in predetermined position.

16. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, means for conveying away the ejected filling-receptacles, means for turning the said filling-receptacles to present a given side of each in predetermined position preparatory to reloading, and mechanism for reloading the filling-receptacle with weft or filling.

17. In combination, means for feeding filling-receptacles, means acting in connection with such filling-receptacles to turn misplaced ones and thereby cause each of the filling-receptacles to be presented with a given side of each in predetermined position for reloading, and mechanism for reloading the filling-receptacles with weft or filling.

18. In combination, means for feeding filling-receptacles, and means acting in connec-

tion with such filling-receptacles to right misplaced ones and thereby cause each of the filling-receptacles to assume a predetermined position.

5 19. In combination, means for feeding filling-receptacles, means for turning said receptacles into the same plane, and means to invert reversed filling-receptacles and thereby cause each of the filling-receptacles to present
10 a given side thereof in a predetermined position.

20. In combination with a loom operating to effect weft replenishment by automatically bringing a reserve filling-receptacle into action and ejecting the spent or failed one, means
15 for conveying the ejected filling-receptacles, means for turning said ejected filling-receptacles into the same plane, and means to invert reversed filling-receptacles and thereby
20 cause each of the filling-receptacles to present a given side thereof in predetermined position.

21. In combination, a conveying device for filling-receptacles, a detector cooperating with
25 the passing filling-receptacles, and means under operative control of the said detector acting to separate the filling-receptacles which are in the desired position from those which are not.

30 22. In combination, a conveying device for filling-receptacles, a turning-over device for causing the advancing filling-receptacles to assume the same plane, a detector cooperating with the passing filling-receptacles, and means
35 under operative control of the said detector acting to separate the filling-receptacles which are in the desired position from those which are in reversed position.

23. In combination, a conveying device for
40 filling-receptacles, a turning-over device for causing the advancing filling-receptacles to assume the same plane, a detector cooperating with the passing filling-receptacles, means under operative control of the said detector
45 acting to separate the filling-receptacles which are in the desired position from those which are in reversed position, and means to invert the latter and thereby place them in the predetermined position.

50 24. In combination, a conveyer for filling-receptacles, a detector cooperating with the advancing filling-receptacles, means under operative control of said detector acting to separate the filling-receptacles which are in desired
55 position from those which are not, means for causing the filling-receptacles last mentioned to assume the desired position, and mechanism for loading said filling-receptacles with filling.

60 25. In combination, a filling-receptacle conveyer branching to form two courses or runs and having in connection with one thereof provisions to right the filling-receptacles passing therethrough, a detector in advance of the
65 point of branching cooperating with the fill-

ing-receptacles moving along said conveyer, and means operatively controlled by said detector and whereby the filling-receptacles which are not in desired position are diverted into the course or run aforesaid in order to be
70 righted therein.

26. In combination, a conveyer having for an intermediate portion of its length two courses or runs, and having in connection with one thereof provisions for righting the filling-receptacles passing therethrough, a detector
75 in advance of such portion coacting with the passing filling-receptacles, means operatively controlled by the said detector and occasioning the entrance of the filling-receptacles into
80 the respective courses or runs, and mechanism for loading the filling-receptacles with filling.

27. Mechanism for reloading filling-cases for employment in loom-shuttles, comprising, essentially, in combination, a magazine for
85 wound filling, devices for ejecting a spent or failed filling-carrier from a filling-case removed from a shuttle, and for introducing a fresh charge or load of filling into such filling-case, and means for automatically threading
90 the filling-case.

28. Mechanism for reloading filling-cases for employment in loom-shuttles, comprising, essentially, means for supporting a filling-case removed from the shuttle in position for being
95 loaded, a magazine for wound filling, devices for ejecting the spent or failed filling-carrier from such filling-case, and for introducing a charge or load of filling into the latter, and means for automatically feeding filling-cases to the loading instrumentalities and
100 delivering the same therefrom after being loaded.

29. Mechanism for reloading filling-cases for employment in loom-shuttles, comprising,
105 essentially, means for supporting a filling-case removed from the shuttle in position for being loaded, a magazine for wound filling, devices for ejecting the spent or failed filling-carrier from such filling-case, and for introducing a charge or load of filling into the latter, means for automatically feeding filling-cases to the loading instrumentalities and delivering the same therefrom after being loaded,
110 and instrumentalities for automatically threading the loaded filling-case.

30. In an organized machine for reloading filling-receptacles preparatory to being placed in a loom, in combination, means for supplying filling-receptacles, a magazine for wound
120 filling, instrumentalities for ejecting the spent or failed filling-carriers from the filling-cases and introducing fresh charges or loads of filling into the latter, means for feeding the filling-receptacles successively into position for the insertion of filling into the same and then discharging the same, and instrumentalities for threading the loaded filling-receptacles.

31. In combination, means for supplying filling-receptacles, a magazine for wound fill-
130

ing, instrumentalities for loading the filling-receptacles with said filling, means for feeding the filling-receptacles to the said instrumentalities and then discharging the same, a plurality of looms, and means for conveying and distributing the loaded filling-receptacles to said looms.

32. In combination, a plurality of looms having receivers for filling-receptacles in connection therewith, a conveyer for filling-receptacles, said conveyer having deliveries for the respective receivers, and means to control the passage of the filling-receptacles to the respective receivers.

33. In combination, a plurality of looms having receivers for filling-receptacles in connection therewith, a conveyer for filling-receptacles, said conveyer having deliveries for the respective receivers, and switches to control the passage of the filling-receptacles through the respective deliveries to the corresponding receivers.

34. In combination, a plurality of looms having receivers for filling-receptacles in connection therewith, a conveyer for filling-receptacles, means for delivering from said conveyer to the respective receivers, and automatic means for regulating such delivery under control of the contents of the receivers.

35. In combination, a plurality of looms having movable receivers for filling-receptacles in connection therewith, a conveyer for filling-receptacles having deliveries for the respective receivers, switches to control the passage of the filling-receptacles through the respective deliveries to the corresponding receivers, and means for operating the said switches from the said receivers.

36. In combination, a slideway for filling-receptacles, means to regulate the movement of the filling-receptacles along said slideway, including a moving stop to arrest a filling-receptacle in position for being loaded, a magazine for wound filling, and means for introducing a load of wound filling into the said filling-receptacle.

37. In combination, a slideway for filling-receptacles, means to regulate the movement of the filling-receptacles along said slideway, including a moving stop to arrest a filling-receptacle in position for being loaded, a magazine for wound filling, means for introducing a load of wound filling into the said filling-receptacle, and instrumentalities for threading the loaded filling-receptacle.

38. In combination, a slideway for filling-receptacles, means to regulate the movement of the filling-receptacles along said slideway,

including a moving stop to arrest a filling-receptacle in position for being loaded, a magazine for wound filling, means for introducing a load of wound filling into the said filling-receptacle, means to hold extended the free ends of the said filling, and instrumentalities to thread the loaded filling-receptacles and disconnect the filling which is introduced thereinto from the said holding means.

39. In combination, a slideway for filling-receptacles, branched as described, a switch to control the passage of filling-receptacles along the respective branches, and a detector arranged in advance of the said switch in the path of the filling-receptacle and operatively connected with said switch, to control the position thereof.

40. In combination, the slideway for filling-receptacles, branched as described, the switch, the electromagnet whereby said switch is operated, and the detector operated by the advancing filling-receptacles and controlling the electric circuit in which said electromagnet is included.

41. In combination with a loom operating to effect weft replenishment by automatically ejecting the spent or failed filling-receptacle and placing a fresh or reserve filling-receptacle in action, means for conveying the ejected filling-receptacle away from the loom, and means whereby the filling-receptacle after being ejected from the loom is delivered to the said conveying means with its respective ends in predetermined position.

42. In combination with a loom operating to effect weft replenishment by automatically ejecting the spent or failed filling-case from the working shuttle, and placing a fresh or reserve filling-case in the said shuttle, reloading mechanism whereby a fresh charge of filling is placed in the filling-case while the latter is removed from the shuttle.

43. In combination with a loom operating to effect weft replenishment by automatically ejecting the spent or failed filling-case from the working shuttle, and placing a fresh or reserve filling-case in the latter, mechanism for ejecting the spent or failed filling-carrier from the said filling-case while removed from the said shuttle and for replacing it with a fresh load or charge of filling.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY I. HARRIMAN.

Witnesses:

CHAS. F. RANDALL,
EDITH J. ANDERSON.