L. HARRINGTON.

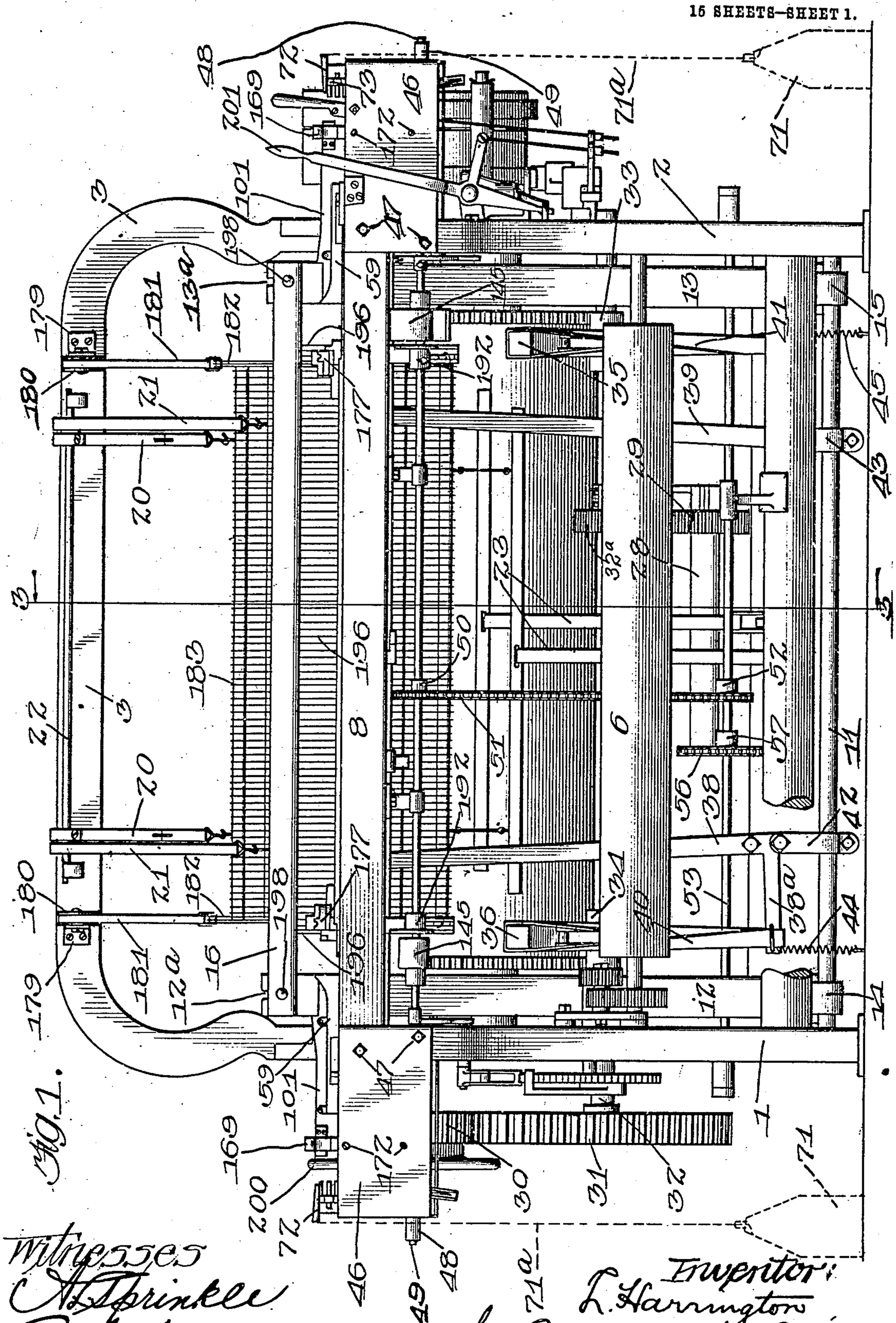
LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 1.



Witnesses
A. Brinkle
Robert H. Weir

Inventor:
L. Harrington
by Brown & Hopkins
Attys

983,550.

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 2.

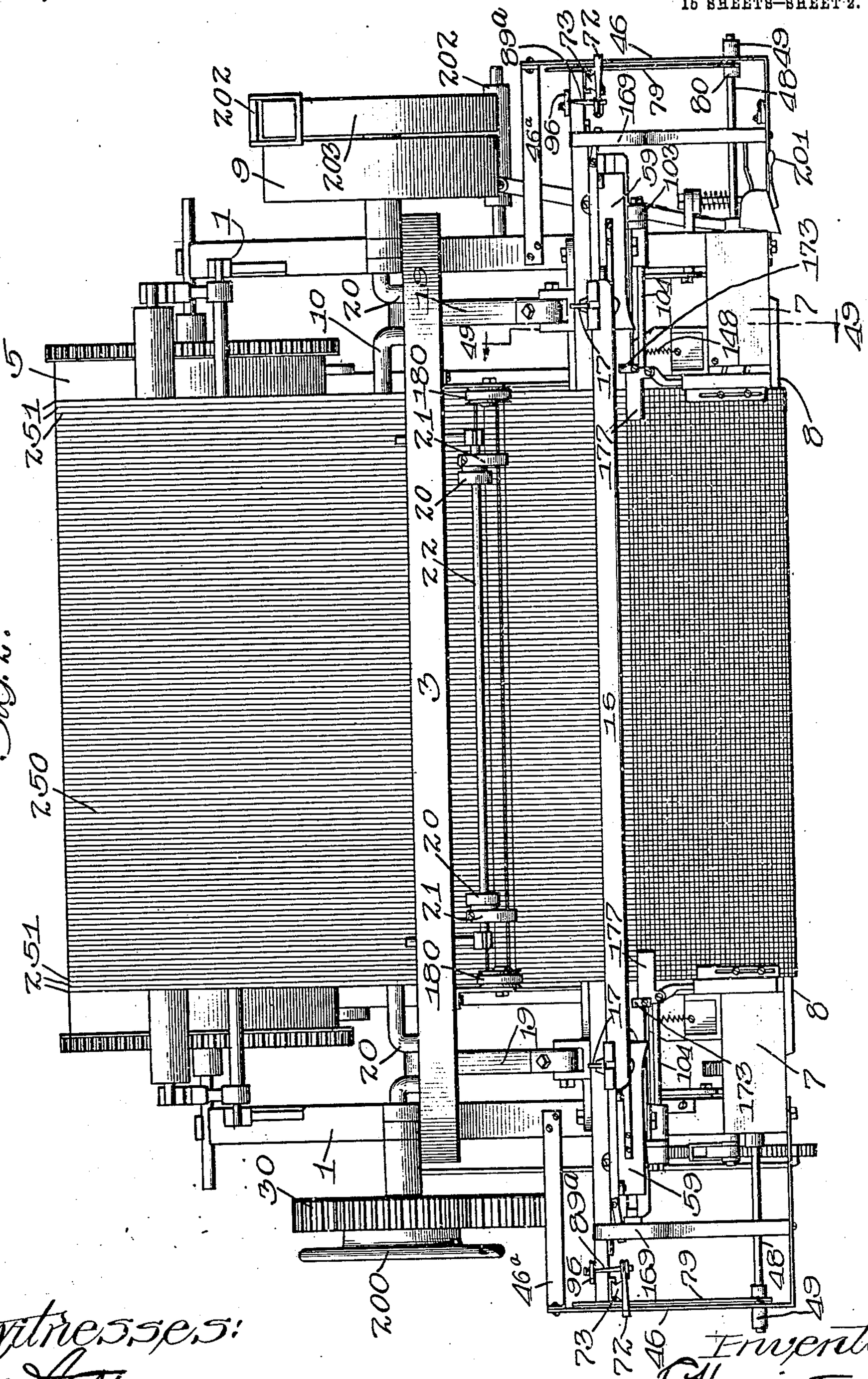


FIG. 2.

Witnesses:
H. L. Sprinkle
Robert F. Weir

Inventor:
L. Harrington
by Brown & Hopkins
Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 3.

Fig. 38.

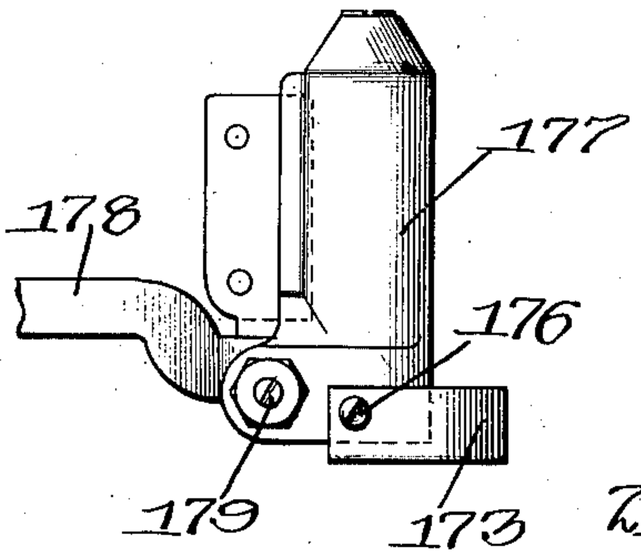


Fig. 39.

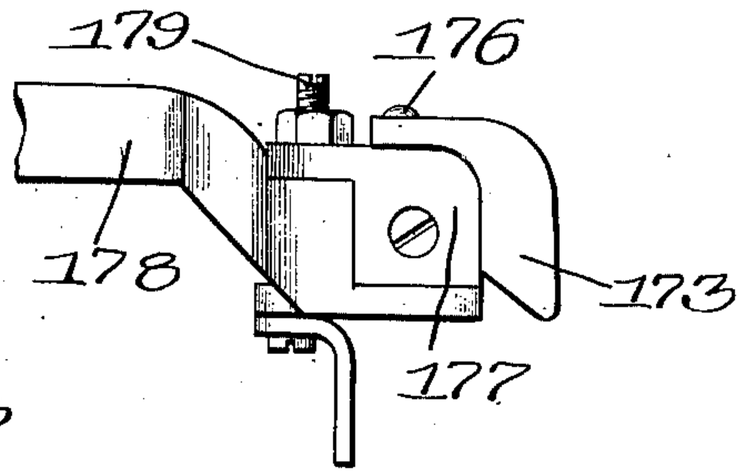


Fig. 3.

Fig. 37.

Witnesses:
A. L. Sprinkle
Robert N. Weir

Inventor:
L. Harrington
by Brown & Hopkins
Attys

L. HARRINGTON.

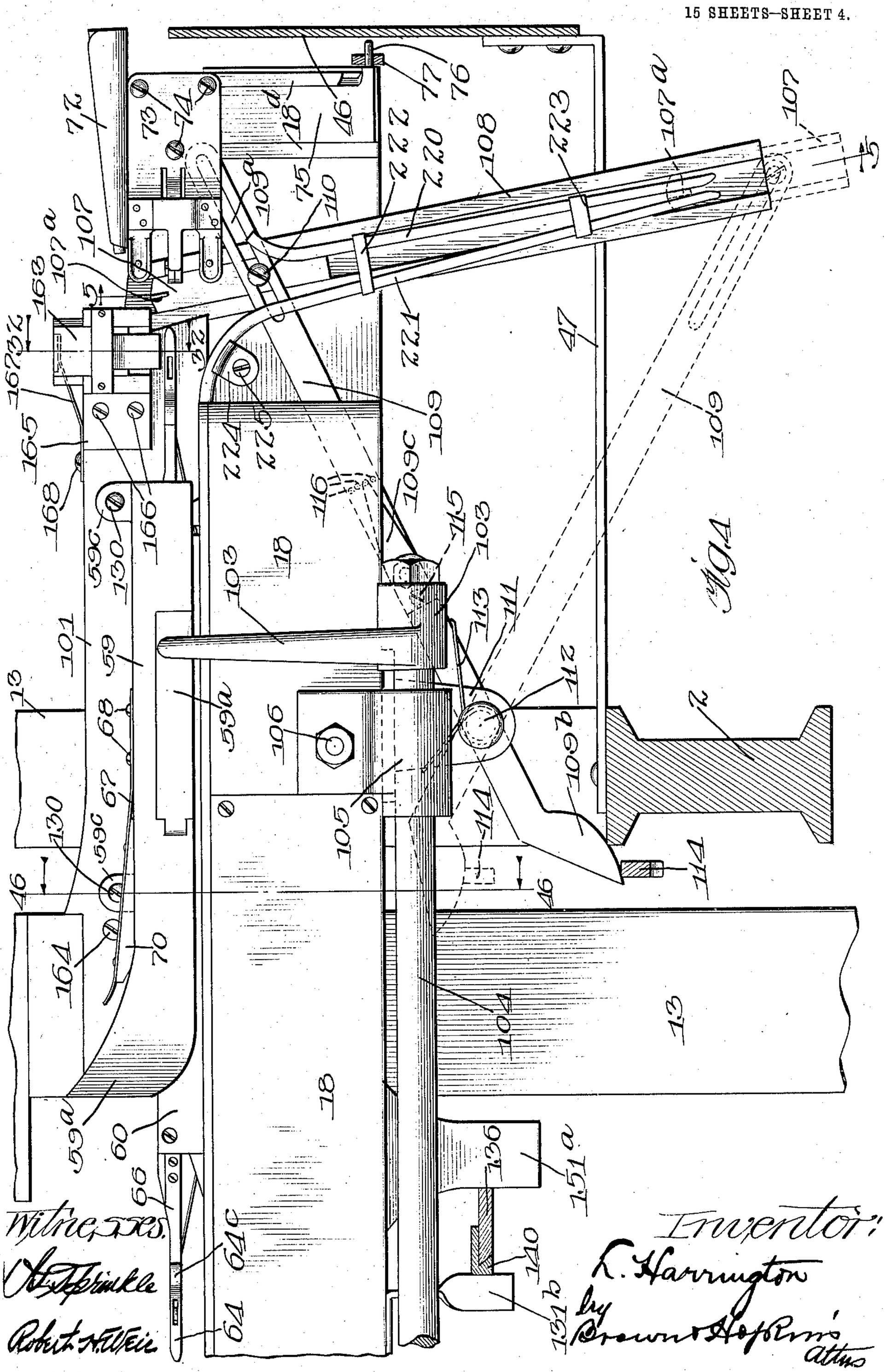
LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 4.



L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 5.

Fig. 5.

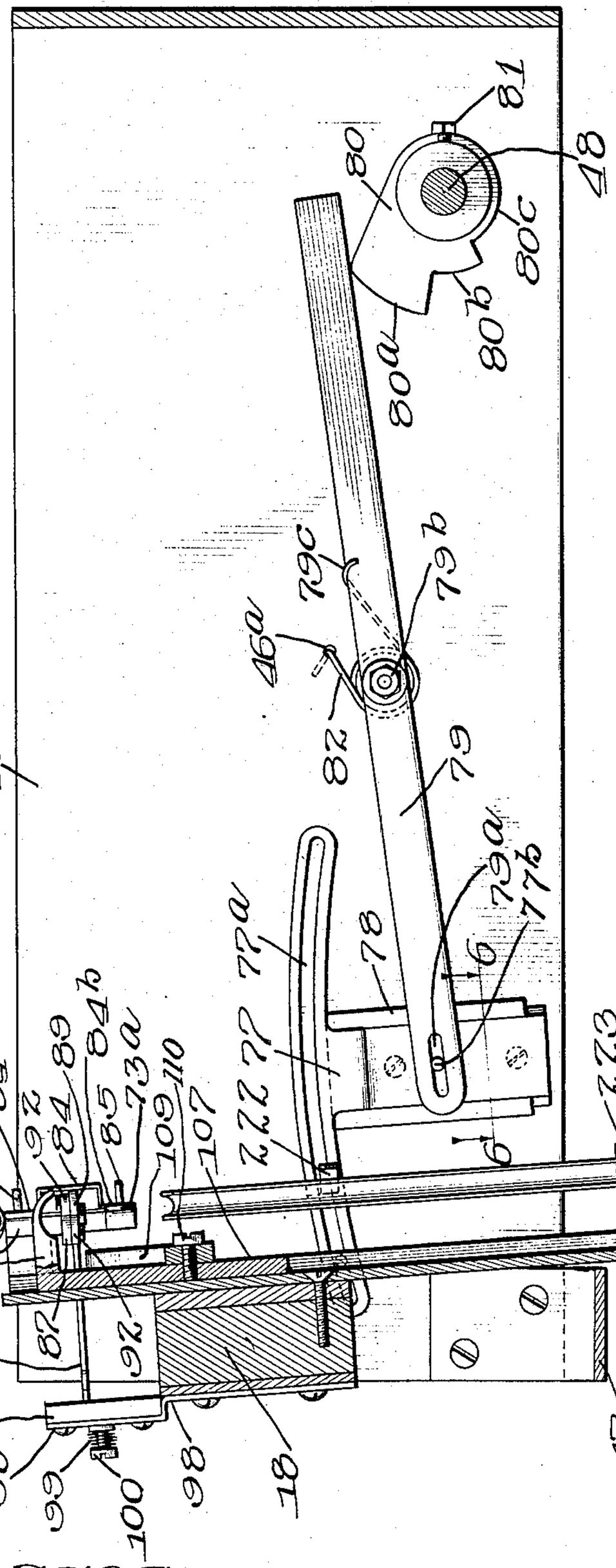


Fig. 7.

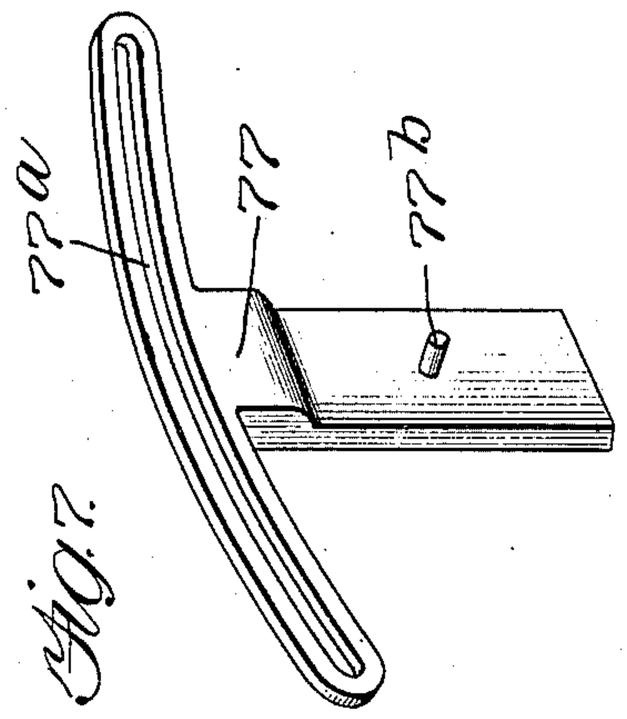


Fig. 4.

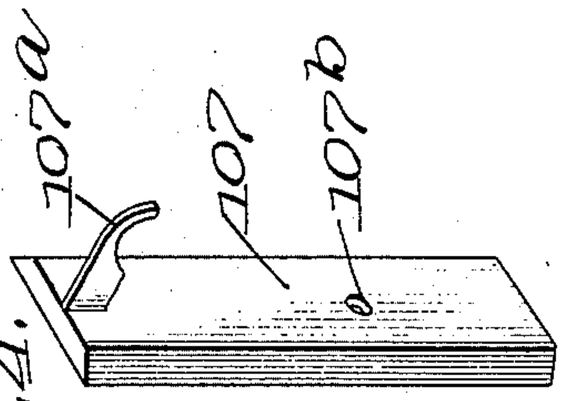
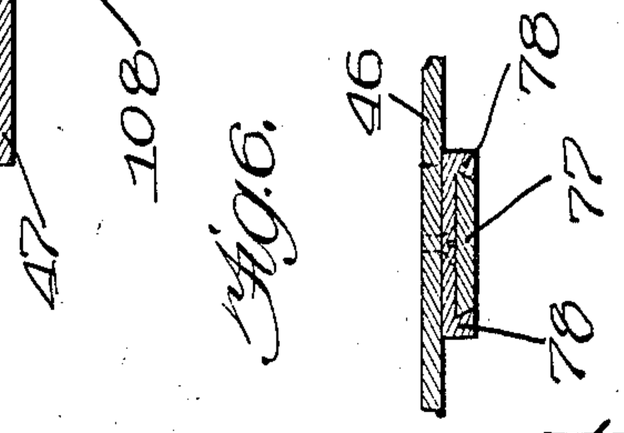


Fig. 6.



Witnesses:

A. Sprinkle

Robert A. Weir

Inventor:

L. Harrington

by Brown & Coburn attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 6.

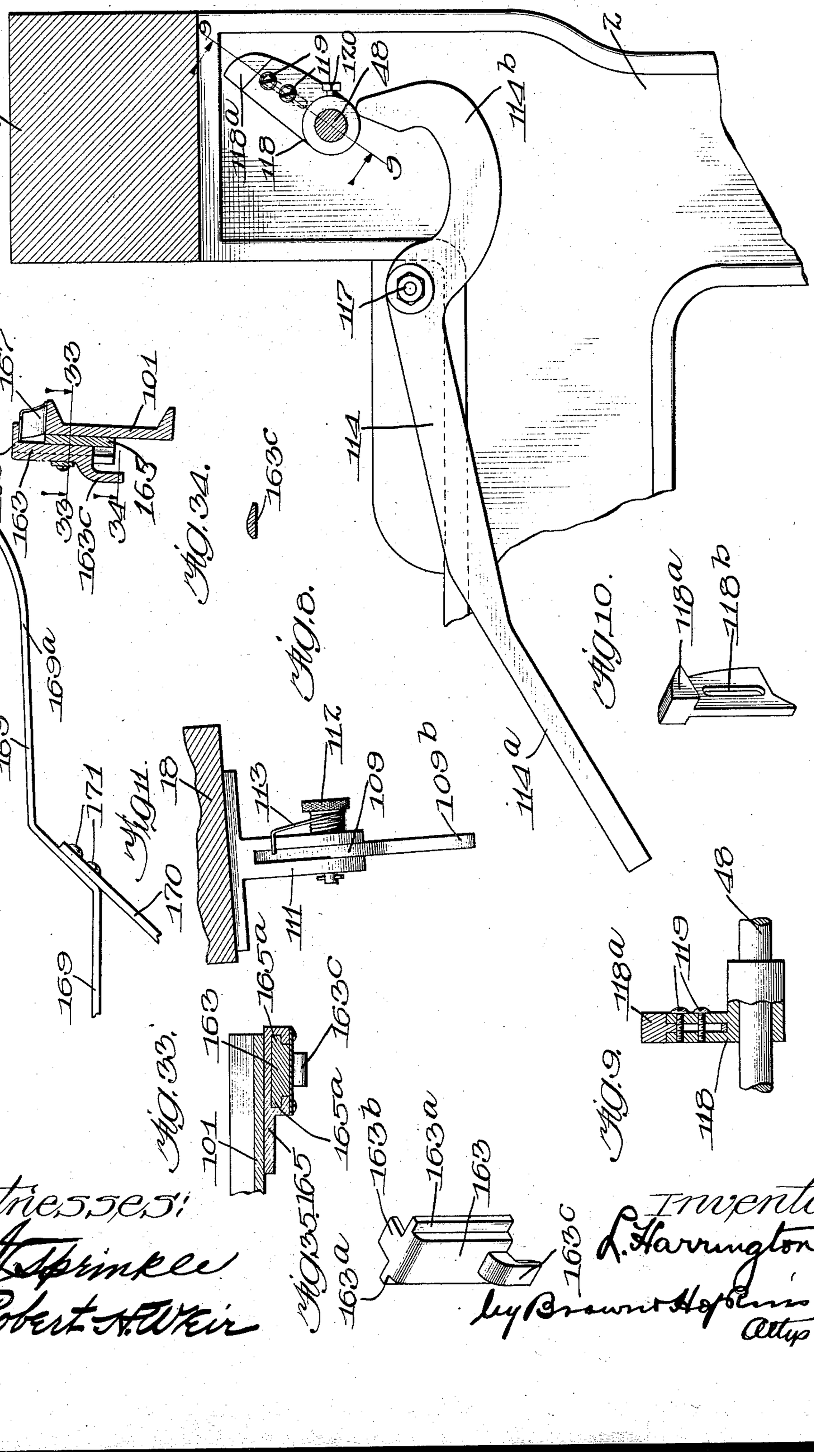


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Witnesses:
H. Hopkinson
Robert N. Weir

Inventor:
L. Harrington
by Brown Hopkinson
Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 7.

Fig 12.

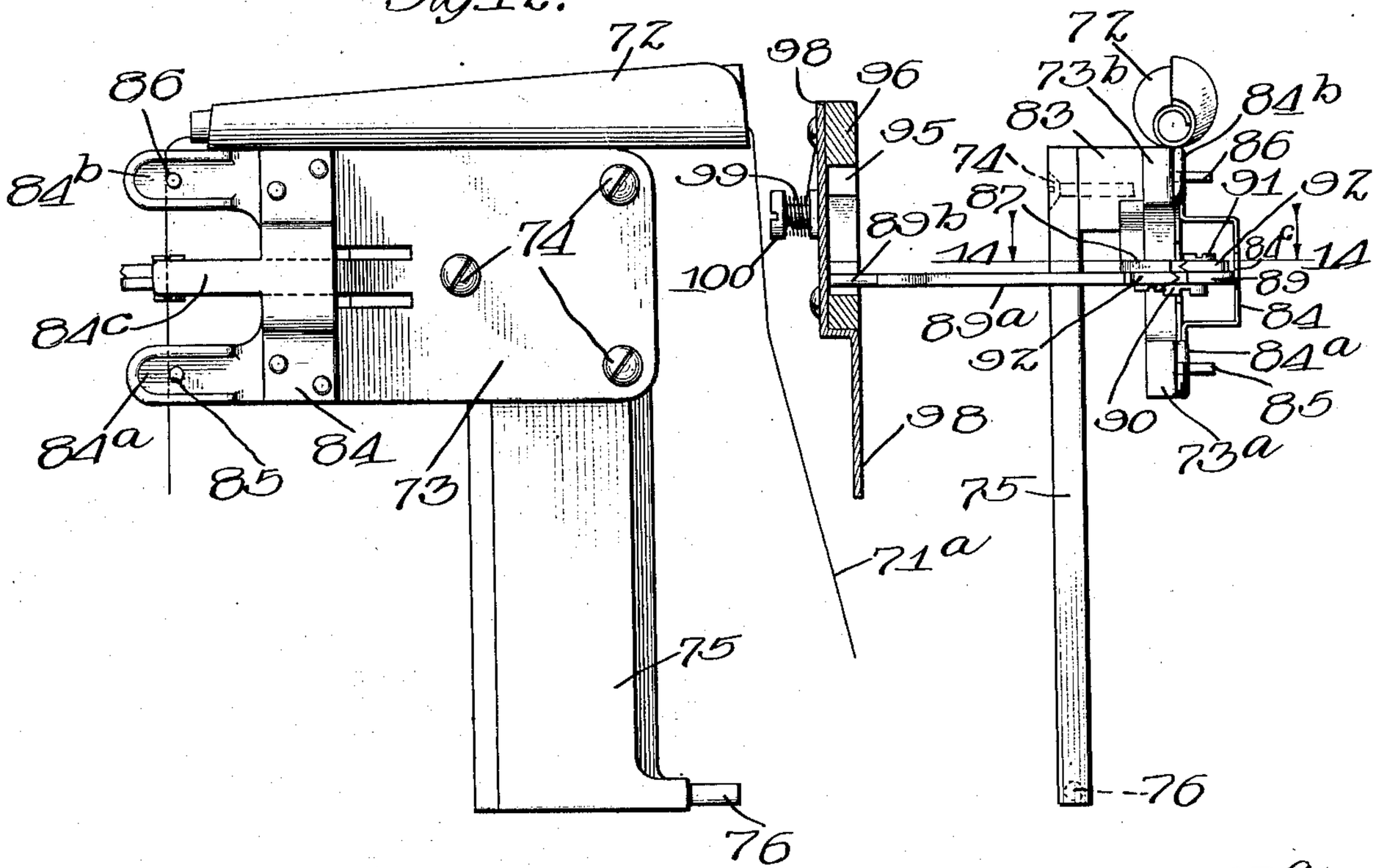


Fig 13.

Fig 16.

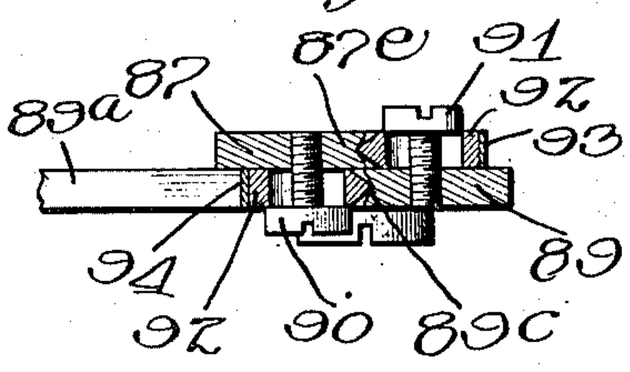


Fig 17.

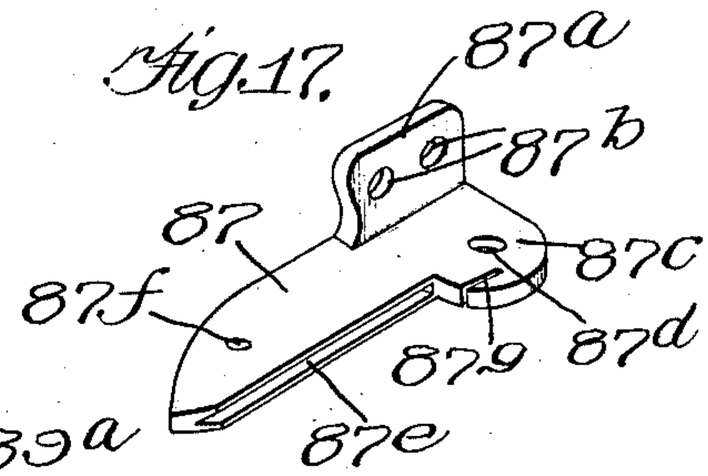


Fig 14.

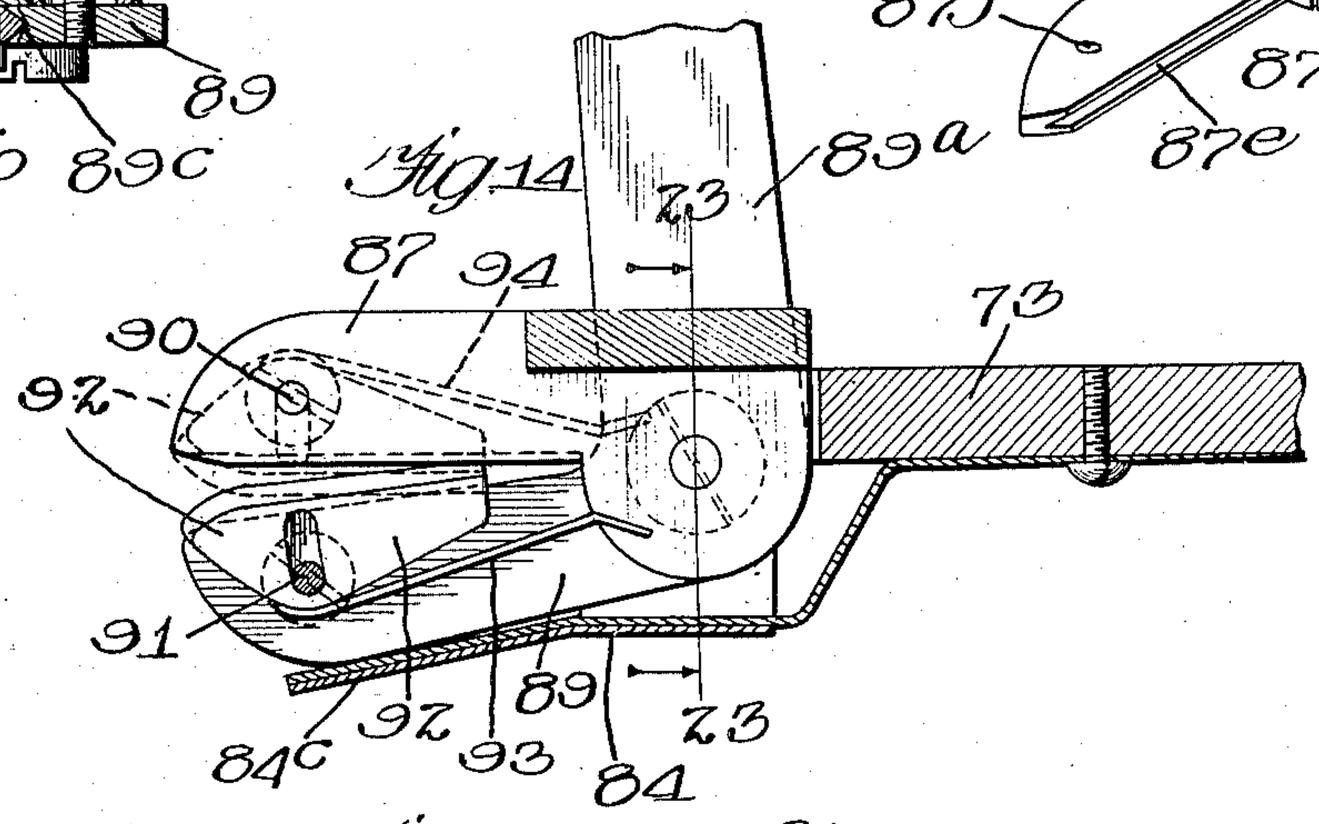
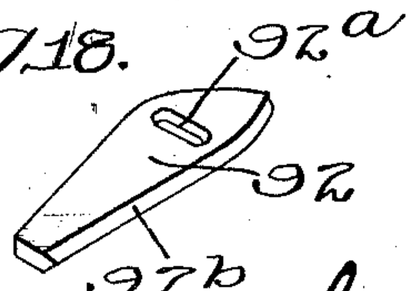


Fig 18.



Witnesses:

H. B. Brinkle

Robert H. Weir

Inventor:

L. Harrington

by Brown & Hopkins

Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 8.

Fig. 20.

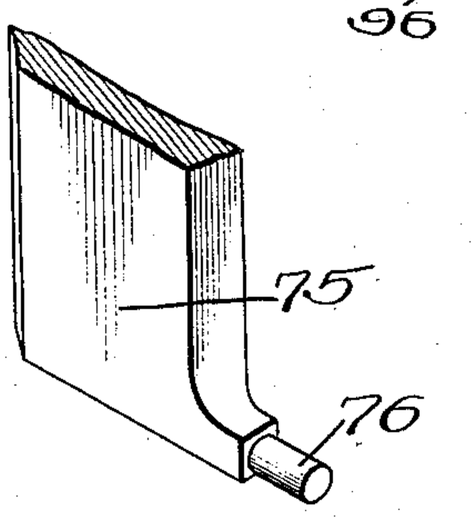


Fig. 15.

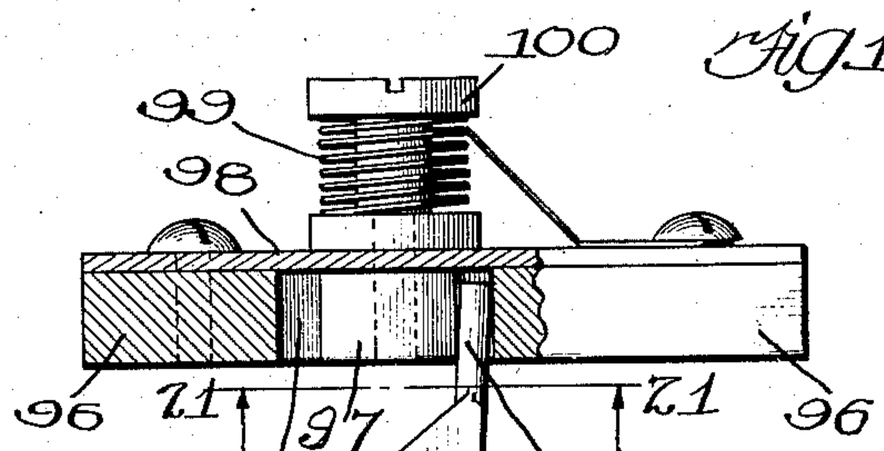
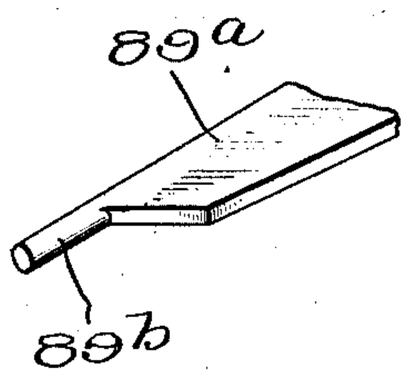


Fig. 19.



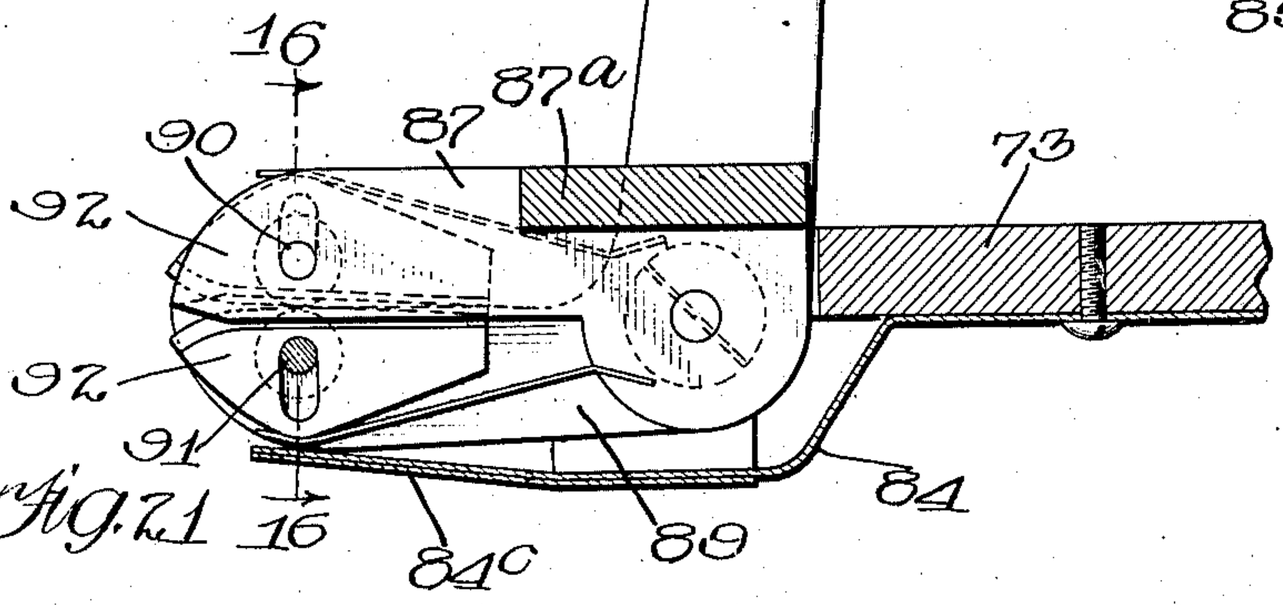


Fig. 22.

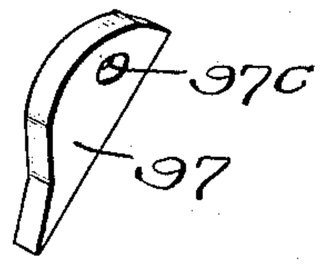


Fig. 21.

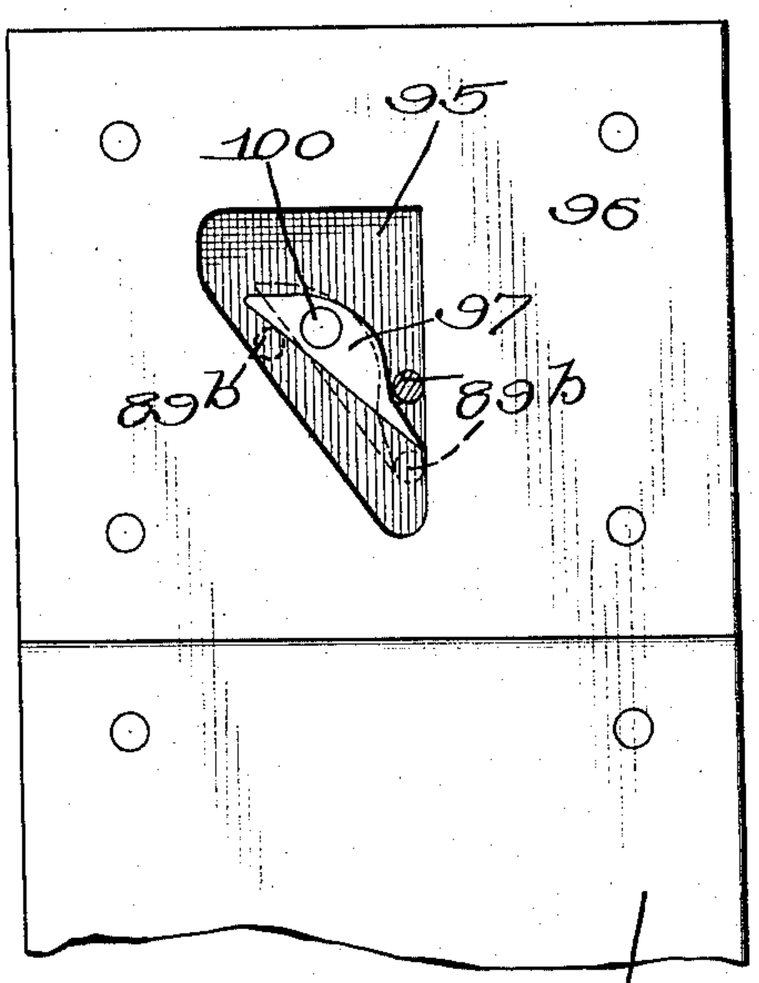
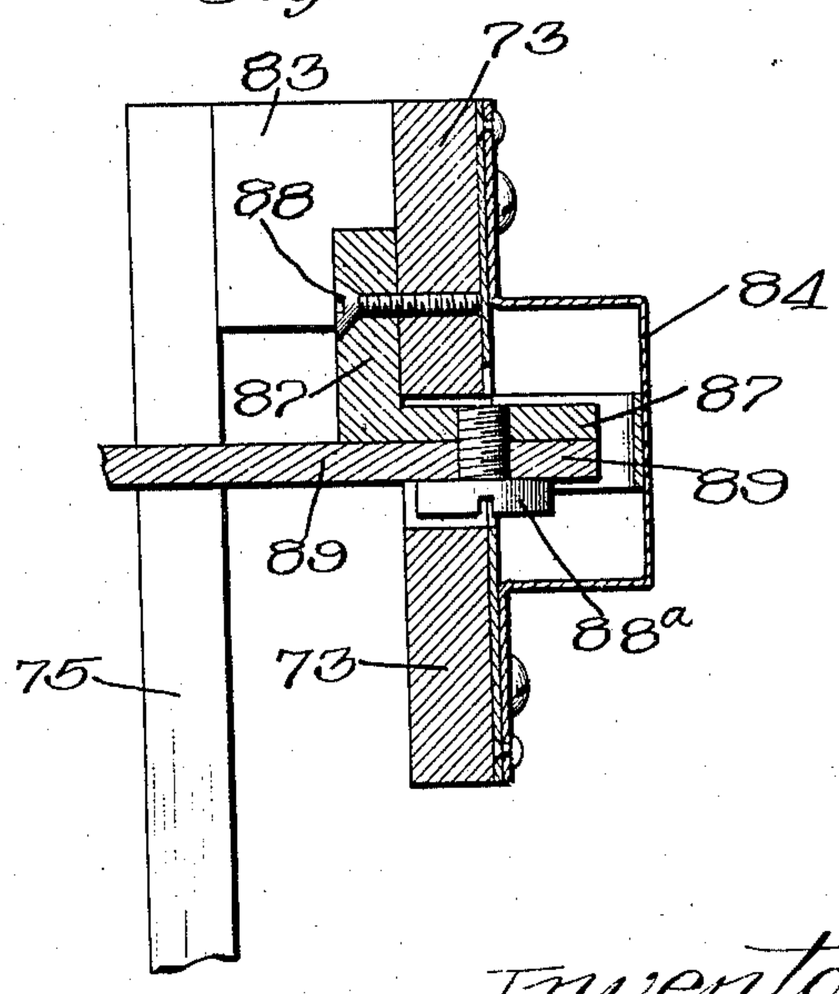


Fig. 23.



Witnesses:
A. L. Sprinkle
Robert H. Weir

Inventor:
L. Harrington
by Brown & Hopkins
Attys

983,550.

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 9.

Fig. 25.

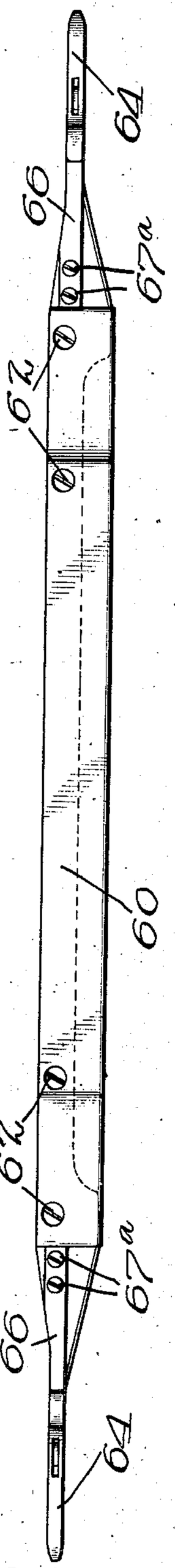


Fig. 26.

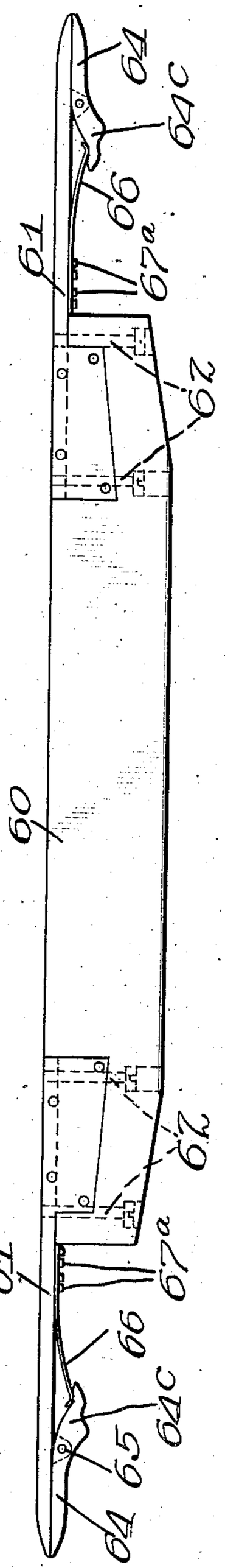


Fig. 27.

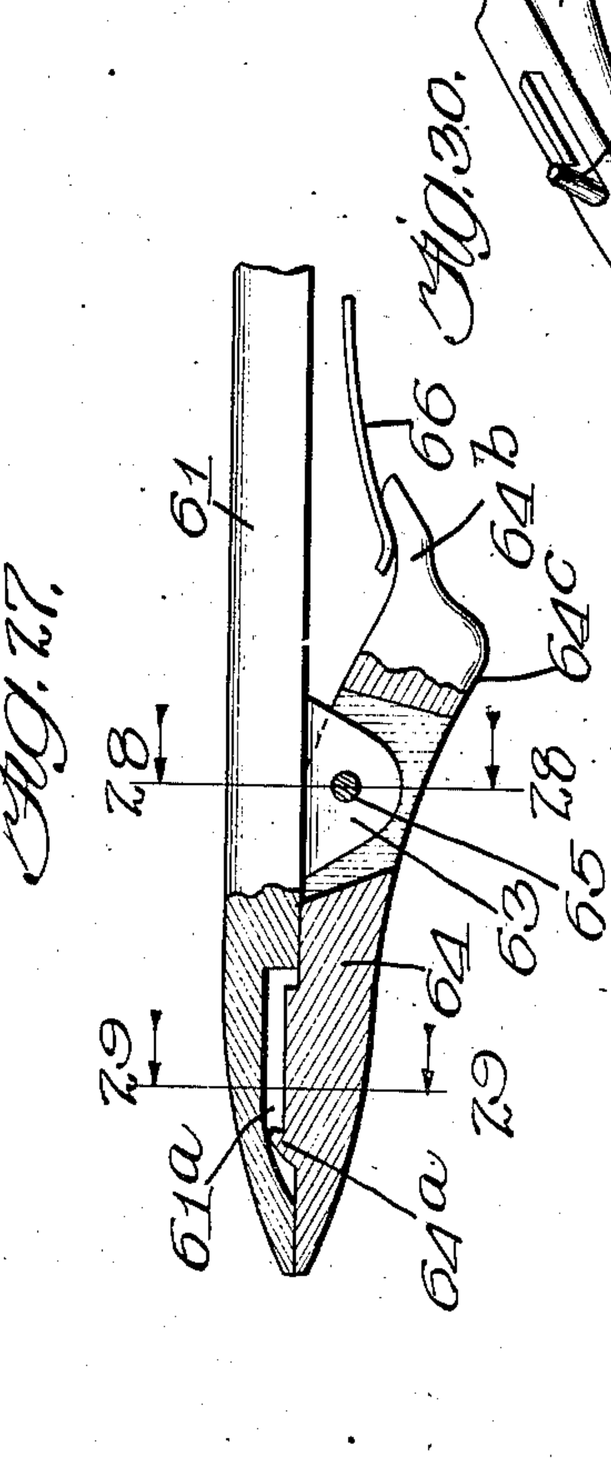


Fig. 28.

Fig. 29.

Fig. 30.

Witnesses:
H. L. Sprinkle
Robert H. Weir

Inventor:
L. Harrington
by Brown & Hoffman atty's

L. HARRINGTON.

LOOM.

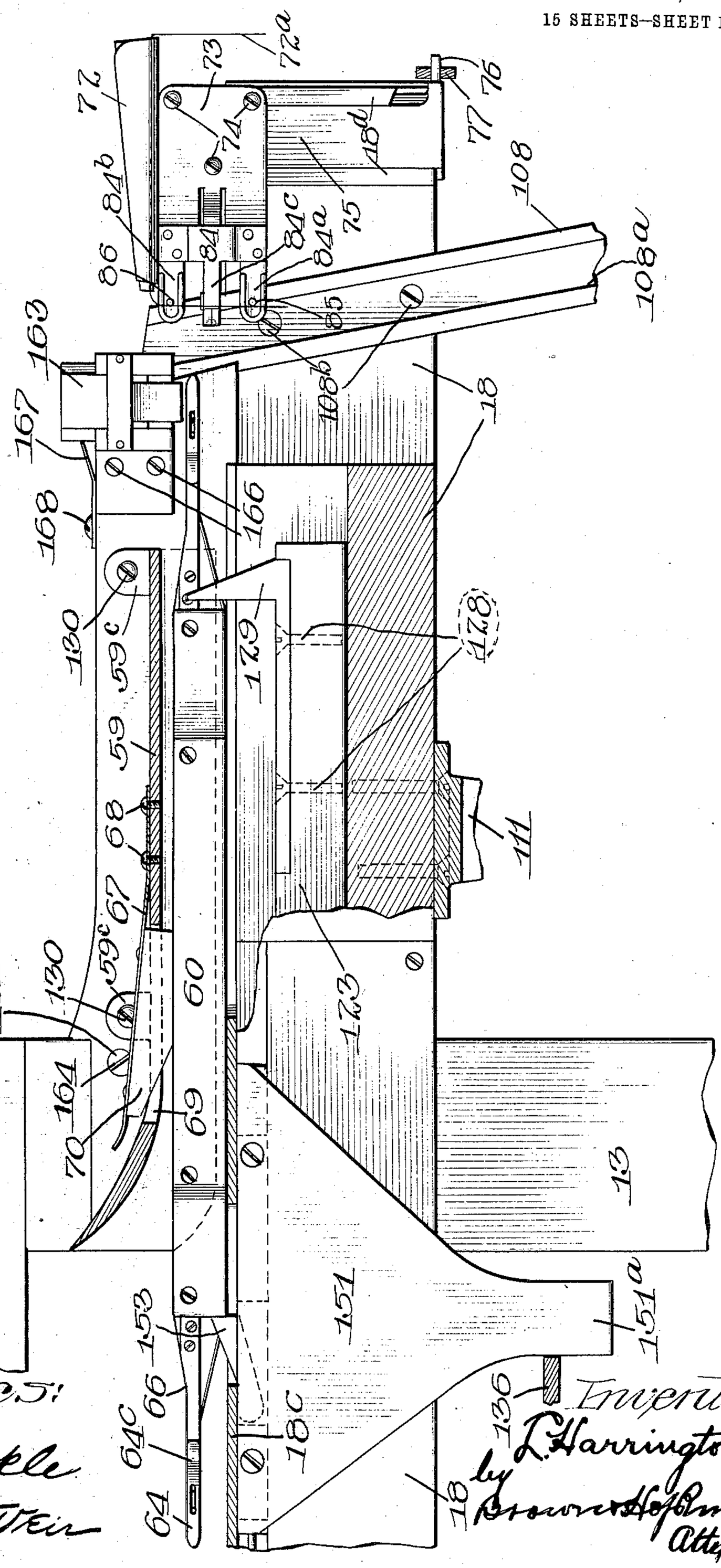
APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 10.

FIG. 31.



Witnesses:

A. L. Sprinkle

Robert F. Weir

Inventor:

L. Harrington

by Brown Hopkins

Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 11.

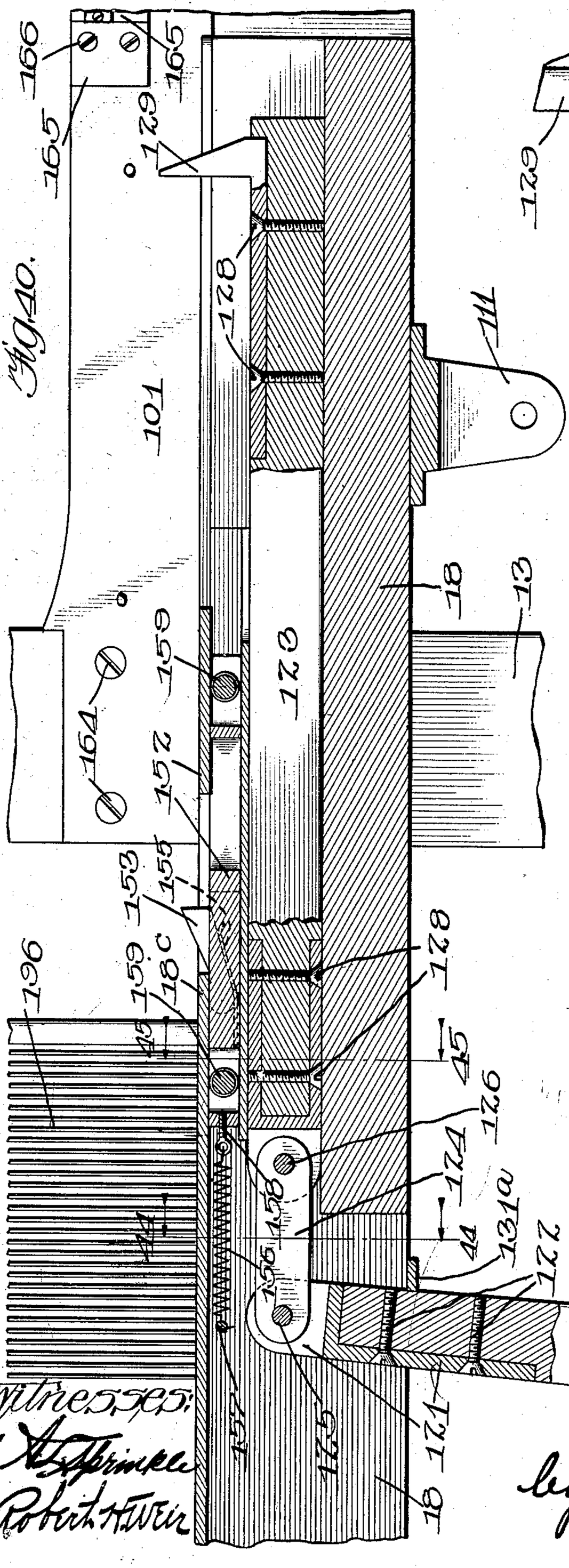


Fig. 40.

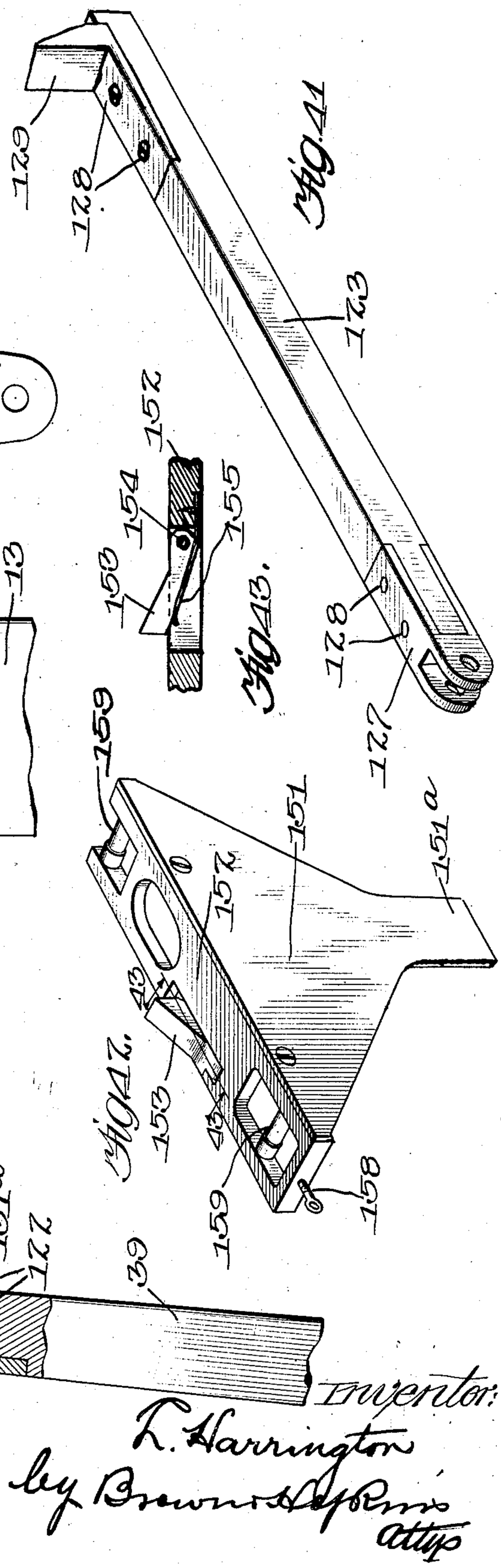


Fig. 41.

Fig. 43.

Fig. 42.

Witnesses:
A. Sperinckx
Robert H. Weir

Inventor:
L. Harrington
by Brown & Sperry
Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 12.

Fig. 16.

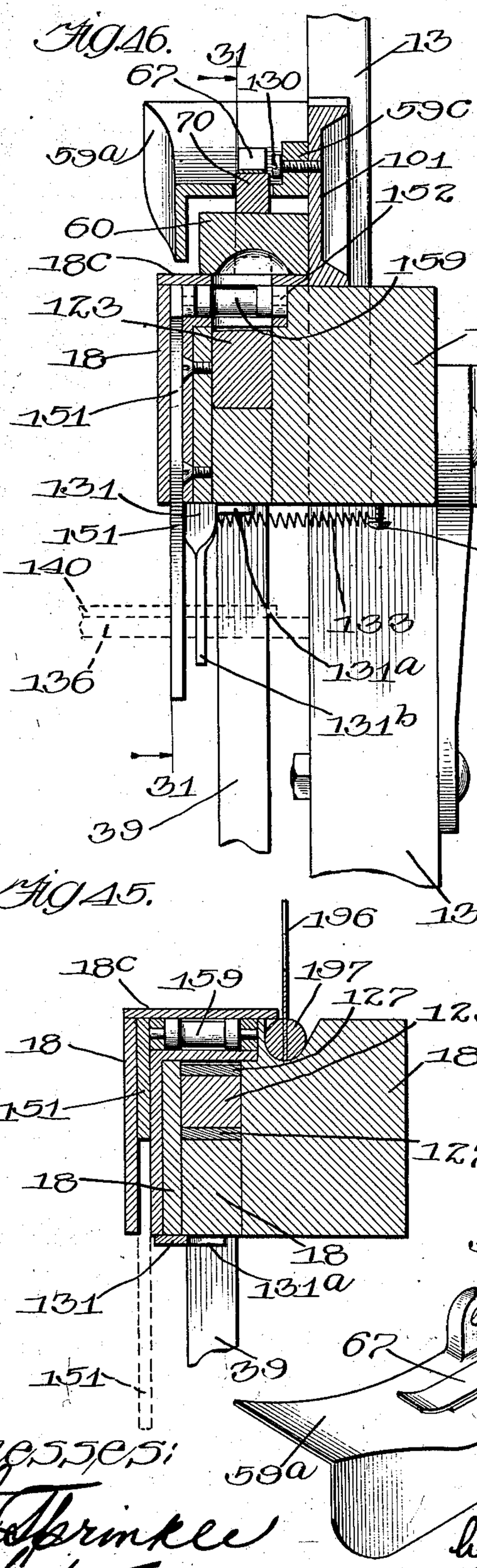


Fig. 48.

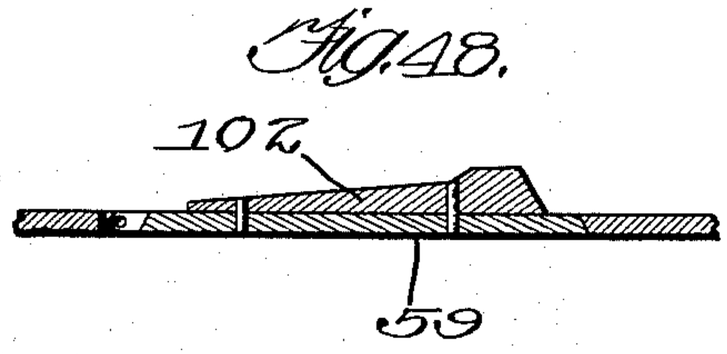


Fig. 44.

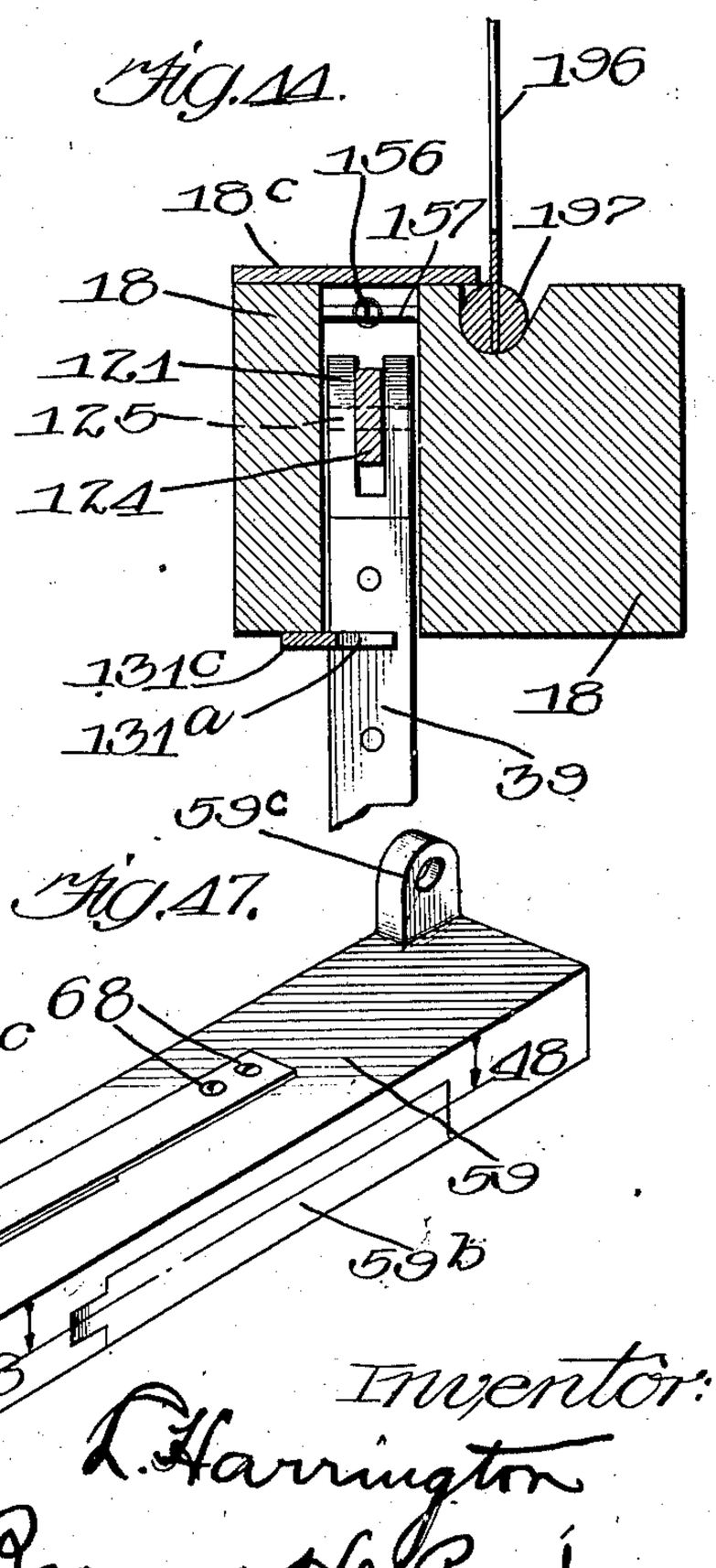


Fig. 45.

Fig. 47.

Witnesses:

S. L. Fairbrinkee

Robert A. Weir

Inventor:

L. Harrington

by Brown & Hopkins

Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 13.

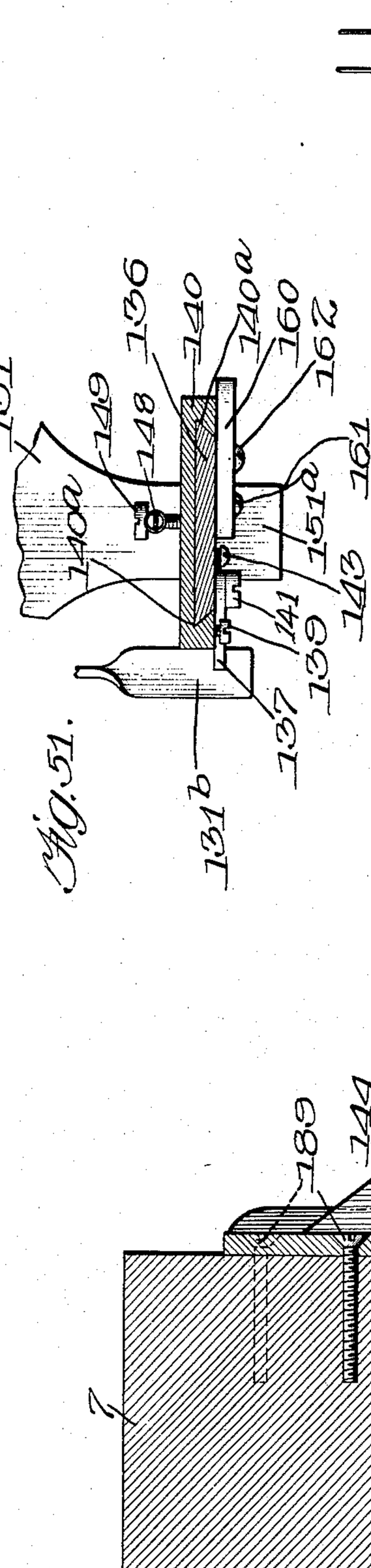


Fig. 51.

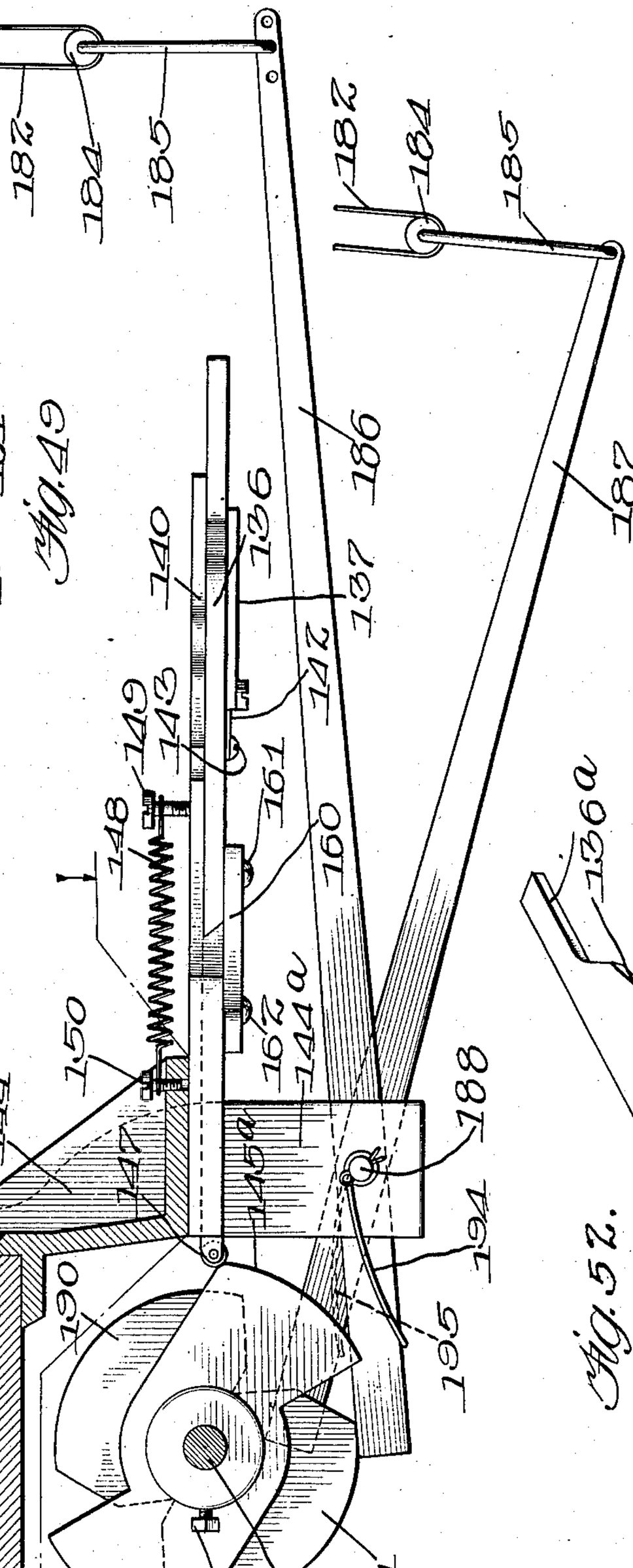


Fig. 49

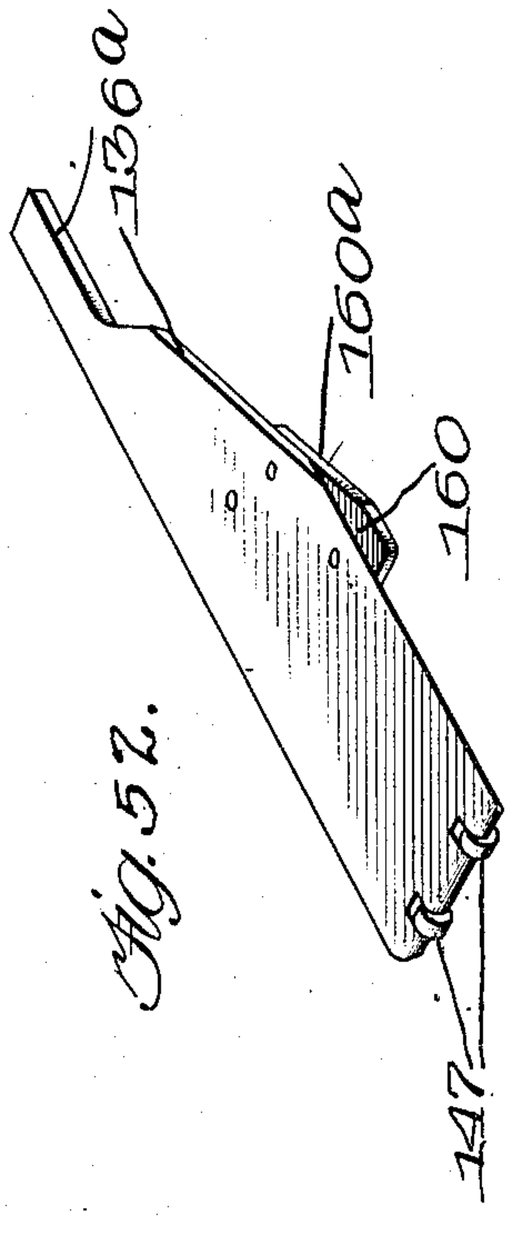


Fig. 52.

Witnesses:

A. Steinkee

Robert A. Weir

Inventor:

L. Harrington

by Brown Hopkins

Attys

983,550.

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 14.

Fig. 54.

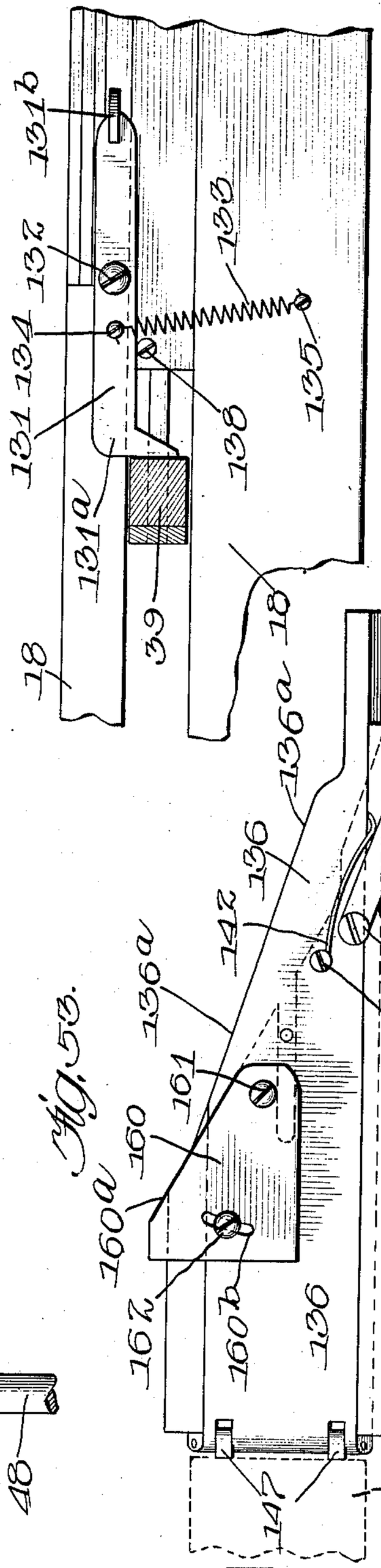


Fig. 55.

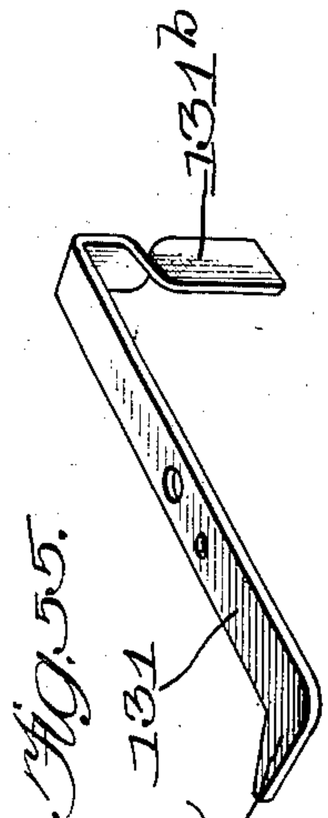


Fig. 50.

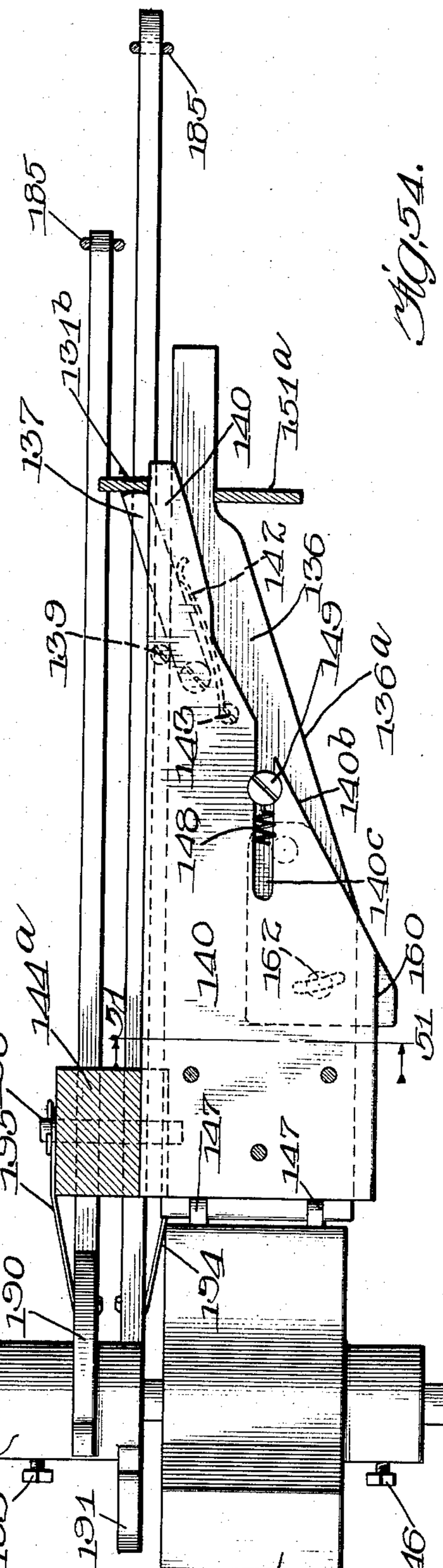


Fig. 53.

Witnesses:

A. Brinkee

Robert N. Weir

Inventor:

L. Harrington

by Brown & Hopkins

Attys

L. HARRINGTON.

LOOM.

APPLICATION FILED AUG. 6, 1907.

983,550.

Patented Feb. 7, 1911.

15 SHEETS—SHEET 15.

Fig. 56.

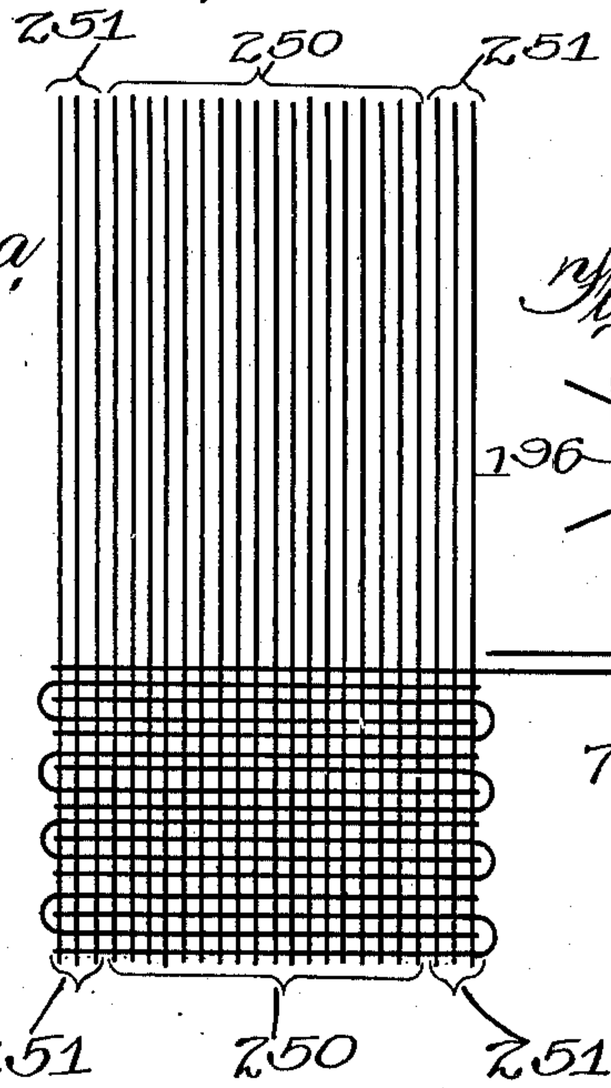


Fig. 56a.

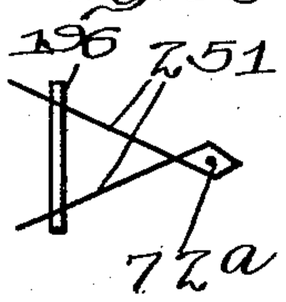


Fig. 57.

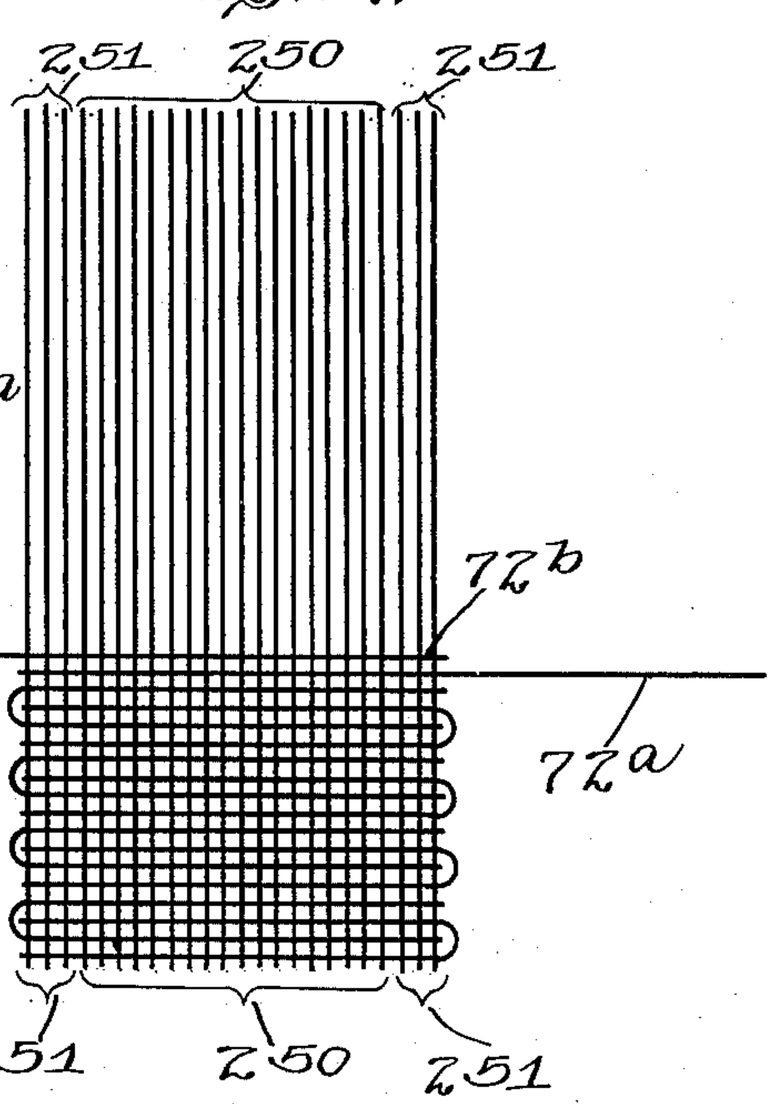


Fig. 57a.

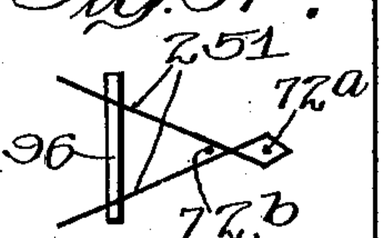


Fig. 58.

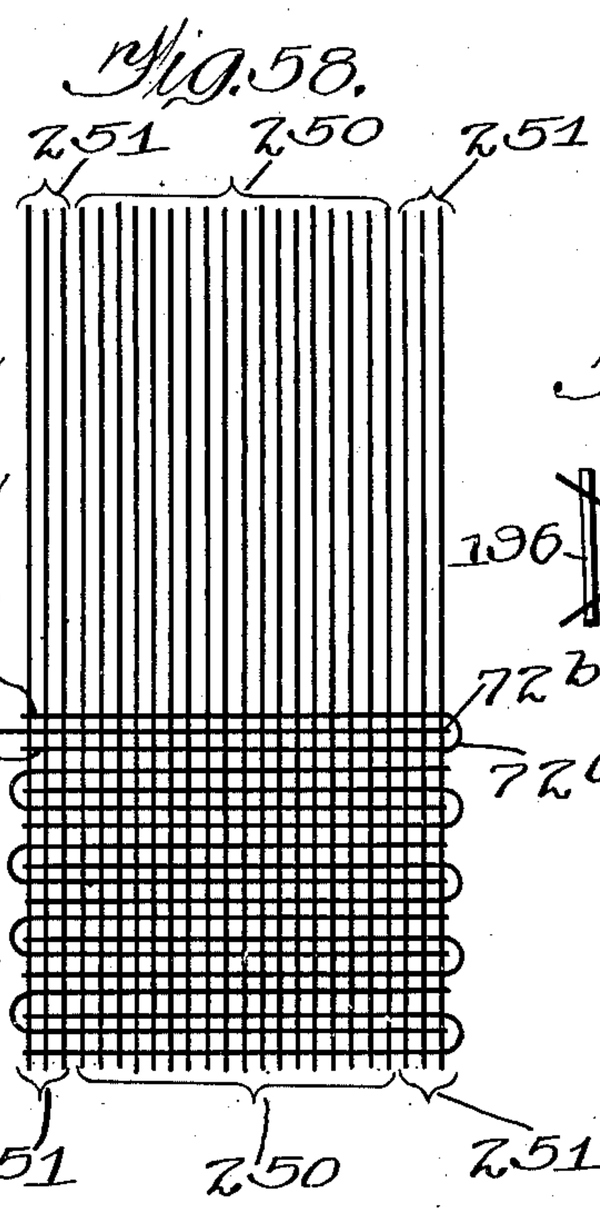


Fig. 58a.

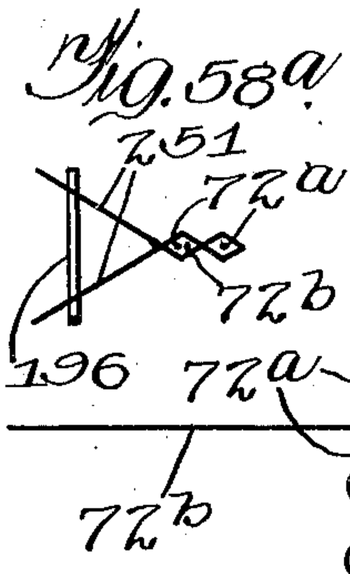


Fig. 59.

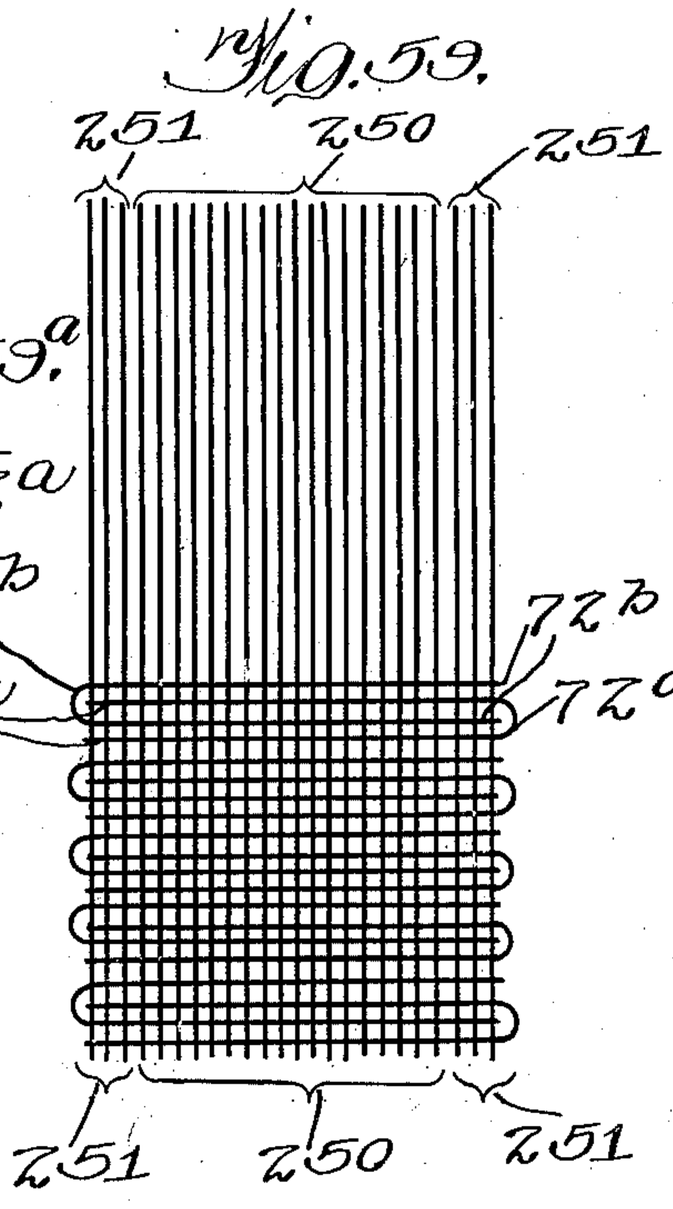
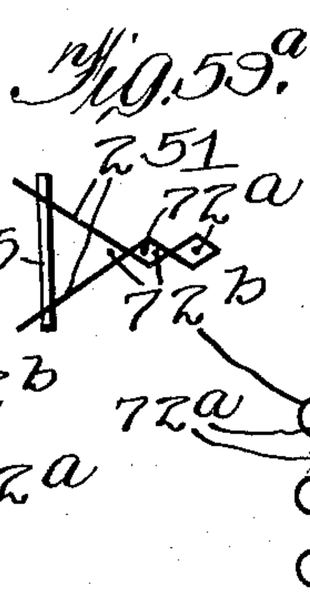


Fig. 59a.



Witnesses:
H. E. Sprinkle
Robert F. Ilbeir.

Inventor:
L. Harrington
by Brown & Hopkins Attys

UNITED STATES PATENT OFFICE.

LESLIE HARRINGTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNITED STATES AUTOMATIC LOOM ATTACHMENT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ARIZONA TERRITORY.

LOOM.

983,550. Specification of Letters Patent. Patented Feb. 7, 1911.

Application filed August 6, 1907. Serial No. 387,329.

To all whom it may concern:

Be it known that I, LESLIE HARRINGTON, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Looms, of which the following is a full, clear, and exact specification.

The invention relates to a loom for weaving cloth or similar fabric, and has for its primary object to provide an improved loom wherein the weft thread or threads may be woven into the fabric from a spool or spools or other source not carried by a shuttle.

In the carrying out of the invention there is provided improved weft thread feed devices, including improved thread measuring, cutting and holding devices, all of which comprise further objects of the invention.

The invention is adapted to lay weft threads alternately from each side into the ordinary sheds formed by the warp, the weft threads being in length approximately twice the width of the warp, both cut ends of each of the weft threads appearing at the same side of the warp and folded at the opposite side, and the weft threads being alternated in arrangement in order that the cut and folded ends may alternate to form the selvage.

A further object of the invention is to provide improved auxiliary heddles for controlling the warp threads of the selvage in order that the cut ends of the weft threads may be inserted and beaten up in the same shed formed in the selvage warp as the folded ends of the weft threads.

A further object is to provide an improved form of weft thread carrier. And a still further object is to provide improved means for controlling and operating the weft thread carrier.

To the attainment of these ends and the accomplishment of other new and useful objects the invention consists in the features of novelty in the construction, combination and arrangement of the several parts all as hereinafter more fully described and claimed and set forth in the accompanying drawings.

In the said drawings Figure 1 is a front elevation of a loom embodying the invention, the warp and the fabric being removed, while Fig. 2 is a plan view of the same showing both warp and woven fabric in position in the loom. Fig. 3 is a sectional view in elevation on line 3—3 Fig. 1. Fig. 4 is an enlarged front elevation of the carrier and carrier box and adjacent parts, including opening device for carrier, weft feed, and thread measuring device, including broken portions of mechanisms for operating these parts. Fig. 5 is an enlarged detail view of mechanism operating the feeder for the weft thread, and is taken on line 5—5 Fig. 4. Fig. 6 is a sectional view on line 6—6 Fig. 5. Fig 7 is a detail view of the segmental member connecting the feed operating lever with the feed mechanism. Fig. 8 is an enlarged detail view of a portion of the mechanism for operating the weft thread measuring device. Fig. 9 is a broken sectional view on line 9—9 Fig. 8. Fig. 10 is detail view of a part of the adjustable cam shown in Figs. 8 and 9. Fig. 11 is detail view of the lever operating the thread measuring device. Fig. 12 is a detail view in front elevation of the weft thread feeder and, Fig. 13 a side elevation of the same. Fig. 14 is an enlarged horizontal sectional view on line 14—14 Fig. 13 showing shears for cutting weft thread in open position. Fig. 15 is a view similar to Fig. 14 showing the shears in closed position and also showing the cam mechanism for operating the movable shear blade. Fig. 16 is a sectional view on line 16—16 Fig. 15. Figs. 17 and 18 are detail views of parts shown assembled in Figs. 14 and 15. Fig. 19 is a broken detail view of the end of the operative shear blade. Fig. 20 is a broken detail view of the lower extremity of the slide operating the thread feeder. Fig. 21 is a sectional view on line 21—21 Fig. 15 showing the cam mechanism for operating the shear blades in elevation. Fig. 22 is a detail of spring controlled cam for operating shear blade. Fig. 23 is a sectional view on line 23—23 Fig. 14. Fig. 24 is a detail of slide for carrying thread into the guide of the measuring device as illustrated in Fig. 4. Figs. 25 and 26 are respectively elevation and plan views of the carrier for the weft thread or threads. Fig. 27 is an enlarged broken detail of one end of the carrier. Figs. 28 and 29 are sectional views on lines 28—28 and 29—29 respectively in Fig. 27. Fig. 30 is a broken detail of one end of the carrier nippers, as shown assembled in Fig. 27. Fig. 31 is an enlarged view in front elevation with parts broken away showing carrier box and mechanism for operating carrier and is taken approxi-

mately on broken line 31—31 of Fig. 46 with parts broken away and omitted. Fig. 32 is a sectional view on line 32—32 of Fig. 4 showing mechanism for opening nippers on end of carrier. Fig. 33 is a section on line 33—33 of Fig. 32. Fig. 34 is a section on line 34 of Fig. 32. Fig. 35 is a detail view of the slide operating the carrier nippers shown assembled in Figs. 4 and 32. Fig. 36 is a detail of the cam surface for operating slide shown in Fig. 35. This part is also shown in the assembled views in Figs. 1 and 2. Fig. 37 is a detail of the member which operates to release the weft thread from the carrier and Figs. 38 and 39 show a convenient means of attaching the same to any ordinary form of a temple. Fig. 40 is an enlarged view similar to Fig. 31 with parts broken away to show mechanism for operating carrier and the connection of the picker slide with the picker. Fig. 41 is a detail of the picker slide. Fig. 42 is a detail of the slide carrying a pawl for forcing the carrier into the feeder past the means operating the carrier nippers. Fig. 43 is a section taken on line 43—43 Fig. 42. Fig. 44 is a section taken on line 44—44 Fig. 40, and Fig. 45 is a section taken on line 45—45 Fig. 40. Fig. 46 is a sectional view on line 46—46 of Fig. 4. Fig. 47 is an enlarged detail view of the carrier box. Fig. 48 is a section on line 48—48 of Fig. 47. Fig. 49 is a detail vertical sectional view with parts broken away showing the mechanism for operating selvage harness and the cam and cam slide mechanism for operating the slide detailed in Fig. 42. Fig. 50 is a sectional plan view taken on broken line 50—50 of Fig. 49. Fig. 51 is a section taken on line 51—51 of Fig. 50. Fig. 52 is a detail of sliding cam for operating slide detailed in Fig. 42 and Fig. 53 is a bottom plan view of the same. Fig. 54 is a bottom plan view of picker release mechanism showing adjacent parts and the picker being shown in section. Fig. 55 is a detail view of the picker release. Figs. 56 to 59 inclusive are diagrammatic views illustrating the successive steps in laying the weft threads in the warp. Figs. 56ª to 59ª inclusive are diagrammatic sectional views illustrating the movements of the selvage warp.

The invention is shown applied to an ordinary form of a plain loom, although it will be apparent that the invention may be applied to any common form of loom. The supporting side frames are indicated by the numerals 1 and 2 connected by a suitable yoke or arch piece 3, which also furnishes a support for both the ordinary harness and supplementary harness for operating the selvage warp threads. The side frame pieces 1 and 2 may also be joined by suitable supports, as for example the cross piece 4, which may also serve as a means for the attachment of certain working parts of the loom.

As is common in this type of loom rolls or beams are provided for both the warp and the cloth, the numeral 5 indicating the warp roll and the numeral 6 the roll on which the cloth is wound. At the upper front corners of the side frames 1 and 2 is a suitable connecting beam 7 provided with a suitable surface either integral therewith or by means of a suitably formed member, as the part 8, over which the cloth is adapted to be passed and deflected thereby as it passes downwardly therefrom to the cloth roll 6. The power is applied to loom at the pulley 9, which is mounted on the shaft 10, and adapted to rotate the same said shaft 10 being carried by suitable bearings on the main frame. The usual form of vibrating lay or lathe is provided, the same being preferably pivoted near the bottom of the main frame on a rod or shaft 11, the ends of which are carried by the side pieces 1 and 2. The lay frame consists primarily of the lay-swords 12 and 13 and are pivoted on the shaft 11 by means of suitable attaching pieces 14 and 15 journaled on shaft 11 and secured to numbers 12 and 13 by bolting or other suitable means. The lay-swords 12 and 13 are connected at their upper extremities by suitable cross-piece 16 which is preferably secured to the said pieces by suitable means allowing a limited amount of vertical adjustment to the member 16, as for example, by use of slots 12ª and 13ª through which bolts provided with suitable adjustable nuts 17 may be passed. Cross member 16 is adapted to serve as the upper support for the reeds and another cross member 18 is provided, which is also secured at its extremities to the lay-swords 12 and 13 in any suitable manner and it serves as a support for the lower ends of the reeds. Thus it will be seen that the construction of the reed used for beating the weft threads into the warp does not differ from the ordinary construction, hence no further description of the same is necessary. The lay or lathe may be rocked or vibrated in any suitable manner, as, for example, by the connecting rods 19, which are pivotally connected at one end to the lay frame, and at their other ends to suitable cranks 20 preferably formed in shaft 10 heretofore described as the main drive shaft which receives its rotation from the driving pulley 9.

The heddles for forming the sheds in the warp do not differ in any particular from the ordinary construction of heddles employed in looms of the described character and hence a description of them will not be attempted except to say that they are supported by the usual form of harness 20 and 21 and balanced over pulleys carried on shaft 22 which is suitably journaled to rotate on the arched supporting portion of the frame 3. For operating these heddles the

usual connections 23 are provided by which the heddles are alternated in movements in approximately vertical planes in order to form the sheds in the warp threads which pass through them. The connecting members 23 are secured at their lower extremities to the levers 24 and 25, which are pivotally secured at their ends opposite their connections with the heddle mechanism and are caused to oscillate by contact with the cams 26 and 27, which are eccentrically secured to the shaft 28 and are adapted to be rotated thereby, since movement is given to shaft 28 from shaft 32 through gear 32ª in mesh with an intermediate gear not shown which in turn meshes with gear 29. (See Fig. 1.).

On one end of shaft 10 is secured the gear 30 connecting with the large gear 31 on the end of shaft 32. The shaft 32 carries suitable cams 33 and 34 adapted to coöperate with levers 35 and 36 pivotally secured at one end to the main frame in any suitable manner, as, for example, by attaching them to the brackets 37. The brackets 37 are attached to the main frame. Levers 35 and 36 are designed to vibrate for the purpose of operating the picker sticks 38 and 39 in a well known manner, the connection therewith being formed by means of the straps 40 and 41, or other suitable connections, secured to the laterally extending arms on the picker sticks, one of which is illustrated by the reference character 38ª Fig. 1. The picker sticks 38 and 39 are pivoted at their lower extremities in suitable connections 42, 43, which are secured to the cross shaft 11 serving also as a support for the beater frame as heretofore described. It will be seen that by this construction when the shaft 32 is caused to rotate the levers 35 and 36 will be vibrated by the rotation of their associated cams 33 and 34, which vibration being imparted through the connections 40 and 41 to the picker sticks will cause them to vibrate in approximately vertical planes in the longitudinal direction of the loom, the vibration of the picker levers causing the picker sticks to oscillate toward the middle of the loom and after the pressure of the cams 33 and 34 are released the picker sticks will be returned to normal by means of suitable springs 44 and 45.

The portions of the loom thus briefly described are of common construction and it will be apparent by slight modifications and changes the mechanism embodying the improvements may be applied to a loom of any desired construction without departing from the purpose or spirit of the invention. From the ordinary form of loom the frame work and many of the operative parts of which are herein shown, the ordinary form of shuttle and shuttle box have been removed.

In order to serve as a convenient means for the attachment of the weft thread feed mechanism a suitable frame 46 is attached to the main frame of the loom at the upper front corners by means of suitable bolts 47. This frame extends laterally from the top front side of the loom for some distance and thence extends rearwardly almost to the main driving pulley 9 at one side of the loom. The corresponding piece also indicated by the numeral 46 in the drawing extends rearwardly a like distance on the opposite side of the loom. In describing the weft thread feed mechanism and the mechanism for operating the weft thread carrier, it is to be noted that the parts at each side of the loom are duplicates in construction except that the mechanism on one side may be termed as right and that on the other side as left. Therefore in the description of these parts of the invention no distinction will be made between the parts used on the right hand side of the loom and those used on the left hand side, and the same reference characters as applied to similar parts will be used without regard as to whether the parts are used on the right hand side or on the left.

The detail construction of the auxiliary supporting frame 46 may be fully seen by inspection of Figs. 1, 2, 4, and 5. At the rearward extremity the member 46 is suitably connected with the main frame by the laterally extending arm 46ª. To furnish a convenient means for applying power to operate the feed mechanism an auxiliary rotating shaft 48 is provided extending along the entire width of the machine and being journaled in the side pieces 1 and 2 of the main frame. The ends of the shaft 48 preferably extend beyond the main frame and through the rearwardly extending branches of the auxiliary supporting members 46. For the purpose of preventing endwise movement of this shaft the ends may be made to extend beyond the members 46 into which they are journaled as described and they may be provided with suitable collars 49. This shaft may be driven in any suitable manner, as, for example, by means of the sprocket wheel 50, chain 51 and sprocket 52 secured to counter shaft 53 to which motion is imparted from any convenient moving shaft or part, as, for example, the shaft 28 through sprocket 55, chain 56 and sprocket 57.

As commonly found in the construction and operation of looms of the type herein described a way is provided at 58 on the top side of the member 18 of the lay and along this way the carrier, which corresponds in some respects to the shuttle of a loom as ordinarily constructed, is adapted to travel in passing the weft threads through the sheds in the warp. At the extremities of the way 58, and on each side of the warp

adjacent to ends of the member 18 receiving boxes 59, adapted to receive the carrier, are provided. The construction of the carrier is shown in detail in Figs. 25 to 30 inclusive. Instead of being adapted to carry a bobbin as in the case of the ordinary shuttle it will be seen that the elongated body 60, preferably constructed of wood or some suitable light material, is provided at its ends with suitable means for grasping and retaining the weft threads. This means preferably consists of the metallic extension pieces 61 secured to the body 60 in any desired manner, as, for example, by the screws 62, the heads of which are counter sunk in the body portion. It will be seen that the construction of the members 61 is such as to form one of the members of a pair of nippers. A suitable lug 63 is formed on the jaw or member 61 to which is adapted to be pivotally attached the other coöperating jaw 64, by means of pin 65. The meeting faces of the nipper jaws 61 and 64 may be provided with suitable means for better retaining the weft threads, as, for example, the counter sunk or recessed portion 61[a] and the irregular boss 64[a] adapted to coöperate therewith. The movable nipper jaw 64 may be held normally in closed position by the spring 66, one end of which is in contact with an extension thereof indicated by the numeral 64[b], the other end of the spring which is preferably of the flat type is secured to the member 61 by means of suitable screws as 67[a].

As before stated, the carrier boxes 59 are secured on the top side of the member 18 of the lay or lathe. They are provided at their extremities with a flared portion 59[a] adapted to serve as a guide to cause the carrier to readily enter the interior of the box. In order to serve as a frictional piece or brake to check the velocity of the carrier on entering the box the flat spring 67 is provided and is secured to the top of the box by the screws 68 or other suitable means. This spring extends over an opening 69 in the top of the box and a suitable member 70, having a beveled surface, is secured to the spring and adapted to pass through the opening 69 and into the path of the carrier and so check its momentum as it is received by the box from the picker. The beveled surface coming in contact with the carrier is raised, thus causing friction by reason of the pressure exerted through the spring 67.

In the ordinary loom the shuttle carrying a bobbin or supply for the weft thread is repeatedly passed back and forth from one side of the loom to the other through the successive sheds formed in the warp. In the present invention the carrier is not made to contain the weft thread supply but takes the weft thread alternately from each side and carries it through the shed as it is picked through the sheds. To accomplish these results the weft thread supplies are placed in any desired position but preferably as indicated diagrammatically at 71 Fig. 1, the weft thread being passed therefrom through the thread guides 72 carried at the outer extremities on the members 18 of the vibrating lay. From these guides the weft thread passes immediately to the feed from which it is adapted to be taken by being received within the nippers of the carrier in the manner presently to be described.

It will be apparent that the weft thread feed mechanism and the carrier box and associated parts carried on the vibrating lay are adapted to move within the housing formed by the member 46 heretofore described. The guide 72 is preferably secured to the top of the thread holder and cutter, all of which mechanism is secured to a member 73, secured by suitable screws 74 to a slide 75 which is carried in ways or grooves 18[d] at the outer extremities of the cross bar 18 on the lay frame. The slide 75 is provided with a laterally extending pin 76 preferably formed integral with same near its lower extremity, the said pin engaging in the slot 77[a] of the segmental piece 77. The slot 77[a] is preferably formed as the segment of a circle the radius of which corresponds with the distance from the pin 76 to the axis on which the lay frame is pivoted. The thread holding and cutting mechanism is therefore carried on the member 75 which is permitted to have vertical movement under control of the pin 76 sliding in curved slot 77[a], and by this construction it will be apparent that as the lay frame is vibrated the member 75 will not change its position in relation thereto until the segmental slotted member 77 changes its position by sliding in the ways 78 by which it is secured to the side of the member 46. The part 78 is secured to 46 in any suitable manner as by means of threaded screws. The member 77 which takes into the ways 78 extends downwardly as illustrated in Fig. 7 and is provided with the pin 77[b] adapted to engage in a slot 79[a] at one end of the lever 79 which is pivoted to the inner wall of the part 46 as illustrated at 79[b] Fig. 5. The other end of this lever is extended to engage with a suitable operating cam 80 which is preferably secured to the shaft 48 just on the inside of the housing formed by the member 46. This cam 80 may be constructed with a collar portion surrounding the shaft 48 and secured thereto by any suitable means, as, for example, the set screw 81. The end of the lever 79 adjacent its operating cam 80 is normally held in contact therewith by means of a suitable elastic spring 82 which is coiled around the pivot 79[b] with one end thereof secured in a hole 46[a] in the member 46 and the other end passing over and secured over the upper edge of

the lever as at 79ᵉ. From this construction it will be seen that the normal position of the lever 79 when the cam action of the eccentric part 80 is not being exerted on it will be by reason of the spring 82 to cause the segmental slotted slide to remain at the upper limit of its stroke and so hold the slide 75 and the described parts carried thereby at the upper limit of its movement. The rotation of cam 80 through the mechanism just described will afford a vertical reciprocating movement to the thread holder and cutter for the purpose of operating the same to open and close the holders and to operate the cutters to sever the thread in the manner presently to be described.

Member 73 while secured to the slide 75 is preferably held at some distance from the front face thereof by means of a suitable block 83. An irregular shape is given to one side of the member 73 enabling the shears and thread holders to be attached. An irregular piece 84 is attached to the front side of the part 73 being preferably formed of sheet metal and having tongues 84ᵃ and 84ᵇ at the upper and lower extremities thereof adapted to coöperate with corresponding tongues formed on the members 73. Pins 85 and 86 are secured to these tongues 73ᵃ and 73ᵇ last mentioned and these pins are extended through holes in the tongues 84ᵃ and 84ᵇ thus forming stops to limit the further entrance of the thread as it passes between the coöperating tongues 73ᵇ and 84ᵇ and the lower tongues 73ᵃ and 84ᵃ. Formed on the member 84 midway between the tongues 84ᵃ and 84ᵇ is another tongue 84ᶜ adapted to serve as a flat spring to press against one of the thread holding jaws on the thread cutting and holding mechanism which appears in the drawing Fig. 12 behind the tongue 84ᶜ and almost entirely hid thereby. This thread holding and cutting mechanism which appears midway between the elastic guides just described is composed of a stationary shear blade and a movable shear blade, each of the said blades being provided near their cutting edges, which are designed to act somewhat like the ordinary scissors blades, with grooves into which elastically controlled sliding members are adapted to coöperate in holding the thread there between, there being edges formed on the shear blades adapted to cut the thread passing between them when the blades are brought together. On each holder and cutter there is secured one stationary shear blade 87 which is adapted to be fastened to the member 73 by suitable screws 88, there being an upwardly extending lug 87ᵃ formed thereon with suitable screw eyes 87ᵇ. The blade is provided with a lateral extension 87ᶜ (see Fig. 17) having a hole 87ᵈ through which a suitable pivotal screw 88ᵃ is adapted to [illegible]s for the purpose of pivotally securing the movable shear blade 89 thereto. This shear blade 89 is provided with an angular extension 89ᵃ which projects almost at right angles to the body of the blade (see Figs. 14 and 15) and is tapered at its extreme end and formed into the rounded pin or trunnion 89ᵇ. As before stated, the pivotal pin 88 secures this shear blade 89 to the blade 87. The character of the cutting edge of both these blades 87 and 89 is best shown by reference to Figs. 16 and 17 in which it will be seen that a groove is formed along their cutting edges as indicated at 87ᵉ and 89ᵉ Figs. 16 and 17. It will be seen, however, that although these grooves are formed in the cutting edges of the shear blades 87 and 89 the material adjacent their flat surfaces is not beveled away but that they are so shaped that when passed over one another as in the use of ordinary scissors they will exert a shearing action to cut the thread. The blade 87 adjacent its point is provided with a screw threaded hole 87ᶠ and the blade 89 is also similarly provided with a screw threaded hole into which in both blades the threaded screws 90, 91 are adapted to be inserted for the purpose of securing the thread holders 92 which are adapted to cooperate with the shear blades 87 and 89, being provided with the beveled edge 92ᵇ adapted to enter the grooves 87ᵉ and 89ᵉ for the purpose of securing the thread there between both before and after the shear blades operate to sever the thread. The screws 90 and 91 accomplish this purpose by passing through the slots 92ᵃ in the members 92 and these slots being somewhat elongated permit of a certain amount of lost motion between the members 92 and the shear blades to which they are secured but being held securely by reason of the comparatively large heads provided on the screws. Flat elastic springs 93—94 are provided to hold the members 92 in constant engagement with their coöperating shear blades when shears are closed, the slot 87ᵍ in the blade 87 being adapted to take the spring 93 while a similar slot formed in the blade 89 is adapted to take the spring 94. By this construction it will be seen that when the weft thread is once passed through the guide 72 between the elastically controlled tongues 73ᵇ and 84ᵇ, past the cutting and holding device just described and between the elastically controlled tongues 73ᵃ and 84ᵃ, sufficient means will be provided for retaining control of the same at all times. If the thread be severed by the operation of the shear blades 87 and 89 their coöperating holding members will retain secure possession of the cut ends until these ends be pulled therefrom forcibly. It will now also be apparent that the vertical movement of the member 75, which carries the parts just described, is for the purpose of operating the shears which is accom-

plished by the mechanism shown in Figs. 13, 15 and 21 and to an extent also in Fig. 5. The arm 89[a] which controls, as before stated, the movable shear blade 89 by reason of the trunnion 89[b], enters an irregular cam surface 95 formed in a block 96.

On the interior of the cam surface 95 a spring controlled switch is secured as illustrated in Figs. 15 and 21, the switch member 97 being shown in detail in Fig. 22. It is provided with a hole 97[c] by which it is secured to a pin 100 journaled to rotate in the metallic piece 98 to which the block 96 is attached. The member 98 is designed to serve as a support only for the block 96 which is accomplished by the lower extremity of the same being fastened by screws or other suitable means to the member 18 on the front side of which are the sliding ways into which the carrying slide 75 is secured. The irregular switch member 97 is normally held in the position shown in Fig. 21 by reason of a spiral spring 99 which is connected at one end to the member 98 and at its other end to the pivotal pin 100, to the inner end of which is rigidly secured the switch piece 97. By means of this construction it will be seen that as the shear mechanism be given a vertical movement, or a vertical reciprocation, relative to the cam block 96, the trunnion 89[b] will be caused to travel approximately the path of the outline of the cam surface 95 which is more or less triangular in shape and hence the arm 89[a] will be vibrated on its pivotal axis 88 thus operating the shear blade 89 relative to the stationary blade 88.

The carrier box 59 is carried on the upper side of the cross member 18 on the lay and consists of an elongated top and side member adapted to coöperate with the member 18 and at the rear with the upwardly extending flange 101 which is secured on the top of the member 18 and may be suitably secured at one end to the lay-swords 12 and 13.

It will be seen that by this construction the carrier box 59, situated as it is, in conjunction with the member 18 and the member 101, forms a closed elongated box open at each end and adapted to receive the carrier therein as illustrated in Figs. 4, 31 and 46. The spring controlled friction member 70 has already been described. The front side of the box 59 is provided with a hinged member 59[a] forming a portion of the side, and being pivotally connected thereto and carrying a wedge shaped member 102 as illustrated in Fig. 48 by which when the carrier enters the box the hinged member 59[b] is forced outwardly to operate the pivoted arm 103 secured on the end of the shaft 104 journaled on the lay by an appropriate bearing member 105, the threaded bolt and nut 106 (see Fig. 4) being utilized for this purpose. The function of the parts just described consisting of the means for rocking shaft 104 by the entry of the carrier within the box and the consequent working outwardly of the pivoted member 59[b] is to cause a suitable member of common construction in this type of looms secured to the shaft 104 to be held out of contact with a rigid stop but which member is adapted to move into the path of the rigid stop when the carrier fails to enter the box 59 and so operate the arm 103 and the shaft 104 in the manner described. The construction just described comprises the ordinary knock off construction used on looms of this type for preventing the lay from coming in contact with the carrier and beating it up in the shed should the carrier fail to pass entirely through the warp at each succeeding pick.

In the brief description already given of the manner in which the weft threads are inserted within the sheds it will be apparent that the weft threads before being severed must be accurately gaged or measured in order that in length they may be approximately double the width of the fabric being woven. In order to accomplish this purpose an improved weft thread measuring device is provided consisting essentially of a movable slide 107 shown in detail in Fig. 24. A suitable guide member 108 is provided having a way 108[a] in which the slide 107 is adapted to be held and allowed to reciprocate in substantially a vertical line but being inclined outwardly slightly at the bottom and extending some distance below the bottom of the frame member 46 and being secured to cross member 18 by screws 108[b] near the thread holder and cutter. The relation of the slide 107 and its guide support to the associated mechanisms with which it is designed to coöperate in preparing and cutting the weft threads is best shown in Figs. 4 and 31.

The slide 107 is provided with the thread hook 107[a] secured to or formed integral with the same near the top thereof. At about one third of the distance from the bottom of the slide 107 a hole is formed therein as indicated at 107[b] and is threaded to take a screw on which the slotted operating arm 109 is secured, said screw being indicated by the numeral 110, Figs. 4 and 5. The lever 109 is provided at the end engaging the screw on the slide 107 with an elongated slot 109[a], and is pivoted near the other end to a suitable depending lug or ear 111 secured in any convenient manner to the lay. The pivotal pin passing through the ear 111 on which the lever 109 is adapted to oscillate is indicated at 112, and in order that the lever 109 may be held in normal position a coil spring 113 is secured around the pivot pin 112 with one end thereof in engagement with the lug 111 and the other end engaging with

the lever thereby holding the slotted end normally at the upward limit of its movement, causing the slide 107 to be normally held in the position indicated in full lines in Fig. 4. It will be noted that the other end of the lever 109 is provided with an irregular downwardly extending angular portion 109[b] on the under side of which is a surface adapted to be engaged by the lever 114, the purpose of which is to actuate the lever 109 against the action of the spring 113 to cause the slide 107 to assume the position indicated in dotted lines in Fig. 4. It is preferred that provision be made for a slight adjustment of lever 109 which may be accomplished by dividing the lever in two parts as indicated in Fig. 4 and securing the two parts together by pin or screw 115, the provision for adjustment consisting of a suitable pin or lug on the extended end 109[c] adapted to take into any one of the plurality of holes 116 in the other portion of the divided member. By this construction it will be seen that the relation of the portion of the lever containing the slot 109[a] may be adjusted within certain limits in relation to that portion which is pivoted on the lay and in engagement with the operating lever 114.

The lever 114 and the means for actuating same are clearly illustrated in Fig. 8, and it will be seen that it comprises an irregular shaped arm provided with cam surface 114[a] adapted for engagement with lever 109, said surface being inclined somewhat to the body portion of the lever which is pivoted by suitable pin 117 to the main frame 2. Beyond the pivotal point of this lever is an irregular extension 114[b] adapted to engage with the cam 118 on shaft 48. The construction of cam 118 is shown in detail in Figs. 9 and 10 and it will be seen that it is made adjustable by having its engaging surface constructed on a separate piece 118[a] adjustably secured between the bifurcated branches on the cam 118, a slot 118[b] being adapted to receive suitable screws 119 by which the parts are locked together. Cam 118 is provided with a suitable collar portion or sleeve adapted to be passed over the shaft 48 and locked thereto by suitable set screw 120. It will be noted that the slide 107 carries on the front face near the top a thread engaging hook or projection 107[a] extending forwardly (see Fig. 5) in order to grasp the weft thread when the same is drawn from the holding jaws across the path of movement of the slide 107 by the nippers on the carrier. As the slide 107 is depressed by sliding in the ways or grooves 108[a] in the guide 108 it will be seen that the weft thread being firmly retained between the nippers on the carrier will be pulled through the guide 72 and downwardly between the elastic guide formed between the tongues 73[b] and 84[b] and in this manner any desired amount of the weft thread may be measured off in order that the exact amount desired for insertion in the sheds may be available without the necessity of the same being drawn immediately from the supply without the loom, by the pick of the carrier.

Reference has already been made to the construction illustrated herein which is a common form of mechanism employed in vibrating the picker sticks. In order to make the picker mechanism available for use in the present invention the upper ends of the picker sticks 38 and 39 are provided with means set forth in detail in Figs. 40, 41, 44, 45, and 46 comprising a suitable bifurcated member 121 attached thereto in any suitable manner as by threaded screws 122. This upper extremity of the picker arm extends upward into the interior of the member 18 on the beater frame entering a suitable housing or cutaway portion provided therein for that purpose (see Figs. 40 and 44). The member 18 is further cut away to provide an elongated recess closed at the bottom immediately under the carrier box in which a picker 123 is carried and adapted to be operated by means of a suitable link connection with the picker sticks 38 and 39, said connection comprising the link 124 and the pivotal pins 125 and 126 secured respectively to the bifurcated member 121 on the picker arms and a similar bifurcated member 127 secured to the picker 123 by suitable means as the screws 128. On the end of the member 123 opposite the said pivotal connection is provided an upwardly extending lug or finger 129 (see Figs. 40, 41, and 31), which is adapted to extend upwardly through a suitable opening within the carrier box and thus being adapted to actuate the carrier when the arms 38 and 39 are oscillated.

In Figs. 31 and 40 the picker arms and the mechanism operated thereby just described are shown in normal condition attained by means of the springs 44 and 45 before referred to, and this position of the picker parts it will be seen permits the carrier to enter the carrier box unless interfered with by the action of the carrier control presently to be described. It will be apparent that with the carrier in the box a quick oscillation of the picker sticks will cause the picker finger 129 to engage the end of the body portion of the carrier and to forcibly discharge the carrier sending it on its way through the shed into the opposite carrier box. The carrier box being firmly secured to the beater frame by the lugs 59[c] and screws 130, the carrier on entering the box will have its momentum checked by contact with the elastically controlled member 70, but it is not designed that the carrier shall be entirely checked or stopped until it has reached the limit of its move-

ment within the box or until it comes in contact with the picker finger 129 in its normal position heretofore referred to as being shown in Figs. 31 and 40. It will be noted by referring to Fig. 40 that the picker 123 while being referred to as shown in normal position has apparently not reached the extreme limit of the amount of movement provided for the picker stick 39. Until it is desired however, that the carrier shall be further moved within the box to permit the nippers thereon to enter the thread holding mechanism the finger 129 is designed to serve as a positive stop which is effected by means of the pivoted lock member 131 the laterally extended end 131[a] of which is normally designed to contact with the picker levers 38 and 39. This pivoted stop member is secured to the under side of the member 18 by suitable pin or screw 132 being held in normal position by spring 133 interposed between it and the member 18 by means of screws 134 and 135, as shown in the assembled view in Fig. 54, the detail of this stop being illustrated in Fig. 55. The end of the member 131 opposite the angular stop portion 131[a] is provided with an angular downwardly extending portion 131[b] which is normally designed to assume the position indicated in Fig. 50 adjacent the sliding cam 136 which carries a pivoted pawl 137 designed to contact therewith when the cam 136 is reciprocated, and in this manner the stop 131[a] is tripped when desired thus permitting the picker arms 39 and their associated mechanisms to pass to the extreme limit of their movement in the direction of the weft thread feed thus permitting the carrier nippers to enter the feed for the purpose of receiving the thread. It will be apparent that this provision will prevent the carrier from entering the weft thread feed mechanism until desired thus preventing possible injury to these parts which might occur should there be any possibility of the carrier coming in contact with the feed mechanism while under the momentum imparted thereto during the pick. A suitable stop as the screw head 138 is adapted to check the movement of the stop lever 131 against the action of spring 133, and similarly a stop as the screw head 139 in the edge of the cam 140 is adapted to serve as a stop for the pawl 137, and also to cause the same to withdraw when 136 is withdrawn. This pawl is pivoted at 141 and controlled by a spring 142 secured to cam plate 136 by screw 143. The cam plate 136 shown in detail in Fig. 52 is adapted to slide in ways or grooves 140[a] in a plate 140 secured to a bracket 144 carried on main frame member 7. The sliding cam plate 136 is adapted to be actuated by a suitable cam 145 journaled on rotating shaft 48 and secured thereto for rotation with the shaft by any suitable means as the set screw 146. It will be noted that this cam is provided with an irregular surface adapted to contact with anti-friction rollers 147 on the end of the sliding cam 136, the cam being held normally in contact therewith by suitable elastic means as the spring 148 secured at one end thereto by the screw 149 and at the other end to bracket 144 by screw 150. From the construction of the cam 145 it will be apparent that it is adapted to give two complete reciprocations to the cam plate 136 at each complete revolution of shaft 48 and that by reason of the concentric delay surfaces 145[a] the cam plate will be retained for a time at the forward limit of its movement at each reciprocation thereof. In addition to providing means for releasing the picker mechanism to permit the entry of the carrier into the feed mechanism the cam 136 serves another purpose by reason of its angular surface 136[a] which is adapted to coöperate with the downwardly extending projection 151[a] of the member 151 which forms a part of a slide shown in detail in Fig. 42, the body portion thereof being indicated by the numeral 152. This slide is adapted to reciprocate longitudinally of the lay below the under surface of the interior of the carrier box and carries a spring pressed pawl 153 projecting upwardly within the carrier box. From the shape of the cam surface 136[a] it will be seen that it is adapted to move this slide in the direction of the weft thread feed mechanism.

When the carrier is within the box and before it continues its movement to enter the weft thread feed mechanism the parts will assume approximately the position indicated in Fig. 31 but immediately after the momentum of the carrier has been slightly checked and has passed beyond the pawl 153 which rises up behind it, the movement of sliding cam 136 and trip pawl 137 causes the picker mechanism to be released by tripping of the stop 131[a] and at the same time the cam 136 starts the slide 151 forwardly thus bringing the pawl 153 into contact with the carrier and continuing its movement until it has entered the thread feed and the nippers have been opened to secure the weft thread. It will be seen that the release of the picker mechanism will cause the finger 129 to be moved to the extreme forward limit of its movement out of the way of the carrier in approaching the weft thread feed. The pawl 153 shown in detail Fig. 43 is pivoted to the member 152 by suitable pin 154 and is held in normal position by means of a suitable elastic spring 155 in contact therewith and attached also to the member 152. It will be noted that the shape of pawl 153 will permit the carrier to readily pass over it by depressing it as it enters the shuttlebox, and that being elastically controlled it will spring into position normally behind the

carrier thus preventing the rebound of the carrier after entering the box as well as serving as a positive means in continuing the carrier movement as just described. To provide for the return of the pawl slide carrying pawl 153, after its release from the action of cam 136, a suitable elastic spring 156 is interposed between the member 18, being secured thereto at 157, and the pawl slide to which it may be secured by the threaded screw eye 158. The member 152 of the pawl slide may be of any suitable construction but is preferably shaped as shown in Fig. 42 being adapted to carry anti-friction rollers 159. When slide carrying pawl 153 is released the spring 156 causes the pawl to be depressed under flange at 18^c.

It will be noted that cam slide 136 as well as the supporting member 140 are provided with angular surfaces 136^a 140^b adapted to impart movement to depending end 151^a of slide 151. These angular surfaces are adapted to approximately coincide when the cam plate 136 is in its normal or withdrawn position. A slot 140^c is provided in the member 140 to permit the entry of the screw 149 when the cam 136 is in its normal or withdrawn position with relation to the plate 140. To compensate for wear or other variations in the movement of the pawl 153 in forcing the carrier to the desired limit of movement in relation to the thread feed the cam surface 136^a is made adjustable by the addition of the plate 160 on the under side thereof provided with the adjustable cam surface 160^a made possible by the pivoting of this plate to 136 at 161 and the slot 160^b and adjusting screw 162.

The construction of the carrier nippers has already been described. It will be apparent that when the carrier is operated by the means just described to approach the weft thread held in the feed mechanism the movable nipper jaw 64 must be operated to receive the thread. This result is accomplished by means of the sliding member 163 adapted to have a vertically reciprocating movement and is mounted on the flange 101 which is carried on the top of the member 18 of the beater frame and secured to the upright branch of said frame 13 by any suitable means as the screws 164. The irregular piece 165 provided with the side grooves 165^a serves as a means for supporting the slide 163 and permitting vertical movement in relation thereto. This supporting member 165 is secured to the part 101 adjacent to the end thereof by any appropriate means as the screws 166. From the construction of the part 163 it will be apparent that the side flanges 163^a are adapted to slide in the groove 165^a. This part is also provided with a rearwardly extending branch 163^b adapted to receive on the under side one end of the flat spring 167, the other end of which is secured to the top side of the member 101 by any suitable means as the screw 168. The lower end of the body portion of the slide 163 is provided with the forwardly and downwardly projecting branch 163^c somewhat rounded or beveled on the back side as shown in the sectional view Fig. 34. This branch 163^c when depressed by contact of the upper end of the slide 163 with the stationary cam surface 169 is adapted to lie in the path of the carrier nippers just before entering the feed mechanism and the contact of the rearwardly extending portion of the nipper jaw 64 by reason of the angular surface 64^c contacting with 163^c serves to open the jaw and admit the weft thread within the nippers, after passing which the nipper jaw closes on the thread. Before the pick of the carrier the lay carries the slide 163 out of contact with the angular surface 169, and the spring 167 will return the slide 163 to normal, and out of the path of the carrier so that the weft thread may be firmly held during the pick of the carrier through the shed. The angular surface 169^a on the part 169 designed to operate the slide 163 is secured to the front branch of the supplementary frame piece 46 and extends rearwardly as best illustrated in Fig. 2. This part is preferably formed from a strap of metal bent into the desired shape as illustrated in Fig. 36 and preferably has a downwardly extending branch or brace 170 secured thereto as by the screws or rivets 171. Suitable screws or bolts 172 serve as means for securing this part and the brace member 170 to the member 46. (See Fig. 1.)

Since the operable nipper jaw on the carrier extends forwardly, a very simple means secured to some part of the main frame or other stationary part of the loom is sufficient to open the nippers to release the weft thread when the same has been carried through the shed. The part 173 is adapted for this purpose and comprises an irregular shaped member as shown in Fig. 37 provided with holes 174 and 175, by which it may be secured to the ordinary form of temple as illustrated in Figs. 2, 38 and 39 by screws or other suitable means as 176. The body of the temple which is of ordinary construction and need not therefore be particularly described is indicated by the reference character 177, and is secured to a suitable supporting bracket 178 carried by the main frame, the means of attachment for securing the temple to the bracket being the threaded bolt 179.

Attached to the arch member 3 extending over the main frame is the means for carrying or supporting the supplementary selvage harness and comprises the brackets 179 carrying the grooved pulleys (see Figs. 1 and 3) 180. These pulleys are suitably journaled to rotate, and the harness 181 which

passes over these pulleys is of the ordinary construction and designed to support heddles 182 also of the ordinary construction except that these supplementary heddles comprise means for controlling only a limited number of the warp treads adapted to form the selvage on either side. The mode of operation of these supplementary heddles is precisely the same as the common form of heddles as illustrated in Fig. 1 carried on the harness 20, 21 and now indicated in the drawing Fig. 1 by the numeral 183, it being understood that the heddles are arranged in pairs as provided for their operation by the two pairs of straps 20, 21. As the mode of operation of the heddles in forming the sheds in the warp is old and well known no detailed attempt at further illustration or description is necessary.

The means for operating the supplementary selvage heddles may be seen by referring to the illustrations Figs. 3 and 49 in which the lower extremities of the heddles 182 are shown passed around small anti-friction rollers or sleeves of any desired character 184 secured to suitable links 185 pivotally attached at their lower extremities to the vibrating levers 186 and 187, both of which are pivotally secured on a common pivot pin 188, carried on the downwardly extending branch 144ª of the bracket 144 heretofore described as furnishing a support for the cam mechanism operating to control the movements of the carrier, and which bracket is secured to the top front cross bar 7 on the main frame by means of the screws 189 or other suitable fastening devices. The operating levers 186, 187 extend beyond the point of their pivotal connections with the bracket 144 and are adapted to engage the operating surface of suitable cams 190 and 191 cast integrally with or secured in any desired manner to a sleeve 192 inserted on the shaft 148 and locked to rotate therewith by set screw 193. The levers 186, 187 are held normally in engagement with the surfaces of their said operating cams by means of suitable springs 194 and 195 secured to the bracket 144ª at one end and bearing against the levers at their other ends. It will be seen that the cams 190 and 191 are arranged approximately at an angle of 180 degrees and by this construction when the lever 186 is operated in one direction to the extreme limit of its movement the lever 187 will occupy exactly the opposite position, a movement common and necessary in the operation of heddles.

In the description of the lay reference has been made to the reeds used for beating the weft thread into the warp shed. A common form of reeds is illustrated by the broken front elevation view shown in Fig. 40 and Fig. 44, the reeds being indicated by the numeral 196 and shown secured to a suitable member 197 extending longitudinally of the member 18 in a suitable groove formed therein. The upper ends of these reeds are secured to the top cross member 16 of the beater frame.

The numeral 198 indicates the pins used for securing the cross member 16 to the uprights 12 and 13 of the beater frame. These pins are preferably threaded and provided with winged nuts 199 as shown in Fig. 3.

Throughout the assembled views of the loom Figs. 1, 2, and 3, parts are shown which as before indicated are common in the class of looms to which the invention refers and to many of such parts attention has not been given in the description, nor have reference characters been applied to many of these parts, which are so old and well known as to require no description to those skilled in the art. But in every case where parts are illustrated in the said assembled views and reference characters are not applied, it is to be understood that such parts are included only for the purpose of showing a completely operative loom, and that they have no further reference to the invention. For example the hand wheel 200 on the shaft 20 adjacent to gear 30 is commonly found in this class of machines, as is also the lever 201 pivoted to the main frame of the loom at the other end and designed by appropriate connections to operate the belt shipper 202 from the idle pulley 203 to the driving pulley 9. The common form of mechanism is also shown adjacent the warp and cloth rolls 5 and 6 for operating these parts in the usual manner.

The operation of the loom is as follows: The weft thread indicated by the numeral 71ª is passed over the guides 72, carried on each end of the lay or lathe, and in threading the loom to start, the weft is preferably inserted at once into the nippers of the carrier, although the same result may be accomplished by passing the thread downwardly between the guide members at the top of the feed into the holding and cutting mechanism, where it is grasped between the elastically controlled members 92 and the slots in the shear blades. The carrier by means of the mechanism already described in entering the feed just above the shears is opened and the nippers receive the thread, which will be firmly held therein. The carrier may now be picked through the shed, and passing along the way on the lay, enter the opposite carrier box, carrying the end of the weft thread through the shed, thus pulling a sufficient length of the thread through the guide 72 to measure the distance of travel of the carrier. At the opposite carrier box, in starting the loom, it will be apparent that the same operation of threading the weft from that side will be repeated,

but that before the carrier enters the opposite box, the weft thread just carried through the warp will be released by the stop 173 carried on the temple, as already described, which contacts with the carrier nippers, causing them to open and release the end of the thread. This opening of the nippers and release of the thread occurs near the beat-up of the lay, thus beating the weft thread into the shed in the usual manner. The result of the pick of the carrier just described, which may be assumed as passing from the right toward the left side of the loom, is illustrated diagrammatically in Fig. 56 of the drawings, the weft thread being indicated by the numeral 72ª, the main warp threads by the numeral 250, and the selvage warp threads by the numeral 251. The selvage heddles and harness, and the mechanism for operating the same, have already been described, but it should be here noted that in order to accomplish the desired results with the use of this auxiliary selvage mechanism, the cams 190, 191, on shaft 148, which operate these heddle levers 186, 187, are timed so that the supplemental heddles shift only on each alternate shift of the main warp heddles. By this mode of operation of the selvage heddles, it is possible to bind a cut end of each weft thread in the same selvage shed with an adjacent folded or continuous end of the weft, a result highly desirable in firmly securing the alternate cut ends of the weft threads in the selvage of the woven cloth. The weft thread having been inserted in the shed formed in the main warp and the selvage warp by drawing the end through in the manner indicated in Fig. 56, both the main heddles and the supplemental heddles controlling the warp threads are simultaneously shifted, following the beat of the reed, and the shed which binds the weft thread is thus completed, including the binding of the thread within the selvage warp as illustrated in Fig. 56ª. The nippers on the opposite end of the carrier having engaged the weft thread 72ᵇ from the opposite feed, the carrier is now picked along the way or race into the original carrier box, thus drawing the weft thread 72ᵇ through the shed in the warp from left to right, as indicated diagrammatically in Fig. 57, the forward end of the thread being released from the carrier nippers just preceding the usual beat from the reed, the opening of the nippers being accomplished by the stop piece 173 on the temple, before described. It should be noted that at this time, although the main warp heddles shift to bind the weft within the shed in the usual manner, the auxiliary selvage heddles do not shift, hence the selvage sheds remain open for a succeeding movement of the carrier. (See Fig. 57ª.) In order to understand the operation of the weft thread feed in coöperating with the carrier to measure, cut and pass the cut end of the remaining half of the original weft 72ª to the carrier nippers to be inserted in the warp on the succeeding passage of the carrier from right to left, or on its second trip or pick from the original carrier box; it will be necessary to observe the relative movements of the thread holding, cutting and measuring devices, beginning with the moment that the carrier leaves the original carrier box on its pick from right to left. The cam 80 on shaft 48 (see Fig. 5) heretofore described, controls the movements of the thread holding and cutting mechanism carried on sliding member 75.

At the time the carrier leaves the original carrier box on the first pick from right to left, the cam 75 is in approximately the position indicated in Fig. 4, but is already approaching the lowermost limit of its movement caused by reason of the lever 79 passing onto the cam surface 80ª, the completion of which movement depresses the slide 77 and through it the pin 76 on slide 75, which brings the trunnion 89ᵇ on shear operating lever 89ª in position in the cam slot 95 to pass beyond the lowermost limit of the pivoted cam switch 97. Soon after the carrier leaves the carrier box on its initial trip from right to left, the cam surface 80ª passes beyond the end of lever 79, thus allowing the adjacent end of this lever to drop in contact with the surface 80ᵇ, a movement which, by reason of the controlling spring 82, lifts the slide 75, bringing the trunnion 89ᵇ up against the lower surface of the cam switch 97 almost, but not quite, past the upper limit of this pivoted cam switch. The carrier now having been picked on its way, this upward movement of the thread-holding mechanism opens the cutting shears, and in separating these blades at the same time separates the holding jaws 92 from their associated shear blades, thus permitting the entrance of the weft thread. At the same time, the opening action of the shears, or, to speak more accurately, the opening movement of the blade 89 contacting with the tongue 84ᶜ on the elastic member 84, also separates the tongues 84ª and 84ᵇ from their associated jaws 73ª and 73ᵇ, thus opening these thread guides at the same time that the shears and their associated holding members are open. As soon as these parts have reached the position just described, the thread measuring device is brought into action by reason of the action of cam 118 acting through pivoted lever 114 and lever 109. This movement of the lever 109 depresses the measuring slide 107 approximately to the position indicated in dotted lines in Fig. 4. It will be noted that the carrier on leaving the original carrier box has drawn the weft

thread after it, and consequently left the thread in position so that the finger or pin 107ª, by reason of its slightly hooking construction, will engage the thread and draw it downwardly, pulling the required amount of slack thread through guide 72 from the source of supply without the loom. In order that a suitable means for shielding the thread may be provided when it is thus measured, the curved guide members 220 and 221 are secured together by the connecting bands or bonds 222, 223, and are fastened in any suitable manner to the lay, as by a clip 224, and screw 225. By referring to the part indicated by the reference character 220ª it will be seen that grooves are provided into which the threads may be laid as the measuring hook 107ª traverses the space between these guides. These grooves, as shown at 220ª, may be lined with velvet or other suitable material (not illustrated in the drawings) having a heavy nap in order to slightly hold or tension the thread after release by the measuring finger 107ª. It will be apparent that since the elastic guides and the cutters and holders on slide 75 are open during this movement of the measuring device as just described, the thread will be inserted therein. By this movement of the measuring mechanism it will be apparent that a sufficient quantity of the weft thread may be measured off between the holding and cutting mechanism and the warp in order to furnish an end sufficient in length for folding or passing back across the warp. It will be noted that it is the cam surface 80ᵇ on cam 80 which holds the mechanism on slide 75, including the cutting shears, in open position. This surface is so timed that the parts are held open until the measuring slide 107 reaches the lowermost limit of its movement and starts on its upward return, thus slightly releasing the tension on the thread. At this moment the lever 79 is caused to drop at its forward end into contact with the surface 80ᶜ on cam 80, which further elevates the slide 75 carrying the trunnion 89ᵇ on lever 89ª beyond the upper extremity of the pivoted cam switch 97, thus releasing the lever 89ª and allowing the trunnion to have the movement indicated in Fig. 21 from left to right across the upper side of the triangular cam slot 95. This release of the shear blade 89 causes it to be closed by reason of the elastic tension exerted thereon by the member 84, which being of sheet metal may also be adapted to serve the purpose of a spring. The closing of the shear blades severs the thread, the ends of which are firmly held, as before described, within the grooves on the blades. It will be seen that the thread holding and cutting mechanism has now reached the upward limit of its movement, where it will remain during the interval that the surface 80ᶜ on the cam 80 is in engagement with the lever 79, which is for a little more than 180° of its circumference. These parts remain in this position, which causes the shearing and holding mechanism to be held above the path of the nippers, thus allowing the carrier on its reëntry into the carrier box and on the completion of its movement into the feed to grasp the cut end of the weft thread 72ª just below the shear blades.

In Fig. 4 the feed mechanism carried on slide 75 is shown relatively higher than in Fig. 31, while in Fig. 31 the relation of the shears and holding devices are shown depressed until the carrier encounters the thread on the upper side thereof. But after the thread is measured and cut, as just described, the upward movement of the slide 75 carries these parts into position for the nippers to engage the thread on the under side of the shears. Now, it will be seen that the carrier having been picked across from the left to the right of the loom, may reenter the carrier box and its movement be continued within the box by the mechanism already described until the nippers receive and close upon the thread below the shears. The carrier is now picked on its return through the warp from right to left, and in leaving the feed mechanism pulls the cut end of the weft thread from between the lower shear blade and its associated holding member 92, the upper cut end of the thread, however, remaining firmly held between the upper shear blade and its holding member 92. On this second pick from the original box it will be seen that the weft thread 72ª will be completely inserted within the warp with both its cut ends appearing in the selvage at the left hand side of the cloth, and being folded upon itself in the right hand selvage. As already stated, before this second pick of the carrier from right to left the selvage warp heddles were not operated, so that it will be seen the folded end of the last ply of thread 72ª will be laid within the same shed as the cut end of the thread 72ᵇ in the selvage warp at the right, while at the left the folded end of the thread 72ᵇ will appear in the corresponding shed with the cut end of the second ply of the thread 72ª. (See Figs. 58 and 58ª.) When the carrier reënters the box at the opposite or left side of the loom, the auxiliary warp heddles shift simultaneously with the main heddles. It will be apparent that as before the carrier on entering the opposite carrier box will have released the cut end of the weft thread near the end of the beat-up of the reed in beating the weft into the shed, and it will be further apparent that upon the carrier approaching the feed on the left hand side of the loom, the movements of the feed and measuring devices just described will have been repeated, so that the nippers may pass below the shears and grasp

the cut and measured end of the weft thread and lay this ply within the succeeding shed of the warp on its return pick. Having now completed the cycle of its movement, the carrier on entering the original box or the one at the left, will find the combination of the holding, measuring and cutting mechanism the same as on the first pick, except that the end of the weft thread supply is now held between the upper shear blade and its associated member 92, and it will also be found that the lever 79 controlling the feed mechanism has passed on to the cam surface 80ª, thus depressing the feed mechanism until the carrier nippers may take the end of the weft thread supply by passing above the shears and between the holding jaws 73ᵇ and 84ᵇ and the shears. The last return movement of the carrier just described in its effect on the weft threads is illustrated in Fig. 59, while Fig. 59ª illustrates the manner in which the ends of the weft threads are formed in the selvage warp. It will be seen that the carrier may now leave the carrier box on the right and all movements heretofore described of the various parts will be repeated, except that the warp heddles operating only on each alternate pick of the carrier, the next weft thread will be laid within the same shed in the warp threads as shown in Fig. 59ª, so that thereafter during the operation of the loom there will be one cut and one folded end of the weft threads beaten together in each selvage shed. It is found that this method of forming the selvage serves to firmly bind the weft threads, thus making, for most practical purposes, as satisfactory selvage as secured by the use of the continuous weft thread as produced by the common type of loom, in which the weft thread supply is carried on the shuttle.

In order that the invention might be fully understood, the details of an embodiment thereof have been thus specifically described, but

What I claim is:—

1. In a loom of the character described the combination of a carrier for the weft thread, nippers at each end of the carrier, means for presenting the cut end of a weft thread to the carrier nippers, means for picking the carrier, means for measuring and cutting from the weft thread supply a second length equal to the warp width and integral with the length passed through the shed by the first pick of the carrier, means for presenting the second cut end of the weft thread, to the carrier nippers, and means whereby each cut end of the weft may be beaten into the same selvage shed with a continuous or folded selvage end of a weft thread.

2. In a loom of the character described the combination with a lay of a weft thread carrier provided with thread engaging means at each end thereof, a way or race for the carrier on the lay, weft thread feed mechanism carried on the lay adjacent the ends of the said carrier way or race, and means carried on the main frame of the loom in operative relation with the said feed mechanism adapted to impart movement to said feed mechanism.

3. In a loom of the character described the combination of a weft thread carrier, a main frame, a lay, a carrier way or race on the lay, a carrier box at each end of the way or race, weft thread feed mechanism adjacent the said carrier boxes, and means for operating the feed mechanism comprising a segmental slide engaging the feed mechanism and carried by the main frame of the loom and means for imparting a reciprocating movement thereto.

4. In a loom of the character described the combination with a lay, of a carrier, a thread feed secured to the lay, a slide on the lay adapted to carry the thread feed, and means for operating the said slide comprising a segmental sliding member secured on the loom frame, and a pivoted lever operatively connected with an eccentric carried on a rotating shaft and with the said segmental sliding member.

5. In a loom of the character described the combination with a weft thread carrier provided with nippers, of a temple carried by the loom frame, and means secured to the temple for opening the carrier nippers at the end of the pick of the carrier to release the weft thread.

6. In a loom of the character described the combination with a lay, of a weft thread carrier, a way or race for the carrier on the lay, thread feed mechanism at the ends of the way or race, nippers on the carrier, a sliding member on the lay adjacent the feed mechanism adapted to open the nippers, and stationary means in the path of the lay for moving the said sliding member into and out of the path of the nippers.

7. In a loom of the character described the combination with a main frame, of a lay, a way or race on the lay, thread feed mechanism carried by the lay adjacent the ends of the way or race, a weft thread carrier adapted to be picked along the said way or race, a rotatable shaft journaled in the main frame, an eccentric cam carried thereby, a pivoted lever coöperating with the said cam, and a segmental slide connected with the said pivoted lever and in operative relation with the thread feed mechanism whereby the said mechanism is operated during the vibratory movement of the lay.

8. In a loom of the character described the combination with a main frame, of a

lay, weft thread feed mechanism carried on the upper ends thereof, and a supplementary frame member carried by the main frame and adapted to serve as a housing for the said thread feed mechanism.

9. In a loom of the character described the combination with a main frame, of a lay, weft thread feed mechanism carried on the upper ends thereof, a supplementary frame member secured to the main frame and adapted to serve as a housing for the said thread feed mechanism, and means carried by the said supplementary frame to operate the thread feed mechanism during the vibratory movement of the lay.

10. In a loom of the character described the combination with a lay, of weft thread feed mechanism carried thereby embodying thread holding and measuring mechanism, and thread cutting shears comprising a stationary and a movable blade, auxiliary thread holding means on said blades, an operating lever secured to the said movable blade, and a cam mounted on the lay and coöperating with said lever on the movable shear blade.

11. In a loom of the character described the combination with a lay, of a weft thread carrier, weft thread feed mechanism adapted to coöperate with the said carrier and comprising thread holding, cutting and measuring means, the said thread measuring means embodying a reciprocating member carrying a thread engaging finger, and a pair of approximately parallel grooved members into which the thread is adapted to be laid during the movement of the thread engaging finger.

12. In a loom of the character described, the combination with a lay, of a weft thread carrier, and weft thread feed mechanism comprising a reciprocating member, a pair of spaced thread holders carried thereby, and thread cutters interposed between the said spaced holding means, said cutters comprising a pair of pivoted blades provided with grooves adjacent their cutting surfaces, and elastically controlled members adapted to coöperate therewith to hold the ends of the weft thread when severed by the said blades.

13. In a loom of the character described, the combination with a weft thread carrier provided with nippers, of a lay, a way or race on the lay for the said carrier, thread feed mechanism, a sliding member adapted to open the carrier nippers and means for controlling the movement of the said sliding member comprising a spring, and a fixed cam track on the main frame for overcoming the resistence of the spring to force the sliding member into the path of the carrier nippers by the vibratory movement of the lay.

14. In a loom of the character described, the combination with a main frame, of main warp heddles, auxiliary selvage warp heddles, a lay, a weft thread carrier, weft thread feed mechanism adapted to coöperate with the said carrier, a countershaft journaled in the upper front corners of the main frame, and means connected with the said countershaft for operating both the auxiliary selvage warp heddles and the said weft thread feed mechanism.

15. In a loom of the character described, the combination with a main frame and a lay, of a carrier, weft thread feed mechanism mounted on the lay, picker mechanism, and means for controlling the return movement of the picker mechanism to furnish a temporary stop for the carrier at the end of its pick, comprising an elastically controlled pivoted member secured to the lay and an engaging cam surface in fixed relation to the main frame and adapted to operate the said pivoted member by the vibration of the lay.

16. In a loom of the character described, the combination with a vibratory lay, of weft thread feed mechanism mounted thereon, a carrier adapted to coöperate with the said weft thread feed mechanism, picker mechanism, means adapted to check the return movement of the picker mechanism comprising a pivoted member secured to the lay, elastic means for holding the said pivoted member normally in the path of the picker mechanism, means for engaging the said pivoted member by the vibratory movement of the lay to release the picker mechanism, and means for positively continuing the movement of the carrier upon the release of the picker mechanism.

17. In a loom of the character described, the combination with a main frame, of a lay, a carrier, weft thread feed mechanism, picker mechanism, means for checking the return movement of the picker mechanism, comprising a pivoted member secured to the lay, elastic means for holding the pivoted member normally in the path of the picker mechanism, and means for engaging the pivoted member to release the picker mechanism comprising a sliding member carried on the main frame of the loom, and a pawl secured thereto and adapted to engage the said pivoted member.

18. In a loom of the character described, the combination with a main frame, of a vibratory lay, weft thread feed mechanism carried thereon, a carrier, a carrier box on the lay adjacent the said weft thread feed mechanism, means for checking the momentum of the carrier within the carrier box at the end of its pick, and means for positively moving the carrier to operative relation with the said feed mechanism, comprising a slide mounted in the lay and carrying an engaging pawl, a cam mechanism

adapted to operate the slide comprising a member secured to the main frame, a sliding cam plate secured thereto and having an engaging surface adapted to coöperate with the said slide, and means for moving the said sliding cam plate to complete the movement of the carrier into the feed mechanism.

19. In a loom of the character described, the combination with a main frame, of a lay, a carrier, weft thread feed mechanism, a carrier box, means for positively moving the carrier through the box into operative relation with the feed mechanism comprising a slide, a member secured thereto for engaging the carrier, and means for operating the slide comprising a cam plate secured to the main frame, a sliding cam plate secured to the first said cam plate, elastic means for holding the last said plate normally in withdrawn position, and means for operating the last said cam plate to complete the movement of the carrier on approaching the feed mechanism.

20. In a loom of the character described, the combination with a main frame, of a lay, a carrier, weft thread feed mechanism, a carrier box, means for positively moving the carrier through the box into operative relation with the feed mechanism, comprising a slide, a member secured thereto for engaging the carrier, and means for operating the slide, comprising a cam plate carried by the main frame, a sliding cam plate secured to the first said cam plate to complete the movement of the carrier on approaching the feed mechanism, and an adjustable cam surface secured to the said sliding cam plate to vary the movement of the slide operating the carrier.

21. In a loom of the character described, the combination with a weft thread carrier, of weft thread feed mechanism comprising a thread guide, a pair of spaced elastically positioned thread holders, and a thread cutting mechanism between said spaced holders comprising a pair of coöperating shear blades and a second pair of elastically controlled thread holders carried by said blades adjacent the cutting edges thereof.

22. In a loom of the character described, the combination with a weft thread carrier, of thread feed mechanism comprising a pair of spaced elastically positioned thread holders, and a thread cutting mechanism between the said spaced holders comprising a pair of coöperating shear blades and a second pair of elastically controlled thread holders carried by said blades adjacent the cutting edges thereof.

23. In a loom of the character described, the combination with a weft thread carrier, of weft thread feed mechanism carried on a vertically moving slide, said feed mechanism comprising a pair of spaced elastically controlled holders, a pair of coöperating shear blades between said spaced holders, an auxiliary pair of elastically positioned thread holders carried by said blades adjacent the cutting edges thereof, and means for operating the said blades and said elastically controlled holders.

24. In a loom of the character described, the combination with a weft thread carrier, a weft thread feed mechanism, comprising a pair of spaced elastically positioned holders, shear blades between the said spaced holders, a vertically moving slide adapted to carry said spaced holders and shear blades, means for operating said slide comprising a movable segmental member carried by the main frame of the loom, and means for operating said shear blades comprising an arm secured to one of the blades, and a cam cooperating with said arm.

25. In a loom of the character described the combination with a main frame, a lay, a weft thread carrier on the lay being provided with nippers, a movable member on the lay and means fixed in relation to the main frame for engaging said movable member to open the carrier nippers at the end of the pick of the carrier to release the weft thread.

26. In a loom of the character described, the combination with a main frame and a lay, of a weft thread carrier provided with nippers, thread feed mechanism on the lay adapted to coöperate with the carrier, a sliding member on the lay adapted to enter the path of movement of the carrier to open the nippers, and means fixed in relation to the main frame for operating the said sliding member.

27. In a loom of the character described, the combination with a main frame, a lay, and a weft thread carrier provided with nippers, of thread feed mechanism, a sliding member adapted to open the carrier nippers, and means fixed in relation to the main frame for moving the said sliding member into the path of the carrier nippers.

28. In a loom of the character described, the combination of a weft thread carrier, of a thread feed comprising spaced elastically positioned holders with cutting means interposed therebetween, auxiliary holders carried by said cutting means for grasping the cut ends of the thread, and a thread measuring device adapted to coöperate with the said feed mechanism.

29. In a loom of the character described, the combination with a main frame, a lay and a weft thread carrier, of thread holding and cutting mechanism carried by the lay, a thread measuring device adjacent the said holding and cutting mechanism and cooperating therewith embodying a sliding member, a guide or way therefor, a thread engaging hook on said sliding member, and

means for reciprocating said sliding member comprising a lever connected thereto and pivoted on the lay, and a coöperating cam mounted on the main frame in the path described by said lever during the vibration of the lay.

30. In a loom of the character described, the combination with a main frame, a lay and a weft thread carrier, of thread holding and cutting mechanism carried by the lay, a thread measuring device adjacent the said holding and cutting mechanism and cooperating therewith, said measuring device embodying a sliding member, a guide or way therefor, a thread engaging hook on said sliding member, and means for reciprocating said sliding member comprising a lever connected thereto and pivoted on the lay and a movable coöperating cam carried by the main frame in the path described by a portion of said lever during the vibration of the lay, and adjustable means for imparting movement to said coöperating cam.

31. In a loom of the character described, the combination with a main frame, a lay and a weft thread carrier, of thread holding and cutting mechanism, a thread measuring device comprising a slide adapted to reciprocate at an angle to the line of pick of the carrier, means for operating said slide comprising a lever pivoted on the lay in engagement with the slide, a movable member mounted on the main frame in the path described by the lever in the movement of the lay and an adjustable rotatable cam carried by the main frame and adapted to operate said movable member.

32. In a loom of the character described the combination with a main frame, of a lay, a carrier, a way or race on the lay adapted to control the movement of the carrier, weft thread feed mechanism mounted on the upper ends of the lay, a supplementary frame member secured to the main frame and adapted to serve as a housing for the end of the lay and the thread feed mechanism carried thereon, nippers on the ends of the carrier adapted to take the weft thread from said feed mechanism, a movable member carried by the lay adapted to open the carrier nippers, and means carried by the said supplementary frame in the path described by said movable member in the vibration of the lay and being adapted to operate the movable member.

33. In a loom of the character described the combination with a lay, of a weft thread carrier, and weft thread feed mechanism carried on the lay and adapted to coöperate with the carrier, said mechanism comprising a pair of spaced elastically positioned thread holding members, a pair of shear blades provided with coöperating cutting edges, means normally holding the said blades in closed position, means for opening said blades, there being grooves in said shear blades adjacent the cutting edges, and elastically controlled plates carried by each shear blade and adapted to coöperate with said grooves.

34. In a loom of the character described, the combination with a main frame and a lay, of a carrier, weft thread feed mechanism, picker mechanism, and means for positively moving the carrier into engaging relation with the weft thread feed mechanism, comprising a sliding member carried on the lay, a spring pressed pawl carried thereby, and an engaging cam surface on the main frame interposed in the path of said sliding member in the vibratory movement of the lay.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 31st day of July A. D. 1907.

LESLIE HARRINGTON.

Witnesses:
FRANCIS A. HOPKINS,
A. L. SPRINKLE.