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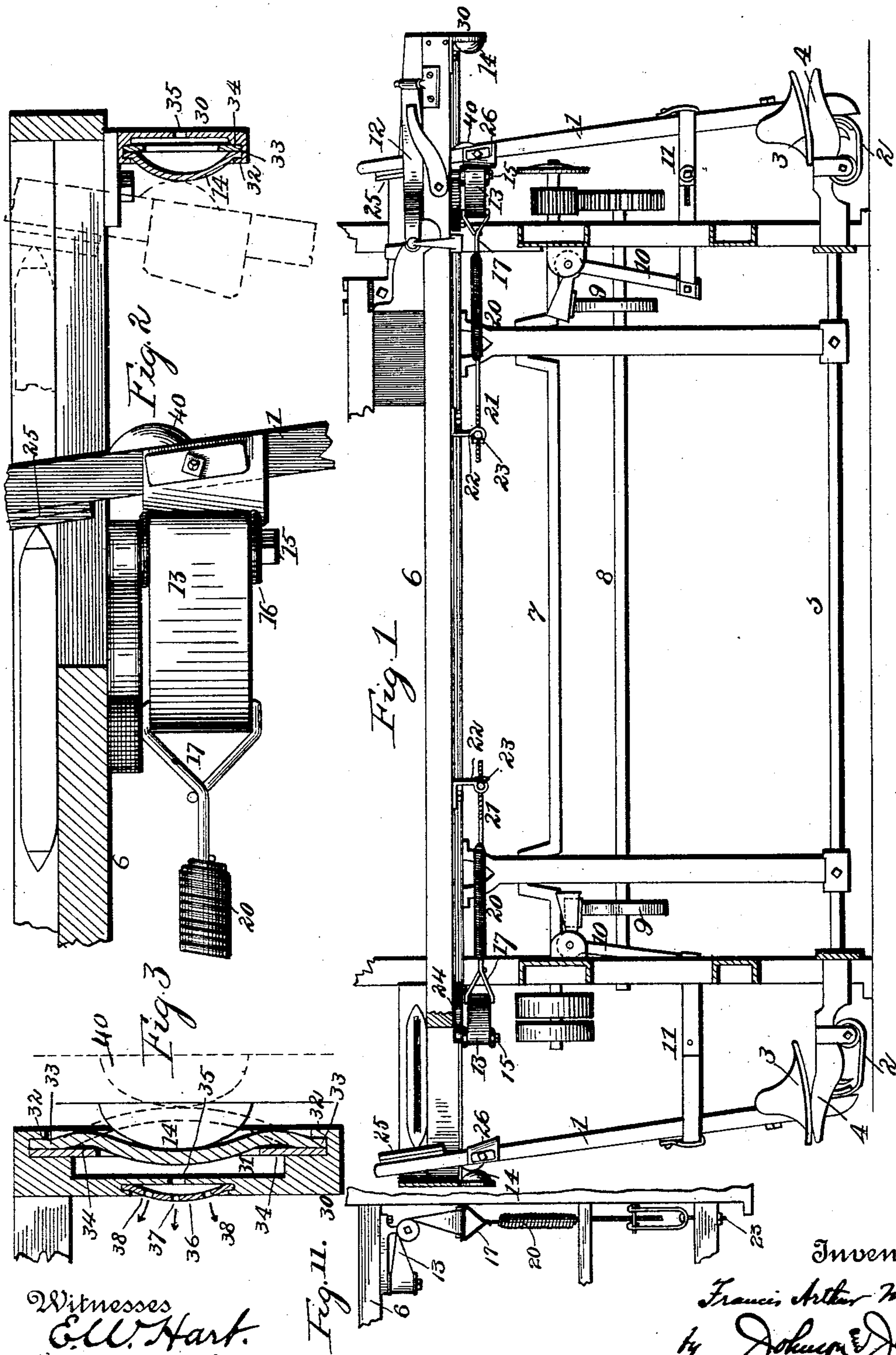
Patented Dec. 25, 1900.

F. A. MILLS.
PICKER STAFF BUFFER FOR LOOMS.

(Application filed May 16, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
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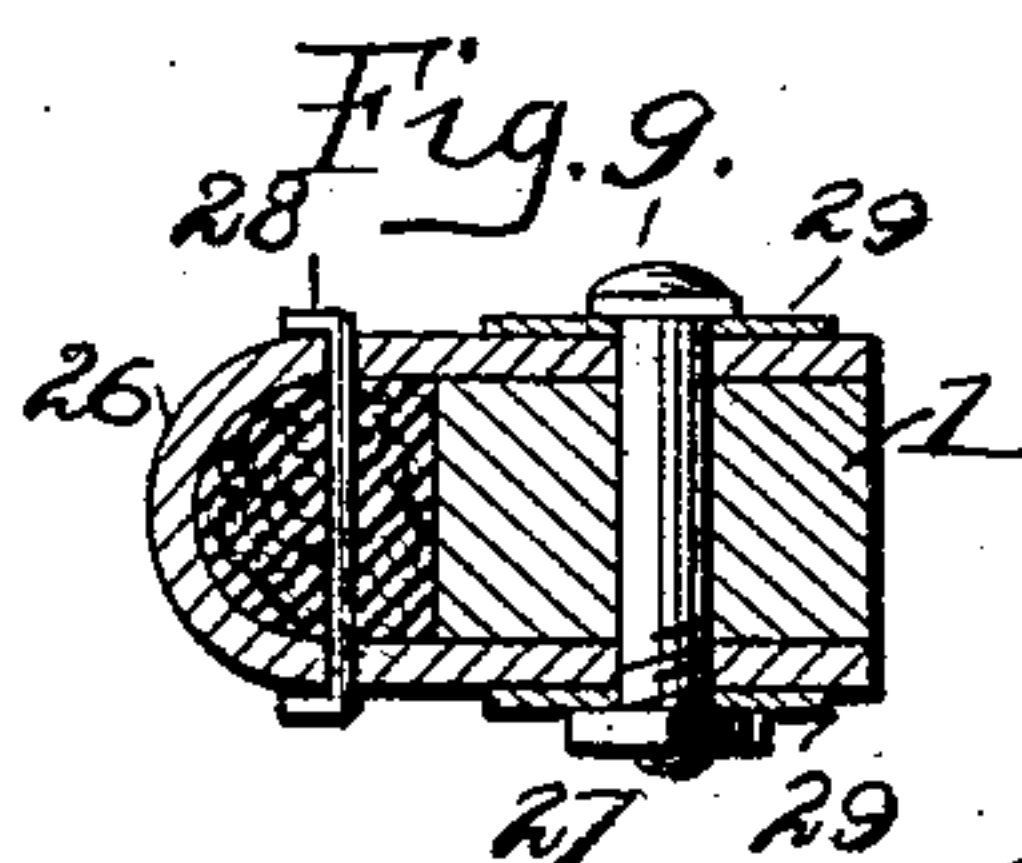
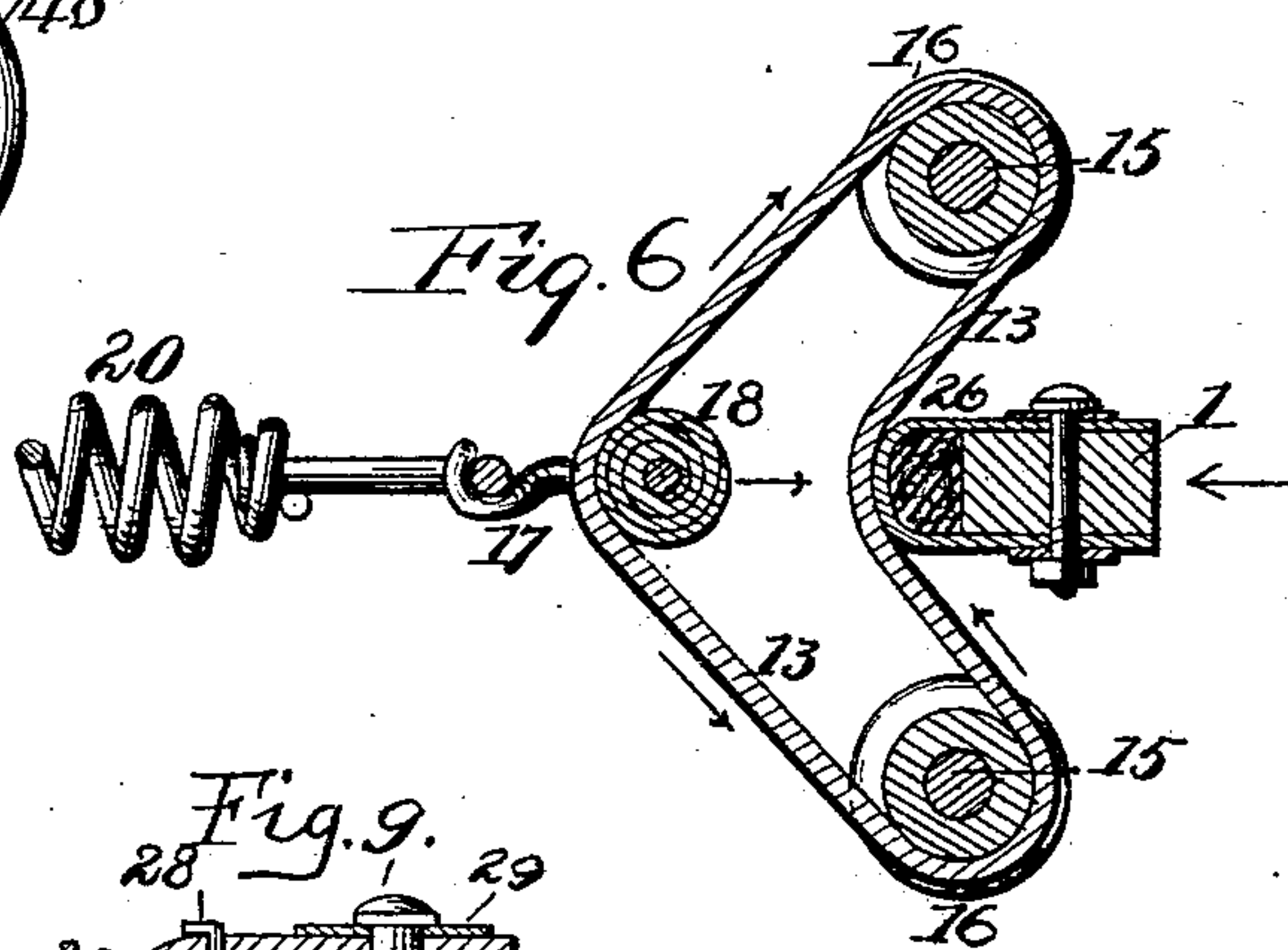
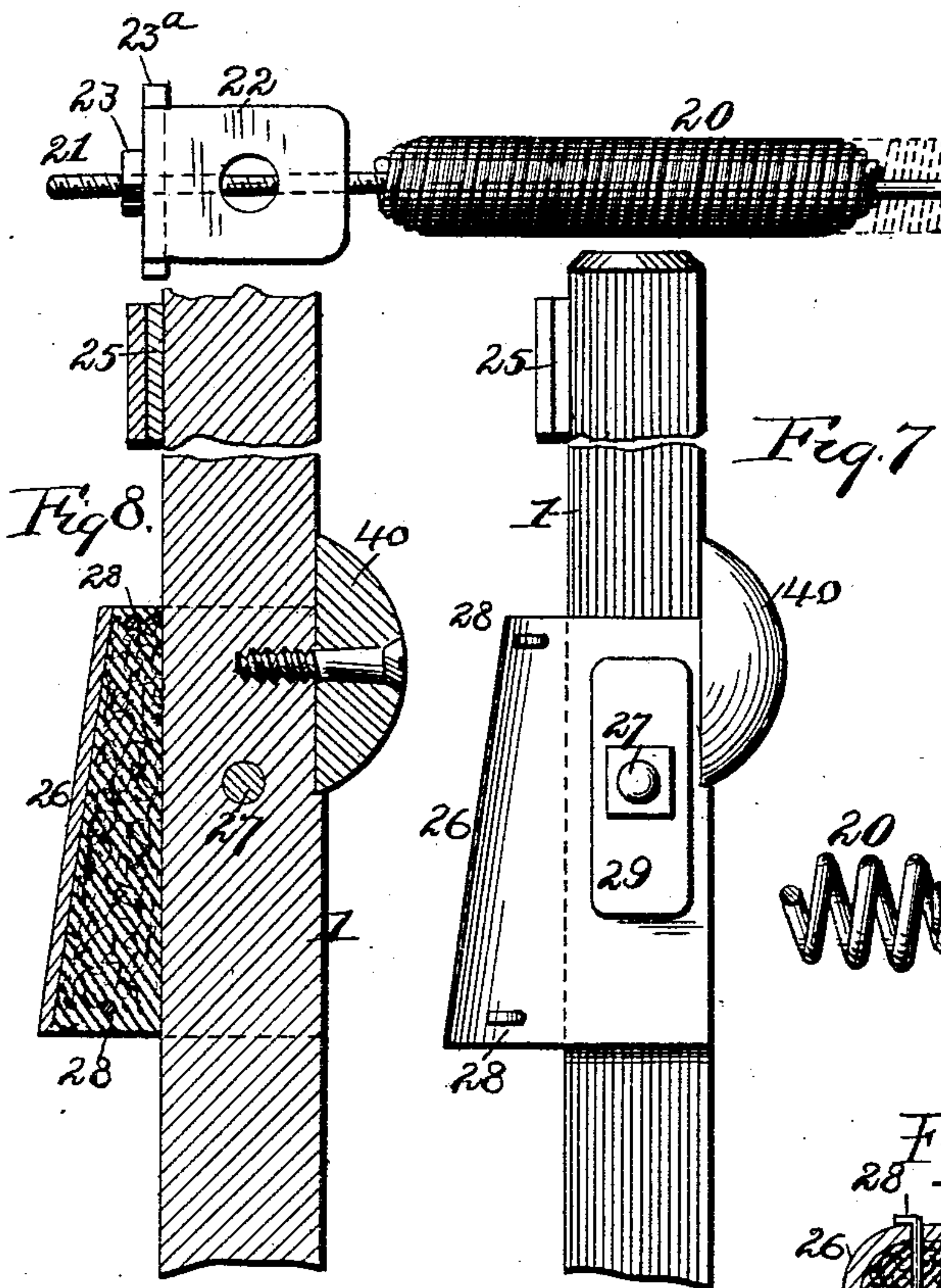
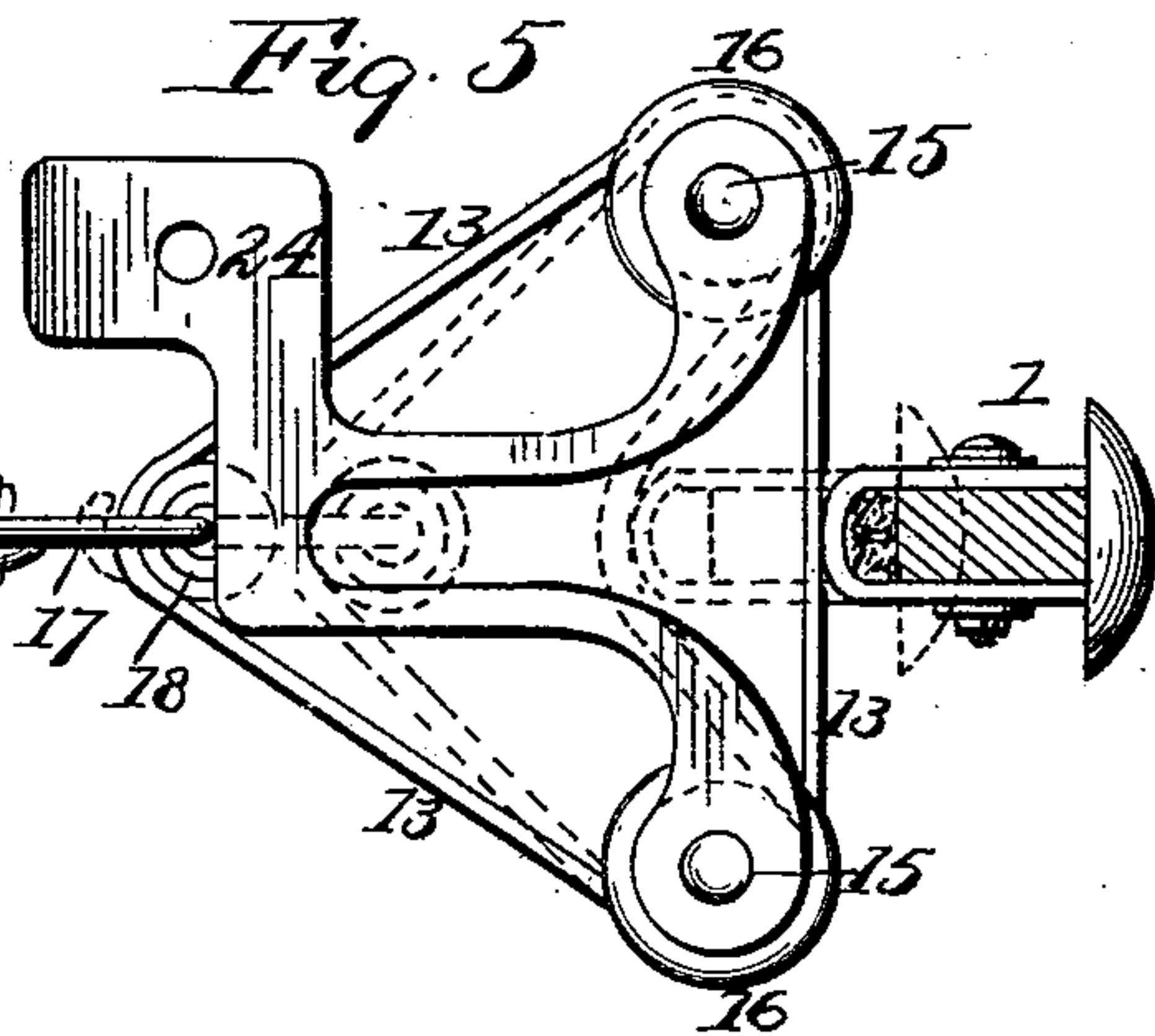
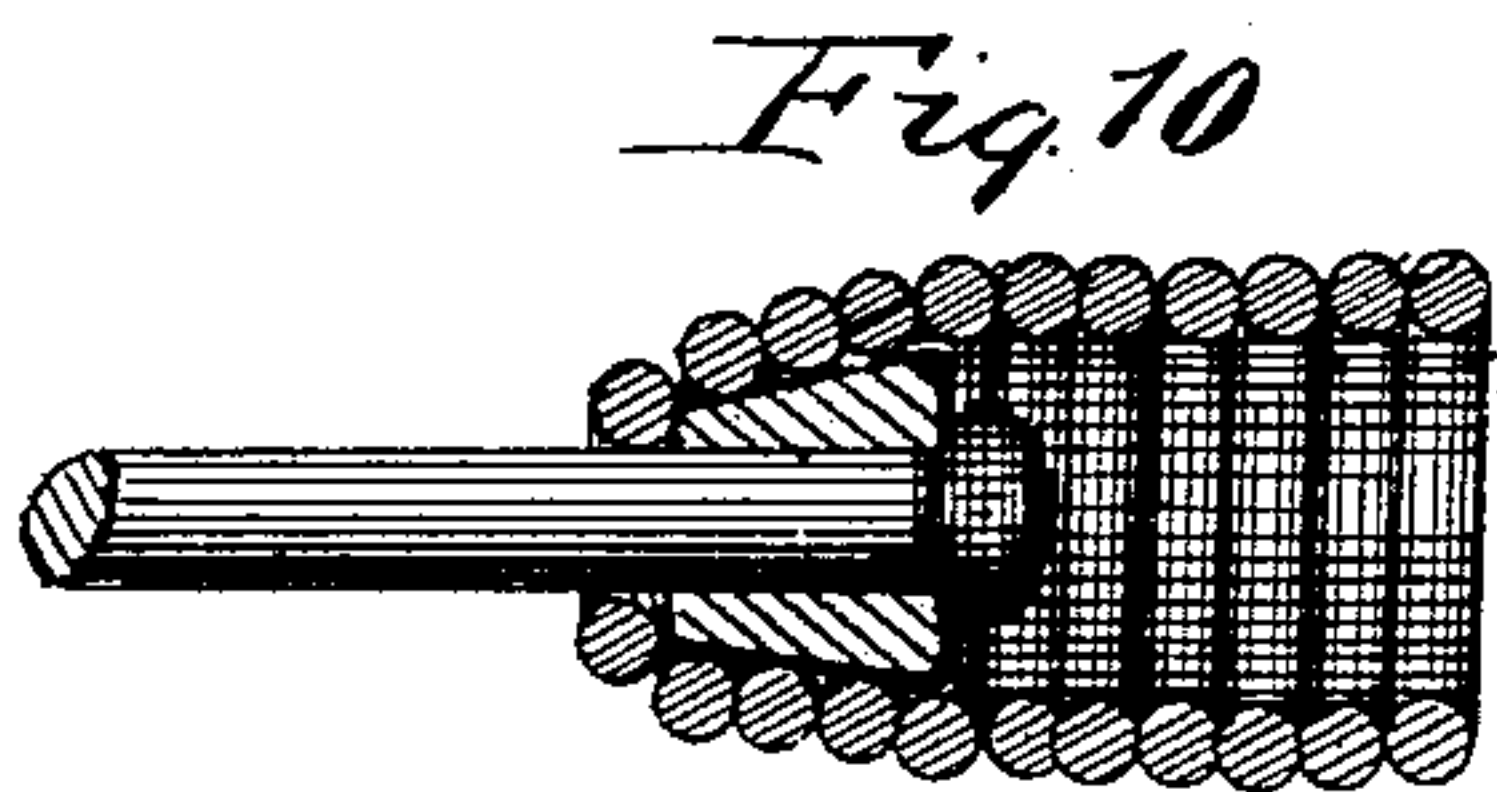
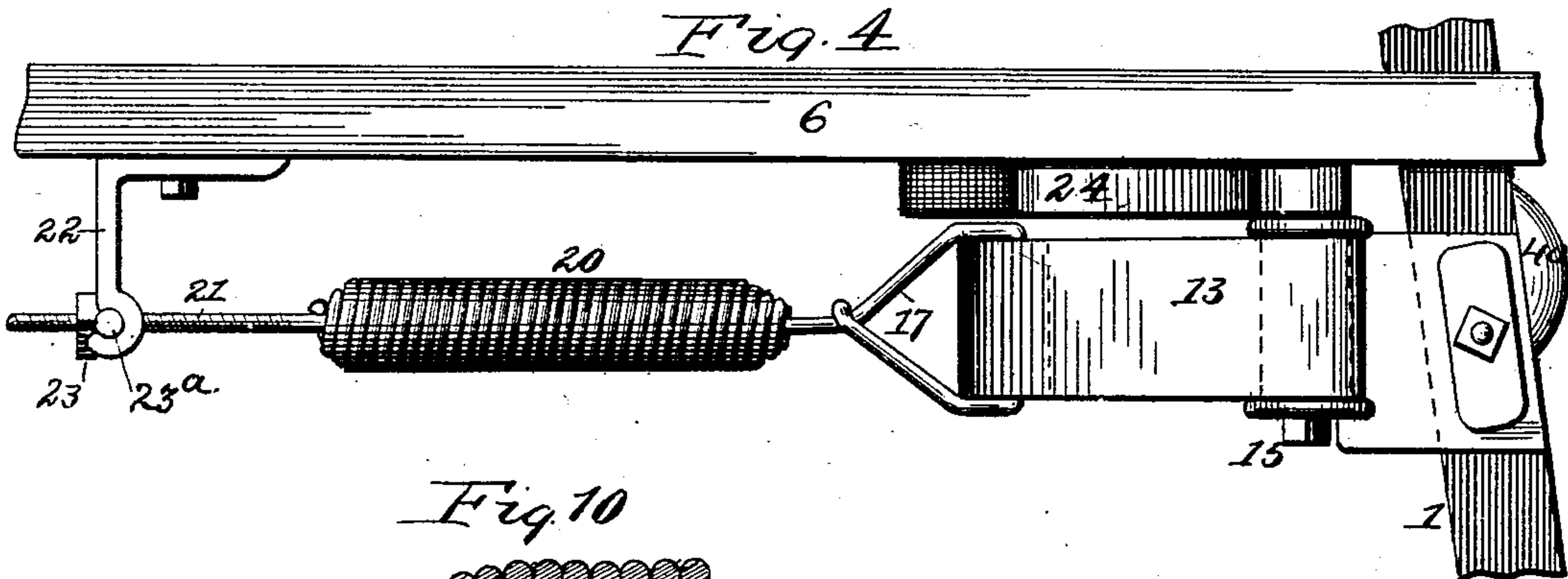
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UNITED STATES PATENT OFFICE.

FRANCIS ARTHUR MILLS, OF METHUEN, MASSACHUSETTS, ASSIGNOR OF
ONE-HALF TO GROSVENOR B. EMMONS, OF SAME PLACE.

PICKER-STAFF BUFFER FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 664,817, dated December 25, 1900.

Application filed May 16, 1900. Serial No. 16,848. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS ARTHUR MILLS, a citizen of the United States, residing at Methuen, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Picker-Staff Buffers for Looms, of which the following is a specification.

In the statement of my invention in picker-buffers for looms the following description, read in connection with the accompanying drawings, will enable any one skilled in the art to which my invention relates to understand its nature and to practice it in the form in which I prefer to employ it; but it will be understood that my invention is not limited to the precise form herein illustrated and described, as various modifications and equivalent changes may be made and adapted by the skilled constructor to carry out my invention.

Primarily my invention is designed to control and to regulate the speed, the flight of the shuttle, and to cushion and prevent the destructive and deranging effects generally of the picker-staff motion caused by the cam-actuated throw of the picker-staff in throwing the shuttle through the open shed from one shuttle-box to the other, as shown in Figures 1, 2, and 4, and in coöperation with the novel means whereby these objects are effected is the provision of means whereby to cushion and prevent the rebound of the shuttle at the end of its flight, so that these two provisions coact, the one to regulate the speed of the flight of the shuttle and to cushion the cam-actuated throw of the shuttle and the other to cushion and prevent rebound of the shuttle at the end of its flight.

Referring to the drawings, Fig. 1 shows in front view the loom parts, comprising the shuttle race-lay, the picker-staffs, the actuating mechanism of these parts, and the coöperation therewith of my improvements. Fig. 2 shows, enlarged, the right-hand end of the race-lay and my improvement applied thereto for cushioning the cam-actuated throw of the picker-staff in throwing the shuttle to the opposite shuttle-box. In this figure is also seen a pneumatic rubber buffer at the end of the

race-lay for receiving, cushioning, and preventing the rebound of the shuttle thrown by the cam-actuated throw of the other picker-staff on the left-hand side of the race-lay, as the dotted lines show. Fig. 3 shows in section, enlarged, the pneumatic rubber buffer for cushioning the picker-staff and the shuttle to prevent the rebound of the shuttle in striking the picker, the pneumatic buffer being shown as collapsed under the resistance of the shuttle-blow. Fig. 4 shows in side view, enlarged, a part of the race-lay and the picker-staff in the relation it has in its cam-actuated blow upon the endless-strap buffer and the adjusting-spring provision, whereby the tension of the endless-strap buffer is regulated to regulate the speed of the flight of the shuttle. Fig. 5 shows in top view the endless-strap buffer, the means for adjusting its tension, and the picker-staff in its relation to the endless-strap buffer at the moment the blow is being delivered in throwing the shuttle, the dotted lines showing the relation of the picker-staff at the limit of its throw and the peculiar action of the spring-connected end of the endless-strap buffer thereunder. Fig. 6 shows in horizontal section the endless-strap buffer and the form it is caused to assume under the impact of the cam-actuated throw of the picker-staff, the point at which the spring is connected with the strap being thereby caused to be drawn toward the point of impact, so that the opposite sides of the strap under such impact are caused to move toward each other, as seen in Fig. 5. Fig. 7 shows in side view the upper end of the picker-staff, its shuttle-throwing and receiving-picker, its wedge-formed cushion-bunter, which coacts with the strap-buffer in arresting the throw of the picker-staff in the throwing of the shuttle, and its button-buffer, which coacts with the pneumatic rubber buffer to cushion the receiving-blow of the shuttle against the picker. Fig. 8 shows the flexible wedge-shaped cushion-bunter in vertical section of the picker-staff, and Fig. 9 is a transverse section showing the manner of securing the flexible bunter-pocket to the picker-staff. Fig. 10 shows the manner of mounting the spring on the adjusting-rod of the strap buffer; and Fig. 11, Sheet 100

1, shows the way in which the endless-strap buffer-spring connection may be vertically arranged in looms in which it is not convenient to arrange such spring horizontally, as in Fig. 1.

My improvement is directed to the avoidance of breaking the cop and filling and the destruction and derangements caused by the picker-staff motion in throwing the shuttle, and my improvements for this purpose are applicable to the picker-staff motion of any loom now in use in which the picker-staffs 1 are mounted and actuated in the slots of the lay in the usual manner. A coiled spring 2 is combined with the staff-rocker 3 and the picker-staff for retracting the latter after having thrown the shuttle. The rocker-beds 4 are fixed upon the lay-shaft 5, upon which the carrying arms or swords of the race-lay 6 are mounted. The power-driven crank-shaft 7, connecting the swords, gives the usual vibratory movements to the race-lay, and a shaft 8 carries cams 9 9, adapted to actuate levers 10 or pick-arms, which, by means of the usual lug-straps 11, connect the levers and picker-staffs and give the cam-actuated throw to the picker-staffs to throw the shuttle. The lay shuttle-boxes have the usual spring-pressed binders, of which 12 is the spring, and all these operating parts of the loom may be of the usual or any approved construction.

Referring to Fig. 1, the endless-strap buffers 13 are seen as mounted upon the under side of the race-lay to receive the cam-actuated throw of the picker-staffs in their shuttle-throwing blows, while at each end of the race-lay is seen a pneumatic rubber buffer 14 to receive the outward spring-actuated throw of the picker-staffs and to cushion them to receive and cushion the blows of the thrown shuttle to prevent its rebound when striking the picker. The prevention of this rebound is of the highest importance in causing the shuttle to maintain its contact with the picker when struck by the shuttle, as in Fig. 1, and thereby cause the shuttle to be thrown with a contact throw as distinguished from a separated striking or hammer blow resulting from the rebound of the shuttle, which carries the shuttle more or less away from the picker and which results in its destruction and of the shuttle itself in not being thrown true. Equally destructive are the cam-actuated hammering blows of the picker-staff upon the race-lay leather-block buffers now in use which break the cop and the filling, and it is the provision of my improvement in the endless-strap buffer which avoids this destruction and gives the important advantage of governing the speed of the flight of the shuttle. The tighter the strap is drawn around the spools the slower will be the speed of the shuttle. The looser the strap is drawn around the spools the faster will be the speed of the shuttle across the shuttle-race. Therefore by tightening or loosening the strap all unnecessary speed can be taken from the

flight of the shuttle, which will cause it to be stopped with less shock, and therefore preventing the breaking of the cop and filling.

Fixed preferably to the under side of the lay are two depending studs 15 15, on which are mounted loosely-flanged spools 16 16 at each side of the path of the picker-staff and near the inner end of the slot in the race-lay, within which the picker-staff has its to-and-fro movements, as in Figs. 1, 5, and 6.

Mediately of the spools and extending inward back of the same is a yoke 17, preferably of strong wire, on which a roll 18, preferably of coiled leather, is loosely mounted. Upon this roll and the spools is placed and held the endless-strap buffer 13, so that normally it has the form of a triangle, as in Fig. 5, full lines, with its side between the spools at a right angle to and crossing the path of the picker-staff, forming the buffer proper. This and roll 18 and its strap have a free yielding under the impact of the picker-staff when thrown by the cam.

A coiled spring 20 connects the yoke 17 with a screw-rod 21, suitably seated in a bracket 22, depending from the race-lay, and a jam-nut 23 on the rod bearing against the adjusting cross-rod 23^a serves to hold the screw-rod 21 from turning and getting loose. The adjusting cross-rod 23^a connects and crosses the bracket 22 and serves to adjust the tension of the spring. Under this tension of the spring upon the roll 18 the endless buffer-strap is kept taut. When the picker-staff strikes the buffer-strap, the roll 18 is caused to be pulled toward the impact of the picker-staff against the tension of the spring. This allows the strap to roll freely with the spools in such pressing force of the picker-staff on the outside of the strap as seen in dotted lines in Fig. 5, so that the opposite sides of the endless strap are drawn and forced together under the pressure and inward throw of the picker-staff and opened or spread apart by the force of the spring when relieved of such pressure. In this action of the picker-staff the deflection of the buffer-strap between the rolls 15 15 will be about three inches from a straight line, and with this movement of the strap under the sudden and powerful blows of the picker-staff it would soon go to pieces were it mounted upon fixed posts by reason of the great friction it would have in being jerked around fixed posts. There must be no fixed or frictional surfaces for the strap to be drawn over, and it is the capacity of the buffer-strap supports to roll freely with the strap that renders it possible to use such a buffer with the picker-staff; otherwise every blow of the latter would give a destructive action to the strap on its supports.

To increase or diminish the speed of the shuttle is an important matter for an important purpose, and this is effected by the adjustment of the screw-rod on its bracket 22, so as to give the spring and its connected endless buffer-strap more or less tension, because

the impact of the picker-staff upon a tightly-stretched endless strap will give a comparatively slow speed to the shuttle, while a less tautness of the endless strap under the impact of the picker-staff will give a comparatively fast speed to the shuttle.

It will be understood that by a more yielding impact upon the endless strap the faster will be the speed of the shuttle, because the extent of the throw of the picker-staff will be increased in proportion to the looseness of the endless buffer-strap, and by tightening the buffer-strap it will cause the shuttle to be thrown slower, because the extent of the throw of the picker-staff will be decreased in proportion to the tightness of the endless buffer-strap.

If the throw of the shuttle is too fast or too hard, it will be more liable to break the cop and filling in striking the opposite picker, and it is the capacity for adjusting the speed of the shuttle by the means that arrests the impact of the picker-staff with a yielding function that is adjuvant in its results to the function of the pneumatic rubber buffer in preventing the rebound of the shuttle. It is the yielding function of the endless-strap buffer under its movement with the loose spools under the impact of the picker-staff in throwing the shuttle to which is largely due the prevention of the breaking of cops and filling, while another important advantage of the yielding function of the endless-strap buffer is the complete relief which it gives from the hammer-blows of the picker-staffs upon the race-lay by reason of mounting the strap upon loose spools. Another important function of the endless-strap buffer is that it causes the rebound of the picker-staff after throwing the shuttle, and thereby supplements the rocker-spring in causing the picker-staff to quickly return to its position ready to receive and to throw the shuttle. The band being loose on the spools makes it rebound quicker. When such spring is used, it need not have much force.

The spools for the endless-strap buffer may be mounted in a bracket 24, bolted to the under side of the race-lay; but the spool-studs may be bolted directly to the race-lay at its opposite sides, and thereby dispense with the bracket shown.

The shuttle is thrown and received by a picker 25 on the picker-staff, while a yielding stuffed bunter 26 on the picker-staff serves to deliver the shuttle-throwing blow of the picker-staff upon the endless-strap buffer and be arrested by it with a cushioned blow in throwing the shuttle. To render this picker-staff bunter best suited for its service, it is made of a leather cover or pocket, preferably filled with cotton-waste, and secured by a nutted bolt 27, passed through the sides of the pocket and the picker-staff, so that the stuffed bunter projects from the same side of the staff as the shuttle-picker. I prefer to make this stuffed bunter wedge-shaped, its

narrowest end upward, as in Fig. 7, because by reason of this form its lowest, widest, or bulging end is thereby caused to strike the endless strap first at the bottom, as in Fig. 2, and this causes the buffer-strap to press the picker-staff down on its rocker-bed; otherwise every time the picker-staff struck the endless-strap buffer the staff would be caused to jump up on its rocker, and thereby cause the shuttle to be thrown wabbling or out of the shed of the warp, and besides it would greatly increase the wear of the picker upon the picker-staffs.

The prevention of the jumping of the picker-staff also prevents the chafing wear of the strap buffer and of the picker-staff bunter and gives a true and better throw to the picker-staff and the shuttle.

I prefer to use cotton-waste filling for the staff-bunter, because it keeps its yielding character and makes a cheap and satisfactory bunter. Rubber or any yielding substance may be used for this purpose.

Pins 28 may be used to confine the cotton-waste in the leather pocket, and a single bolt and stiffening-plates 29, fastened by the bolt, are sufficient to secure and preserve the elongated projecting or bulging form of the stuffed bunter.

It is important to note that the spools are mounted to be freely rotative on their posts, while the endless-strap buffer is mounted to freely hug the spools and has no fixed connection with its mounting at any point, so that it is free to be changed in its position on the spools. This gives the strap buffer free rolling bearings, and the rolling of such bearings will allow the strap buffer to move freely on the spools to the right and to the left, as effected under the pulling action of the pressure of the picker-staff in forcing the buffer side of the strap between the rolling bearings, and in this new way the point of impact on the endless-strap buffer can be changed by hand to any part of the strap in either direction, and therefore give life to the strap, and this loose mounting of the spools is a feature of my improvement. It is also important to note that the endless-strap buffer, being unattached or not rigidly held or bound at any point, will readily yield to the impact of the picker-staff bunter and that the spring in restoring the strap-buffer to its normal triangular form will by the rebound of the strap when relieved of such impact cause the picker-staff to also rebound in the direction in which the rocker-spring acts to retract the picker-staff. It will also be noted that the endless-strap buffer is confined on the spools between their end flanges by means of the pulling action of the roll 18 within the endless buffer against its side opposite to that which receives the impact of the picker-staffs and in line with the path of its movement, and this also constitutes a feature of my improvement.

To obtain the best result in the action of the pneumatic buffer for cushioning and pre-

venting the rebound of the shuttle, I prefer to construct and give it the form which I will now describe.

Referring to Fig. 1, the pneumatic buffers are seen fixed to and depending from the ends of the race-lay to cushion the picker-staffs against the receiving-blows of the shuttle to prevent its rebound, thereby causing the shuttle to be retained in contact with the picker and to be thrown by a contact instead of a striking or hammer blow of the picker. The buffers are of rubber, of concavo-convex form, and are seated and self-fastened in a bracket 30, adjustably bolted to the under side of the race-lay and formed with an open-face recess-chamber 31 and a circumferential rim or flange 32, forming an undercut groove by which the buffer by an integral circumferential rim 33 is secured upon a base rubber ring 34 within the groove, whereby the buffer is rendered both self-sealing and self-secured to and over the recessed or chambered face of the bracket. This construction gives the advantage of seating and securing the buffer by jamming or squeezing its rim within the seating-groove by hand, so that the buffer-rim fills the groove, which will cause the buffer-rim to be self-bound and air-tight within the groove, so that no air can escape around the rim and the pneumatic part will stand out from the bracket-holding groove and may be easily and quickly set in place and should it become damaged quickly removed and renewed.

I make the buffers less than a half-sphere for the purpose of lessening the tendency to form ridges in its surface in being collapsed under the blows and compressing action of the picker-staff button-bunter 40 to prevent the buffer from cracking, as seen in dotted lines in Fig. 3, which shows the device enlarged. For the escape and inlet of the air there is a vent 35 in the seating-base of the bracket, and I prefer to make this vent about a sixteenth of an inch in diameter. This vent is perpetually open and is effective for the perfect action of the buffer, as in Fig. 2; but I may use it with a flexible valve 36, preferably of rubber, seated in the back of the buffer-holder, as in Fig. 3, and having a vent 37, coincident with the holder-vent and also perpetually open for the inlet and escape of the air, but which is preferably about a thirty-second of an inch in diameter or about half the size of the bracket-holder vent. It is important, however, that the air shall have comparatively free egress when the buffer is collapsed, and for this purpose the valve has a series of holes 38 around its small vent, which are opened by the force of the air bulging the valve when the rubber buffer is collapsed and closed and when the valve is sucked in flush upon its wall-seating, so that the air only enters the buffer through the small valve-vent. The bulging of this valve from its seating allows the air to escape from all its openings and to close instantly upon its seating when

the buffer is relieved from the impact of the picker-staff, allowing the air to pass in only through the small central vent-hole.

Looking at Fig. 2 it is seen by dotted lines how the shuttle is received against the picker with a comparatively soft blow, because the picker-staff itself is the means, by reason of resting against the pneumatic buffer after having given the impact, of returning slowly under the expanding action of the buffer, and this is the reason why the shuttle is retained against the picker and the picker against the shuttle to be thrown without hammering effect of the picker upon the shuttle. This result is due to the construction, form, and manner of seating and holding the buffer. In this figure I have shown the pneumatic rubber buffer without the valve, and it may be so effectively used.

The important matters are the things which render the picker-staff motion and the throwing of the shuttle perfect in effecting the advantageous functions stated—the endless-strap buffers to receive the impact of the picker-staffs, mounted without fixed connection at any point upon freely-rotative spools, and the adjustment of the tension of the endless-strap buffer, whereby the speed of the shuttle may be regulated; the coöperation with the said endless-strap buffer of a cushioned leather buffer on the picker-staff to hold the staffs down upon their rocker-beds, whereby the shuttle is thrown with a true flight and the rebound of the picker-staff from its blow delivered upon the endless-strap buffer, whereby in connection with the rocker-bed or foot-spring the picker-staff is caused to return to its position, and the coöperation with the endless-strap buffers to receive the inward impacts of the picker-staffs with the pneumatic rubber buffers to receive the outward impacts of the picker-staffs. With these primary elements of the picker-staff motion I believe myself to be the first to provide the picker-staff with a cushion leather bunter co-operating with a strap buffer on the lay.

Looking at Figs. 5 and 6 it will be seen how the endless strap is caused to change its position on its rolling spools under the impact of the picker-staff. The impact forces the endless strap inward between its spools, as in Fig. 6, and by the same impact causes the strap at its apex connection with the spring-connected roll to be drawn inward toward the staff, and by this double movement of the endless strap the spools are caused to roll freely with the strap in the direction of the impact. The sudden release of the impact will allow the spring by its roll to pull back and the impact-receiving side of the strap to a straight line, and thereby cause the spools to roll with the strap and keeps it under proper tension on its mounting-rolls.

I have set out the coöperation between the endless-strap buffer and the pneumatic rubber buffer for receiving the impacts of the picker-staffs, and this conjoint action is best seen in

Fig. 2, wherein the powerful destructive hammer cam-actuated blows of the picker-staff in throwing the shuttle are borne by the durable and perfect action of the endless-strap 5 buffer, while the non-destructive spring-blows of the picker-staff are borne by the pneumatic rubber buffer, the picker-staff being cushioned in both its blows.

Except for the purposes of the combination 10 of devices hereinafter set forth in the claims I do not in the Letters Patent to be issued on this application claim the herein-described pneumatic rubber buffer device as to its construction, as such matter is made the subject 15 of claim in an application filed by me of date April 19, 1900, Serial No. 13,496.

I claim—

1. In a loom and in combination with the picker-staffs, of buffers arranged to receive 20 the shuttle-throwing blows of the picker-staff consisting of a pair of rolls loosely mounted on fixed studs at the inner end of the race-lay slot, a strap loosely confined around said rolls and a spring maintaining the seating 25 of the strap upon the loose rolls whereby it is free to move with the rolling of both rolls in one direction under the impact of the picker-staff to throw the shuttle and with both rolls in the opposite direction under the 30 tension of the spring.

2. In a loom and in combination with the picker-staffs, of buffers therefor consisting of a plurality of loosely-mounted rolls and a strap or band supported thereon free to move with 35 the rolling of the rolls under the impact of the picker-staffs, one of said rolls supported to have a free rectilinear movement toward and from the others, and a spring connected to said roll.

3. In a loom an impact-buffer for picker-staffs, comprising an endless strap or band, a series of freely-rolling supports around which the strap or band is freely supported, one of 40 said supports being freely movable inwardly in a line coincident with the path of the picker-staff, a spring holding the movable support in its normal position to keep the endless strap or band taut, and means for adjusting the tension of the spring.

4. In a loom an impact-buffer for picker-staffs, comprising three triangularly-arranged loose roll-bearings, and an endless strap or 45 band supported freely and unattached around said bearings across the path of the picker-staff and a spring directly connecting and supporting one of said rolls.

5. In a loom an impact-buffer for picker-staffs, comprising a pair of loosely-mounted flanged spools, an intermediate loose roll, a 50 yoke forming the axis of said inner loose roll, a spring connected at one end to said yoke, a threaded rod extending from the opposite end of the spring, a bracket in which said rod is seated, a nut on the rod bearing against the 55 bracket to regulate the tension of the spring, and an endless strap or band freely supported upon the said three roll-bearings; the point of

impact surface of the strap or band being its outer face between the two first-named rolls and in center line with the spring-connected 70 roll.

6. In a loom, the combination with the shuttle race-lay, the picker-staff and the operating mechanism, of a buffer comprising bearings at opposite sides of the slot in the race-lay, a third bearing in rear and intermediate 75 of the first two, and an endless strap or band supported upon said three bearings with the outer side of one run in the path of the picker-staff. 80

7. In a loom, the combination with the shuttle race-lay, the picker-staff and the operating mechanism, of a buffer comprising roll-bearings at opposite sides of the race-lay slot, a third or tension roll in rear and intermediate 85 of the first two, a tension-spring connected to said third roll, means for adjusting the tension of said spring and an endless strap or band supported on said three bearings with the outer side of one run in the path of the 90 picker-staff.

8. In a loom, the combination with the picker-staffs and wedge-shaped cushion-bunters thereon, of buffer-straps and loosely-mounted rolls therefor whereby the strap is 95 free to move with the rolling of the rolls and the picker-staffs prevented from jumping up under their blows upon the strap.

9. In a loom, the combination with the shuttle race-lay, the picker-staff having a cushion-bunter on its inner side and a convex button-bunter on its outer side, and an operating 100 mechanism, of a pneumatic rubber buffer at the outer end of the race-lay slot in the path of the button-bunter and an endless spring-pulled strap supported at the under side of the race-lay with its outer side or run in the 105 path of said cushion-bunter.

10. In a loom, a picker-staff provided with a bunter comprising a leather pocket, side 110 plates, a bolt passing through the sides of the pocket, the picker-staff and through said plates, and a filling of flexible material, within said pocket.

11. In a loom and in combination with the 115 race-lay, the picker-staffs and operating mechanism therefor, of a pair of spools loosely mounted on fixed studs on each side of the race-lay slot, a tension-spring and a loosely-mounted roll carried by said spring, an endless 120 strap or band loose and unattached on said spools and means for adjusting the tension of said spring.

12. In a loom and in combination with the race-lay, the picker-staffs and operating mechanism 125 therefor, of a pair of spools mounted to turn freely on fixed studs on each side of the race-lay slot, a tension-spring and a loosely-mounted roll carried thereby in line with the path of the picker-staff, an endless strap or 130 band loose and unattached on said spools, means for adjusting the tension of said spring, and a wedge-shaped cushioned bunter on the picker-staff arranged to operate as stated.

13. In a loom and in combination with the race-lay, the picker-staffs, operating mechanism therefor, a pair of spools mounted to turn freely on fixed studs on each side of the race-lay slot, an endless band loose on said spools and a tension-spring arranged to maintain said band under tension, of a roll loosely mounted upon said spring engaging the band in the path of the picker-staff and movable in said path to maintain the tension of said band under the blows of the picker-staff.

14. In a loom and in combination with the race-lay, the picker-staffs and operating mechanism therefor, of a pair of loosely-mounted

spools, an endless band mounted loosely thereon to cross the slot of the race-lay, a spring arranged to maintain said strap under tension, and a roll connecting the spring and freely supporting one side of the band so that the impact upon the other side of the band will cause its two roll-supported sides to approach each other.

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

FRANCIS ARTHUR MILLS.

Witnesses:

A. E. H. JOHNSON,

A. ROLAND JOHNSON.