

C. LIE.
NET TYING MACHINE.
APPLICATION FILED FEB. 20, 1906.

906,728.

Patented Dec. 15, 1908.

4 SHEETS—SHEET 1.

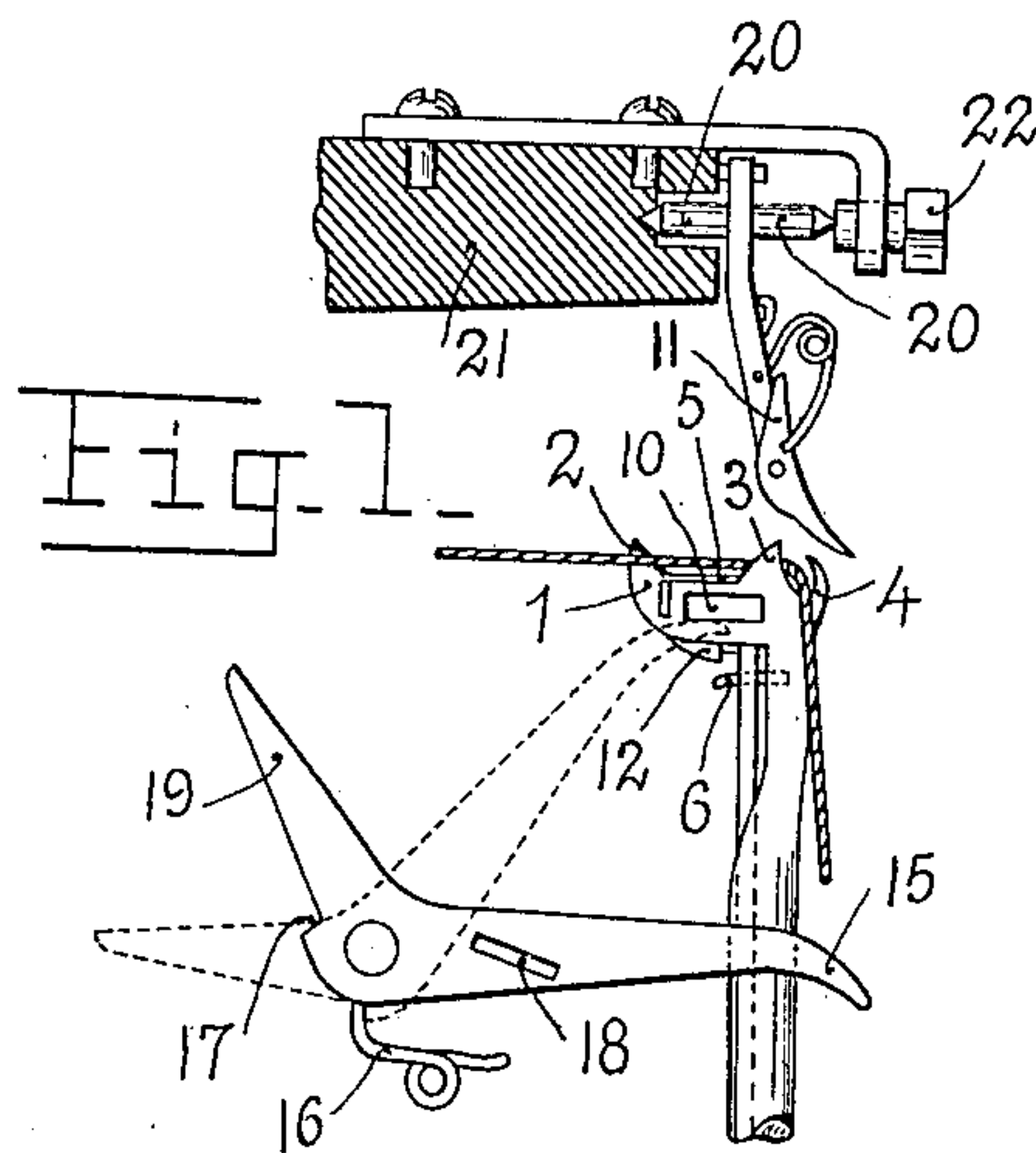


Fig. 1.

Fig. 6.

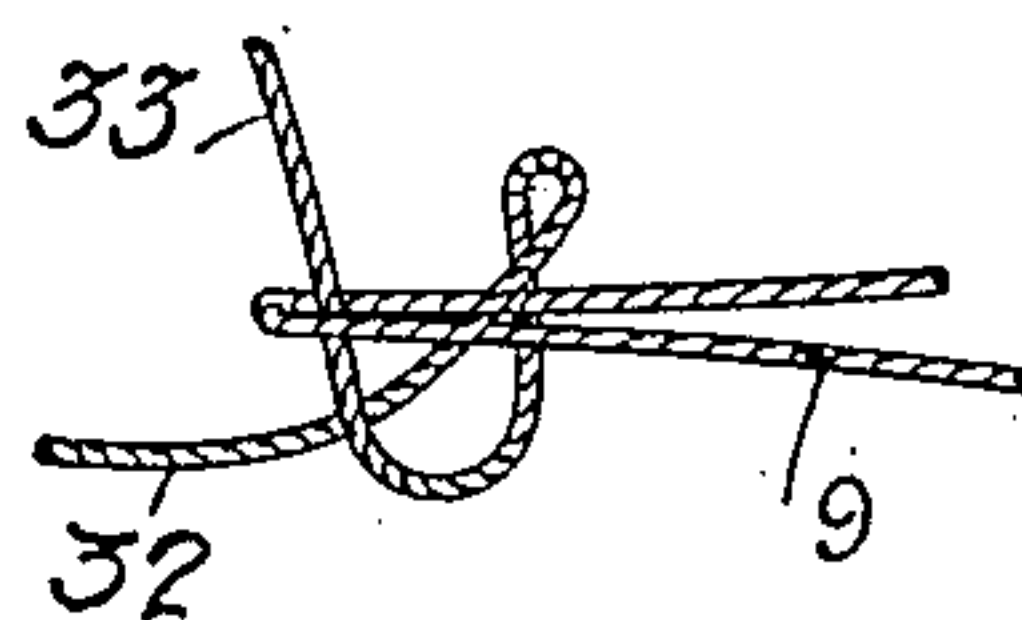


Fig. 2.

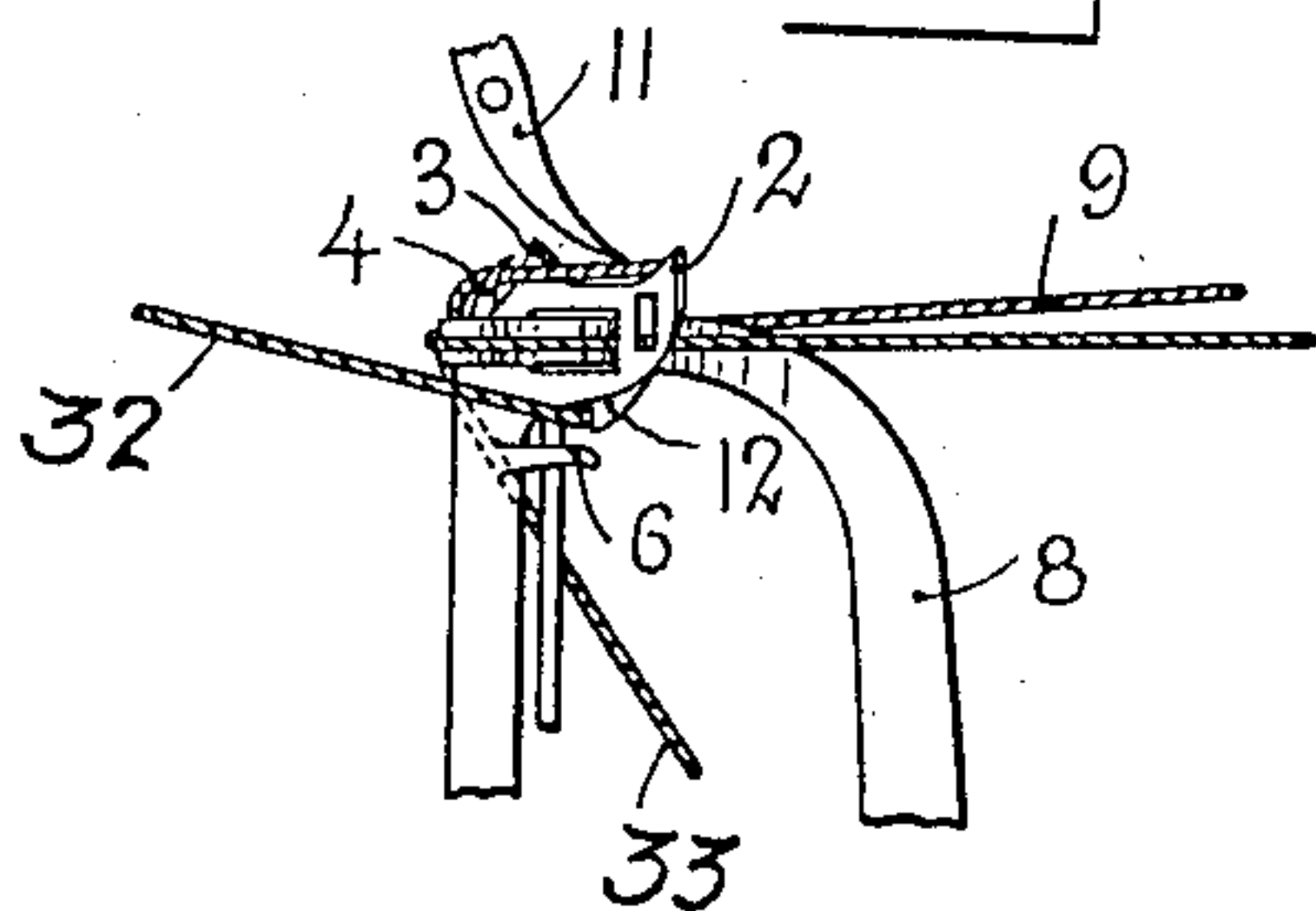


Fig. 3.

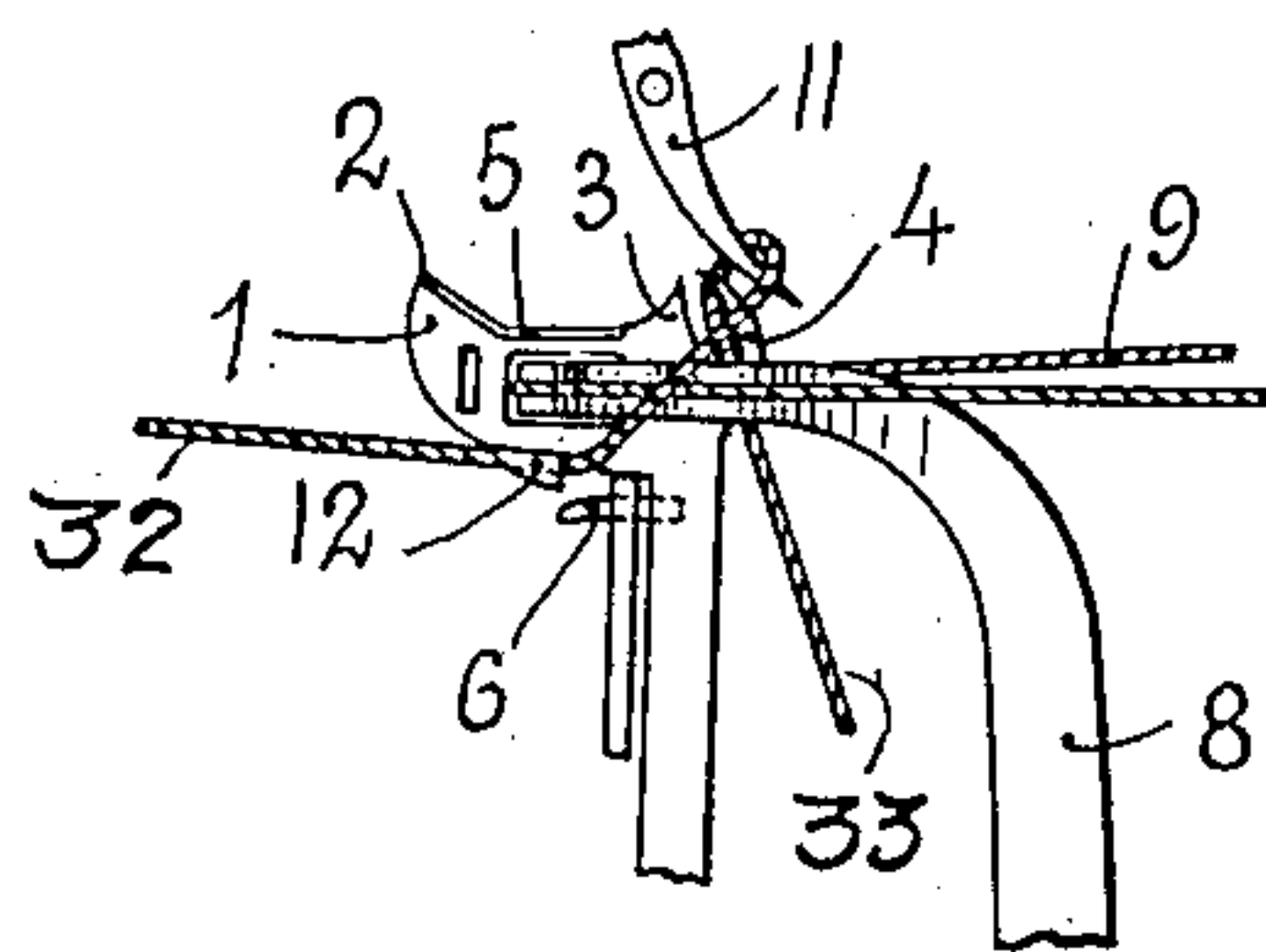


Fig. 4.

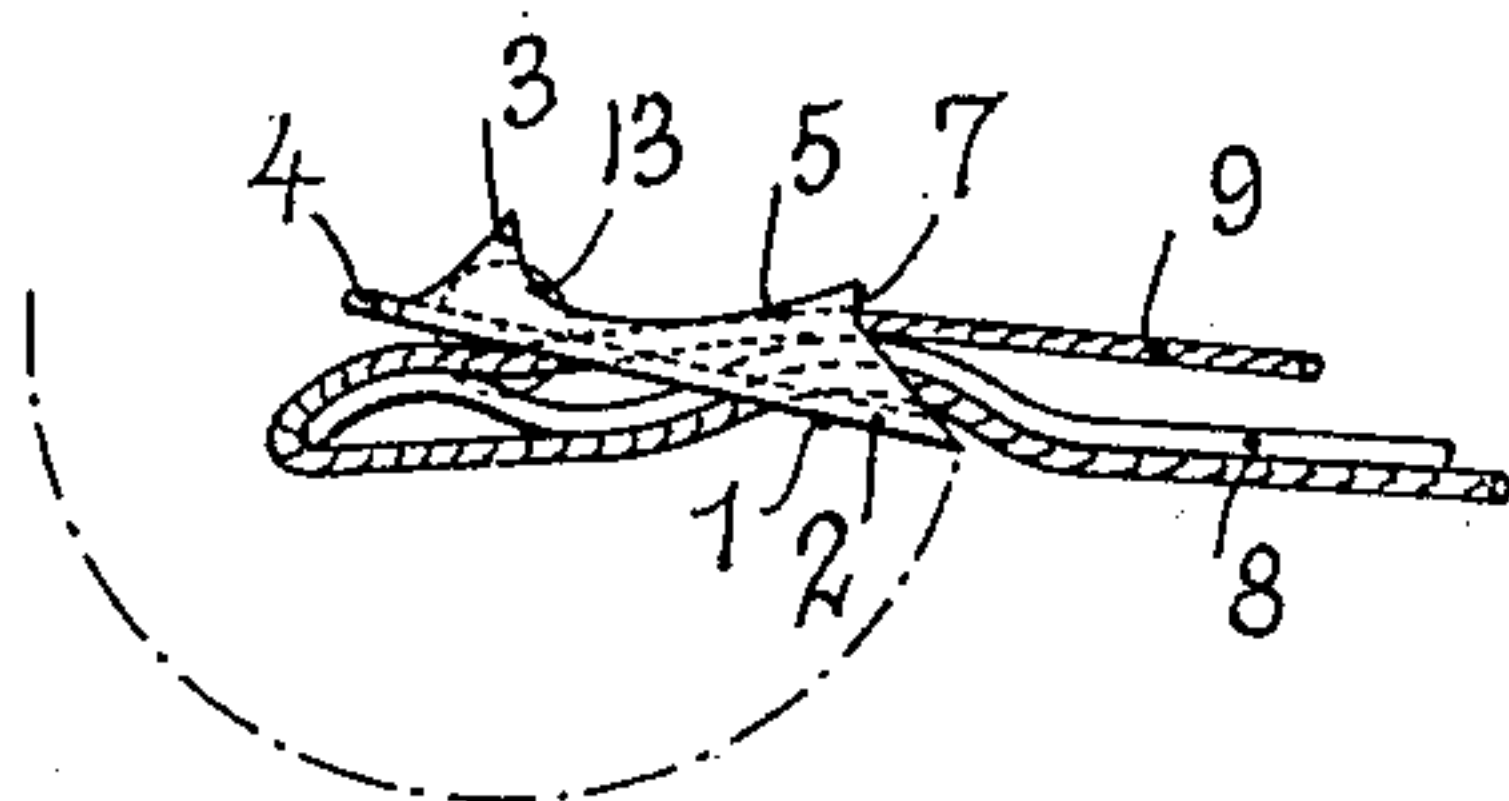
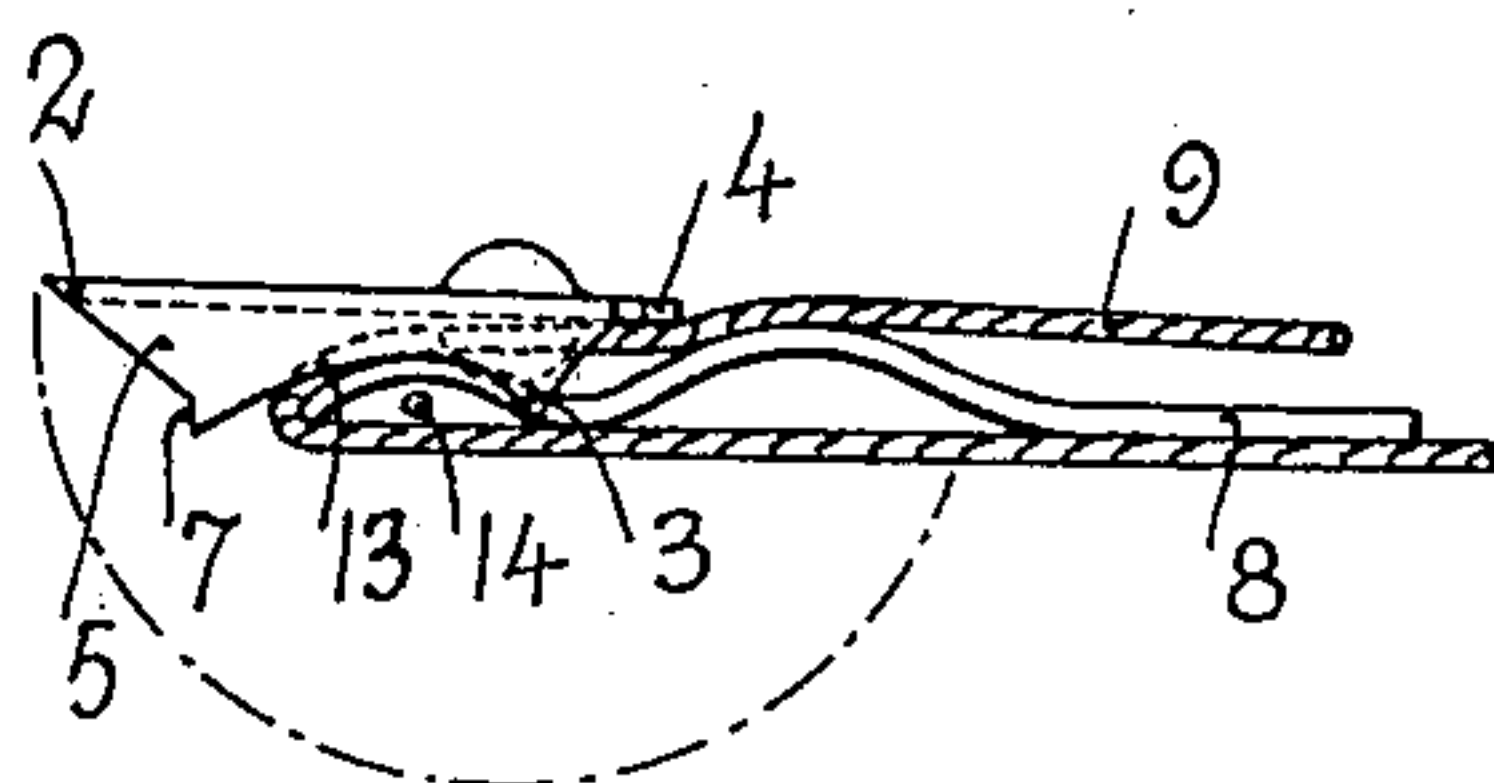


Fig. 5.



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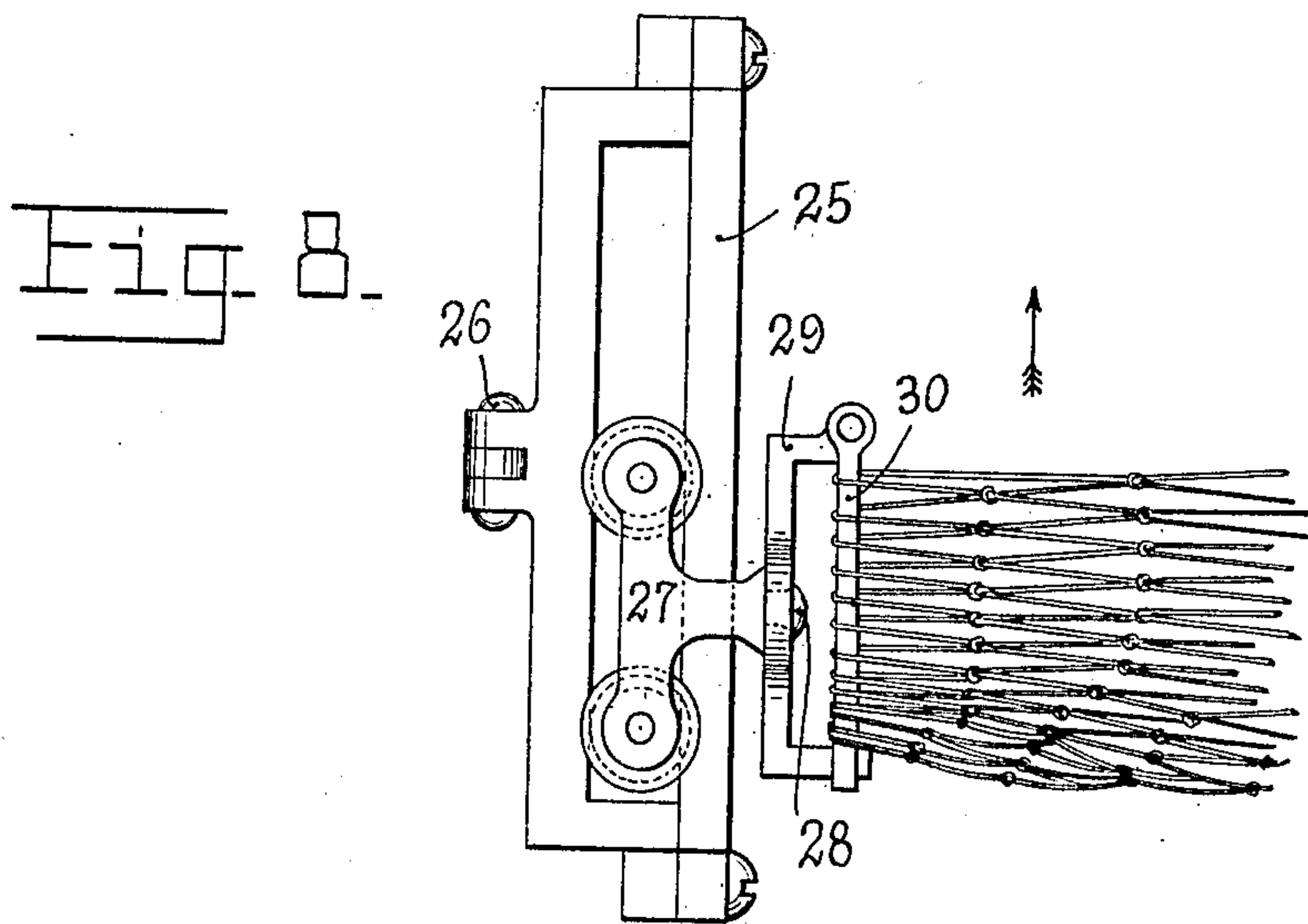
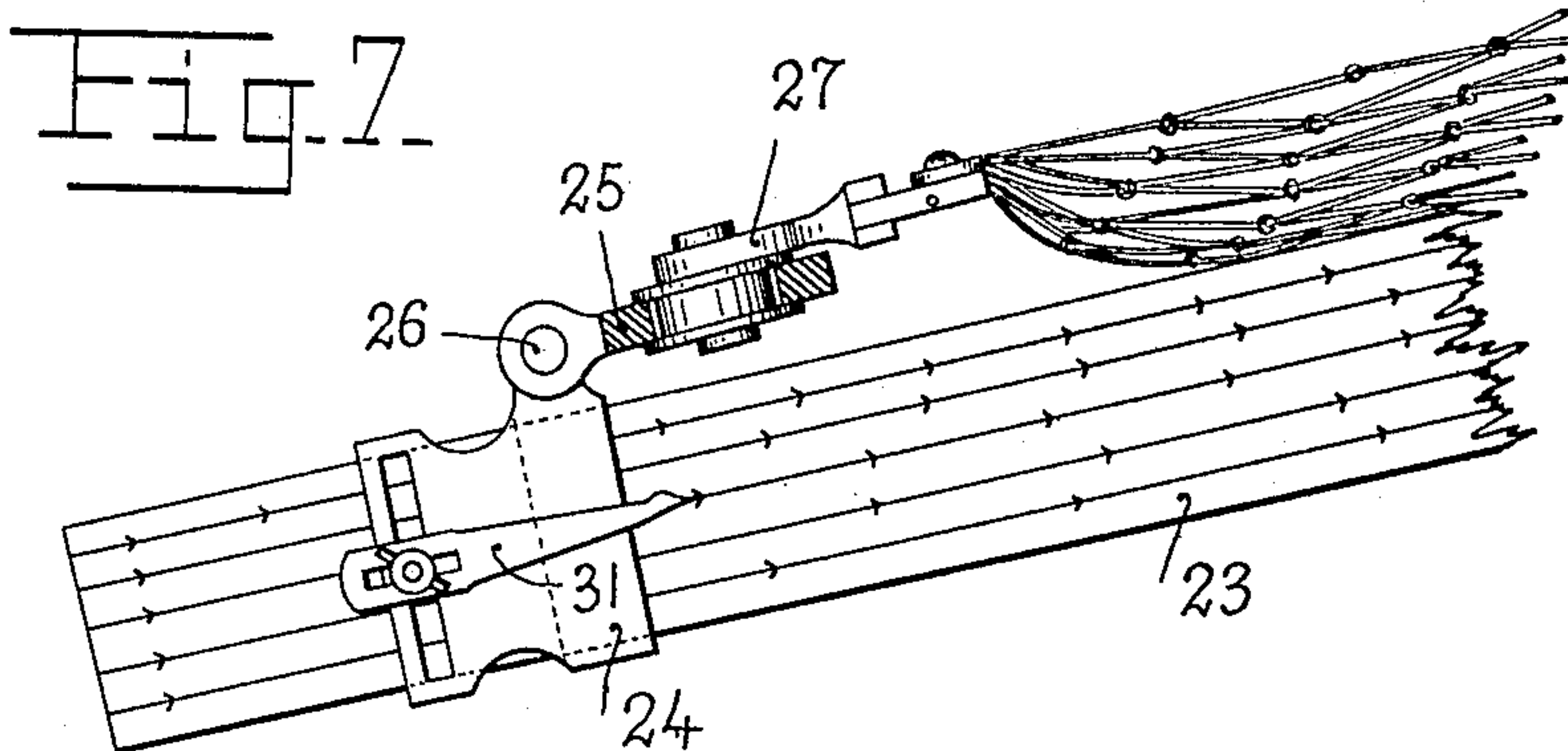
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4 SHEETS—SHEET 2.



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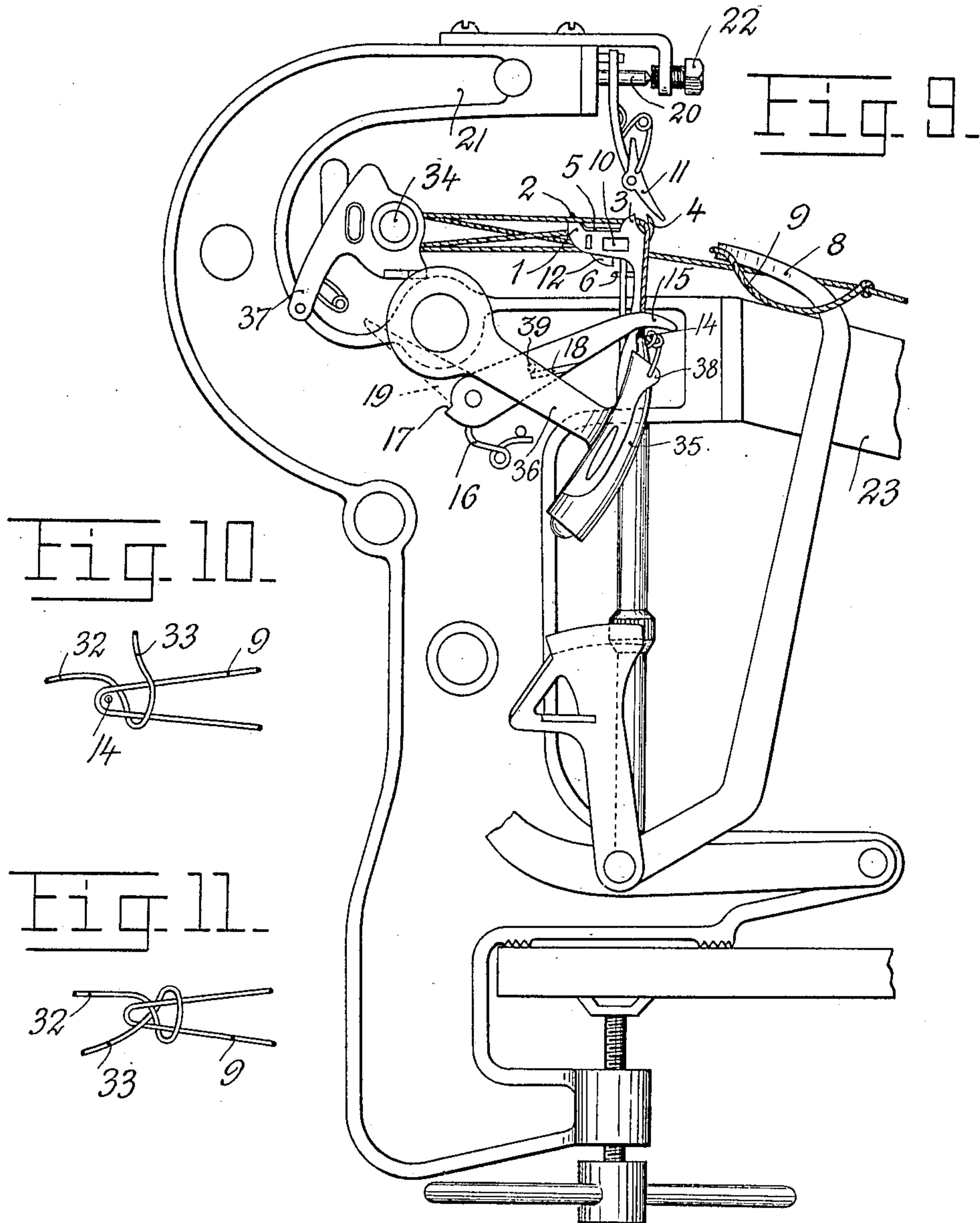
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 12.

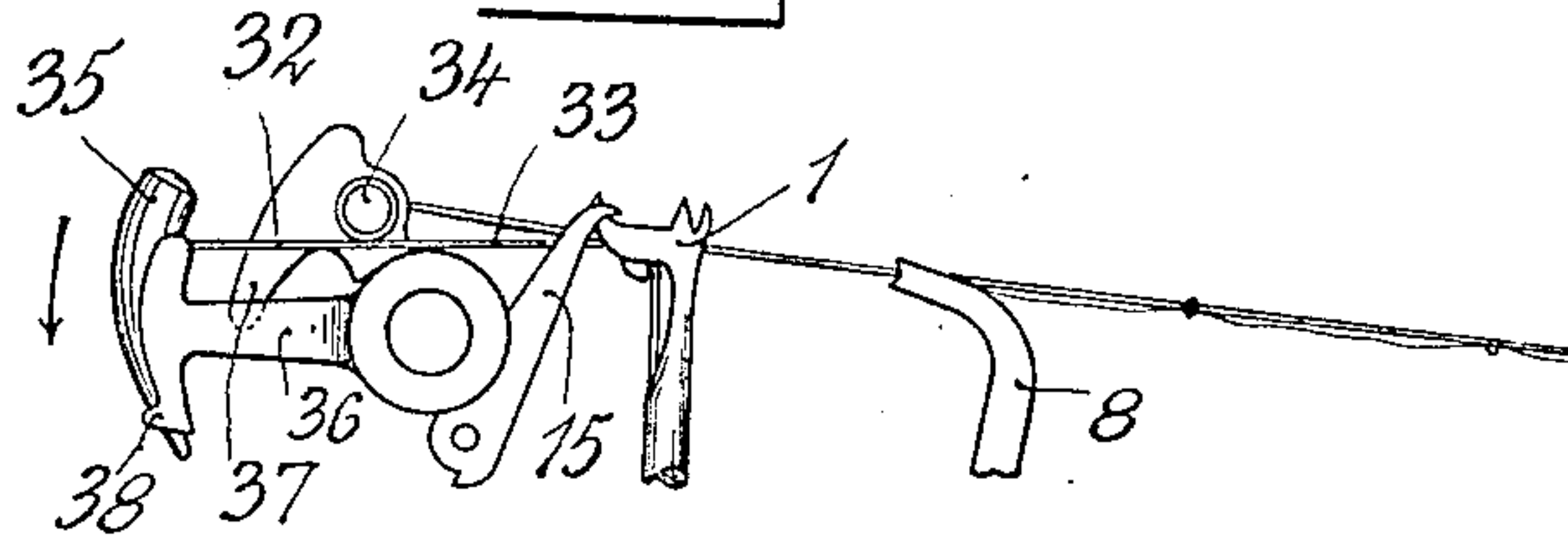


Fig. 13.

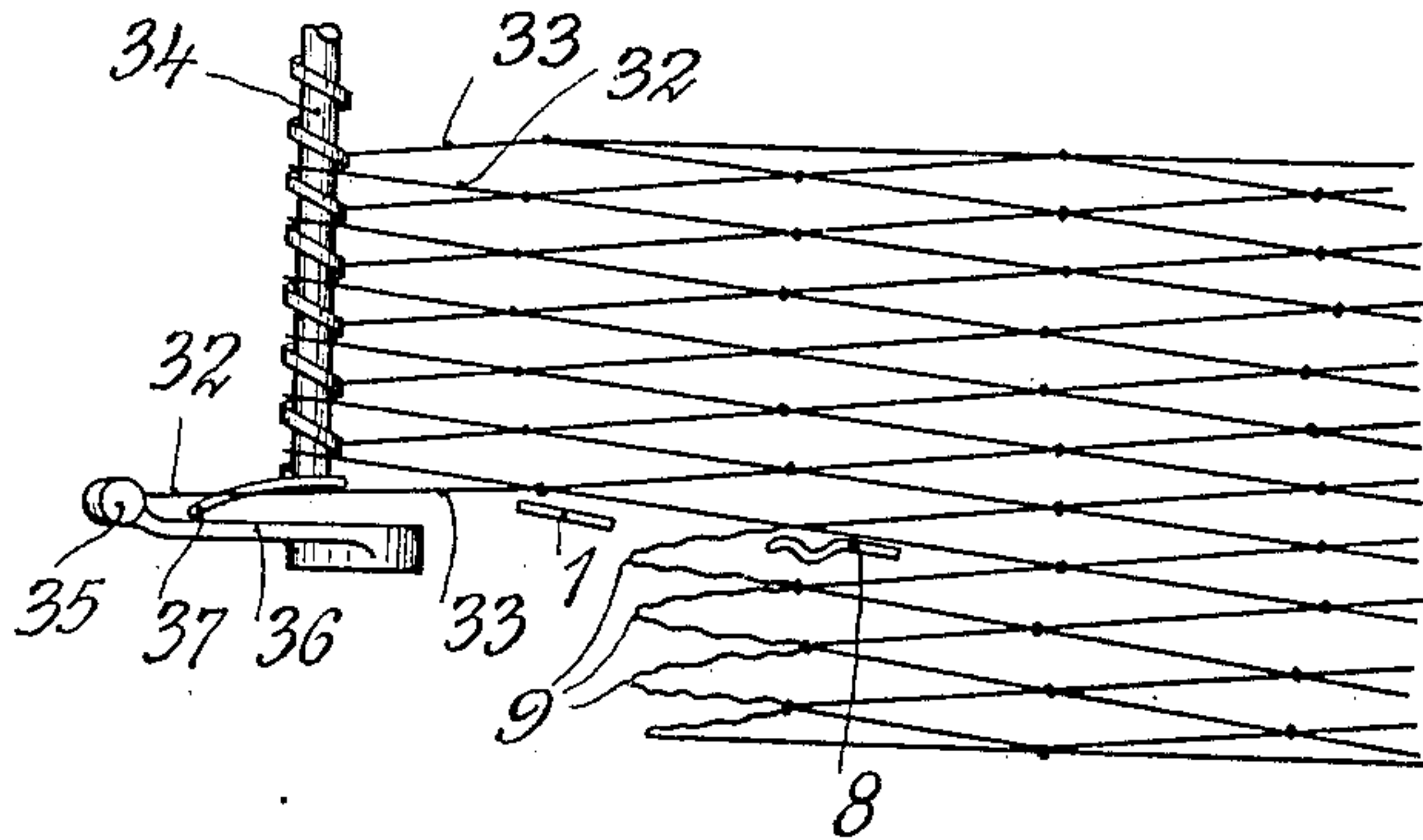


Fig. 14.

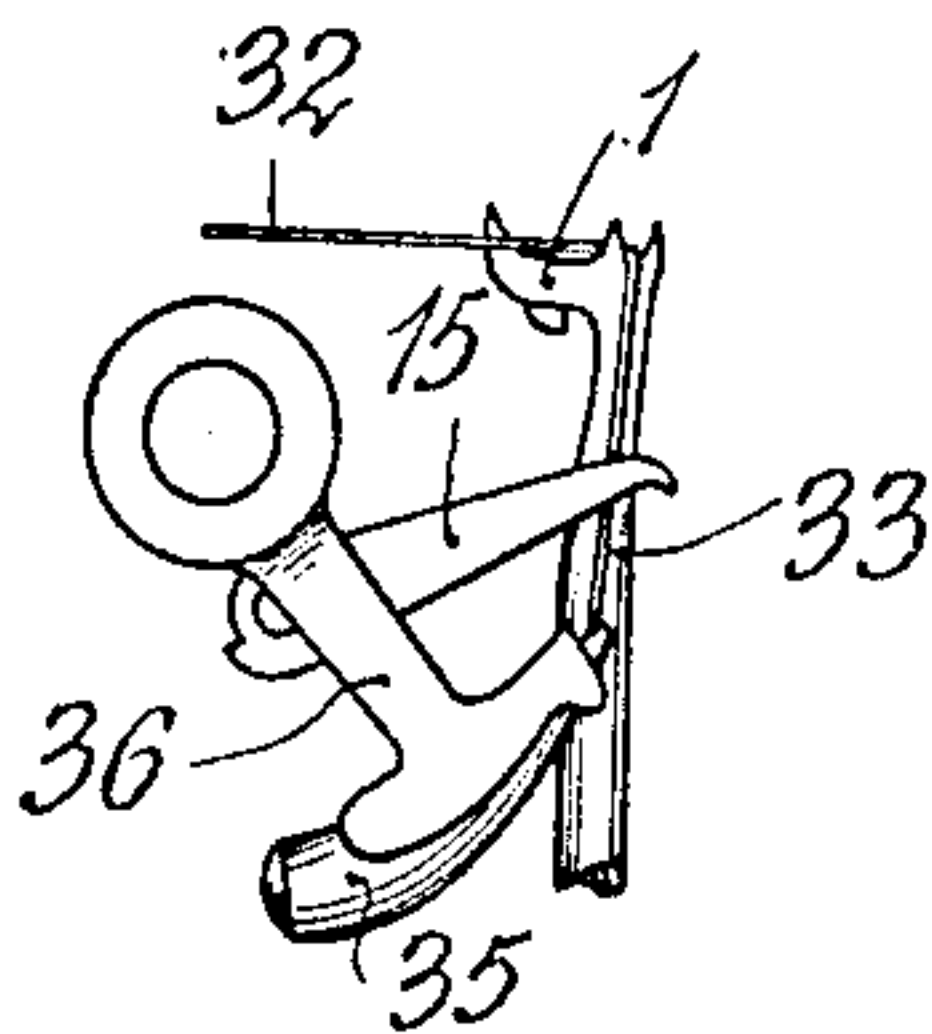
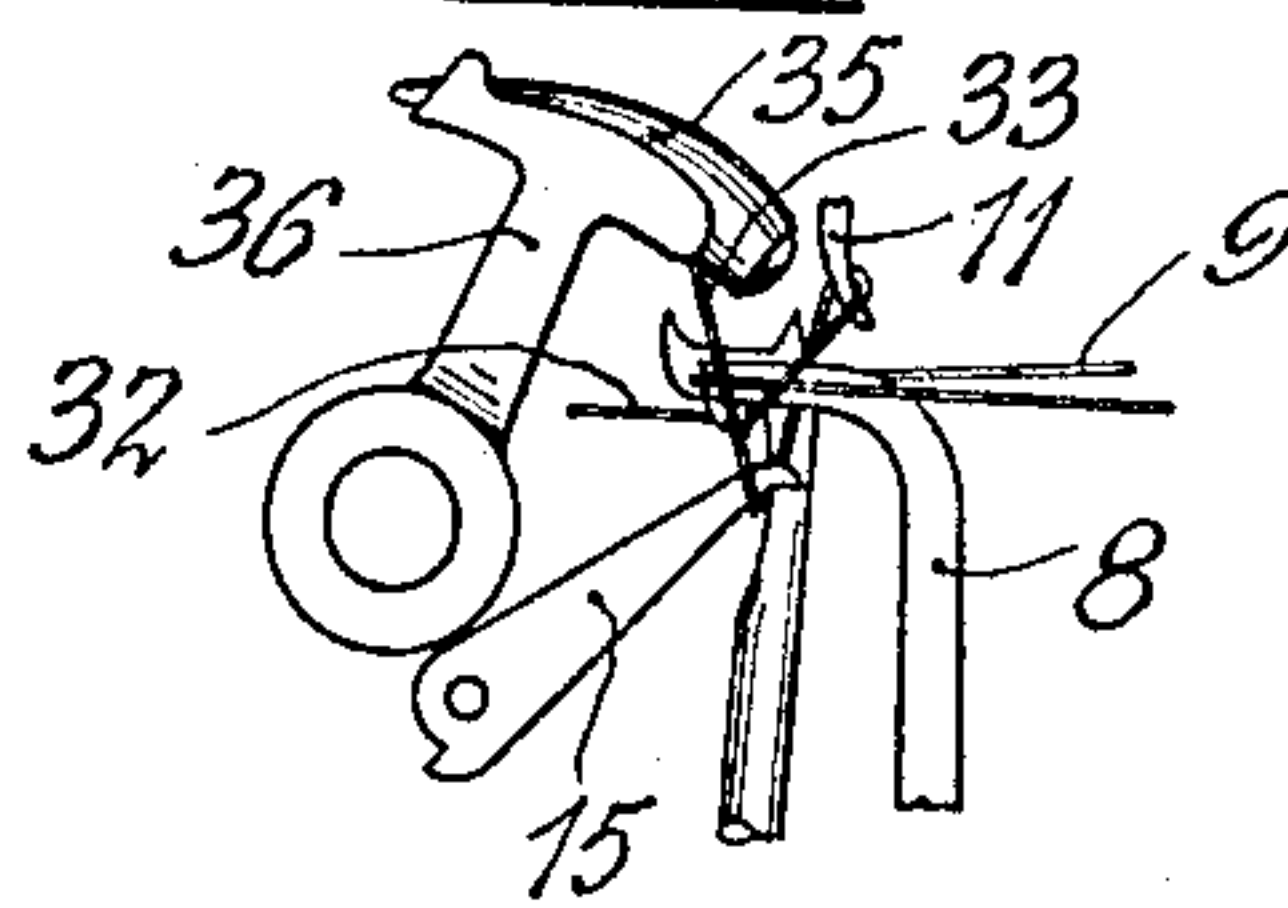


Fig. 15.



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UNITED STATES PATENT OFFICE.

CORNELIUS LIE, OF BERGEN, NORWAY.

NET-TYING MACHINE.

No. 906,728.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed February 20, 1906. Serial No. 302,002.

To all whom it may concern:

Be it known that I, CORNELIUS LIE, a subject of the King of Norway, residing at Rosenborggaden 22, Bergen, Norway, have invented certain new and useful Improvements in Net-Tying Machines, of which the following is a specification.

The present invention relates to net binding devices belonging to a well-known type and consists in improvements, which cause the operation of such devices to be more secure than heretofore possible.

My invention is illustrated in the accompanying drawings in which—

Figure 1 shows the knot-tying device in its first position together with the needle and the thread-bight holder; Fig. 2 is a side elevation of the knot-tier and the mesh feeder in the second position; Fig. 3 is a side elevation of the same parts in the third position; Figs. 4 and 5 are plan views, corresponding respectively to Figs. 2 and 3 and drawn to an enlarged scale; Fig. 6 shows the position of the threads just before the mesh knot is drawn tight; Fig. 7 is a side view of the entire net holder together with a part of the inclined bar; Fig. 8 is a plan view of the net holder proper; Fig. 9 is a side view showing the machine frame and the essential operating parts mounted in position; Figs. 10 and 11 illustrate two stages of the knot-tying operation; Figs. 12 and 13 are elevation and plan views, respectively showing the parts diagrammatically in a certain position; and Figs. 14 and 15 show, in two stages, the manner in which the down-hanging yarn bight is held tight.

Net-binding devices, of the class to which the present invention belongs, are illustrated and described in the specification of Norwegian Letters Patent No. 10476 dated July 15, 1901. In this class of machines, one end of the net is attached to the lower end of an upwardly inclined bar —23— (Figs. 7 and 9), while the net end, in which the new mesh series is tied, is located oppositely the so-called "knot-tier" —1— (Fig. 9), to which the meshes in the last formed series are successively led and the new meshes tied one after the other. The new meshes, in each series, are supported (preferably) by a screw spindle —34— which makes a complete revolution during each mesh forming period. The knots are formed in such manner that the shuttle thread —32— (Fig. 13), previously placed around the free end of the screw

—34—, is, by means of the knot-tier, placed in a bight first under and then above the mesh —9— of the preceding series (Fig. 10). Then the end —33— of the shuttle yarn is threaded up from beneath and through the fore end of the mesh —9— by means of the point —14— of the shuttle passing upward through the bight (Fig. 11). The new mesh carried by the screw —34— (see also Fig. 13) is formed at one end by thread —32— and at the other end by the part —33— of the shuttle yarn. During the further upward movement of the shuttle the formed knot (Figs. 6 and 11) is drawn tight.

The formation of the knot and the supporting and feeding of the mesh —9— take place in well-known manner by means of parts illustrated in Figs. 1-5 and described below.

When the shuttle —35—, carried in usual manner in an arm —36—, is oscillated in anti clock-wise direction, the yarn —32, 33— (Fig. 12) running out from the shuttle bobbin (not shown) meets with the outer side of an inclined projection —37— arranged on the outer end of the screw —34— but not rotating with it. When now the shuttle moves downwards from the position shown in Fig. 12, the yarn —33— slides down along and beneath the lower end of the projection —37— and, when then the shuttle is oscillated in the opposite direction, the yarn is carried up at the inner side of the projection —37— and will place itself in the uttermost thread gap of the screw —34—, so that the yarn now forms the two sides of a new mesh. During this movement of the shuttle its yarn also is placed between the two horns —2— and —3— of the knot-tier —1— (Figs. 1, 9 and 14) and runs downwards from the right side of the horn —3—. When now the knot-tier makes a half revolution to the position shown in Figs. 2 and 4 the fore end of the mesh —9— of the previously tied series (which mesh has been placed by hand upon the mesh feeder —8— and by means of the same moved to the correct position at the side of the knot-tier) is carried through the opening —10— of the knot-tier, and at the same time the shuttle yarn slides down along the fore edge of the tier and snaps behind the hook —12—, it being understood, that the opening —10— is provided solely to enable the mesh feeder to go forward with the mesh at a certain time when the tier is in the way, and has no function in the formation of the

knot. Then the knot-tier —1— is turned back again. During this the upper part of the shuttle yarn bight is caught by the spring-acted needle —11— (Fig. 3). The yarn part —32— is held by the hook —12—, while the mesh —9— makes no movement. The position of the threads is now that shown in Fig. 3 in elevation and in Fig. 10 in plan. Now, in order to complete the knot, the shuttle point —14— (Figs. 5 and 10) is again moved upwards in the reverse clockwise direction through the fore end of the mesh —9— (position Fig. 11), whereupon the knot is drawn tight by the shuttle yarn being in usual manner frictionally braked or jammed between the outer side of the shuttle and a springy tongue —33— upon the shuttle support or carrier (Fig. 9). Before the knot is drawn tight it is held fast by means of the needle —11— and the hook —12—. In a certain position of the shuttle the hook —12— is moved a little upwards (by a mechanism not shown) in order to loose the knot thread, whereupon the drawing-tight begins, the knot being now held only by the needle —11—. Finally this needle yields and the knot, which is now almost quite drawn tight, is loosened from said needle.

The above description of the machine formerly known is necessary for the understanding of the improvements forming the object of the present invention. The parts, which are new in the illustrated machine, are those indicated at —4, 5, 6, 7, 13, 15, 16, 17, 18, 19, 20 and —22—. The purpose of the said parts is to provide a knot forming device and net holder wherein the maximum security is obtained for the correct formation of the knot and whereby the completed end of the net, which is held fast, adjusts itself automatically as the tying of a series of meshes progresses.

According hereto one feature of my invention consists in providing at the rear end of the knot tier —1— a hook —4— in such a manner, that the shuttle yarn deposited between the two upper projections —2— and —3— is then led between the projection —3— and the hook so as to be prevented from sliding down at the said rear end of the tier. In the formerly used tiers this hook —4— was not present. Therefore often the yarn at the rear end of the tier slid down and caused malformation or prevented the formation of the knot. This defect is obviated by means of said hook —4—. Further the shuttle yarn during the turning of the knot-tier has to slide down at its front end. In order to facilitate this a flat projection —5—, which at the front inclines against the point of the projection —2— (Fig. 5), is arranged on one side of the tier between the projections —2— and —3—. The projection —5— is further provided with a stop or nose

—7— against which the yarn stops during the movement to the position shown in Fig. 2. Still further it is a matter of fact, that during the turning of the tier —1— from the position shown in Fig. 2 to that shown in Fig. 3 the yarn part —32— tends to snap off the vertically movable hook —12—. This inconvenience is prevented by providing beneath the hook —12— a fixed pin —6—.

In order to complete the knot the hanging end —33— of the yarn must, as mentioned above, be carried up through the projecting end of the mesh —9— (Fig. 11) in front of the shuttle yarn bight. To this end the projection —5— is so cut as to form a rounded recess or curve at —13— (Fig. 5). At the same time the end of the mesh feeder —8— is correspondingly curved so that between the end of the feeder and one side of the mesh is formed an opening, through which passes the point —14—, Fig. 5, of the shuttle whereupon the now formed knot is drawn tight.

While the knot is being tightened the part —33— of the shuttle thread beneath the mesh hangs down in a bight, which is gradually decreased. Heretofore it has been usual to let this bight be slack, which however often resulted in a displacing or an incorrect formation of the knot. This drawback I remove by holding the said bight tight. For this purpose I provide a turnable lever —15— (Figs. 1, 9, 12, 14 and 15) which catches the yarn bight and follows upwards with the same (Fig. 15) the lever being braked by a friction spring —16— and held fast in its upper position by said spring, which engages a nose —17— on the lever. During the downward movement of the shuttle, a projection (see the small dotted circles, 39 in Fig. 9) on the shuttle carrying arm —36— meets with the projection —18— and returns the lever —15— down to its initial position. For the reliable formation of the knot it is finally important that the catching needle —11— during the drawing tight of the knot may be easily movable laterally. For this purpose the needle is suspended between two center points —20— journaled in the adjusting screw —22—, and in the overhanging arm —21— of the machine.

I now will proceed to describe the net holder.

In the old net tying machines the end of the net which has been prepared has been attached to the bar —23— by means of a clip which during the operation turns on a vertical pivot according as the tying of each series of meshes progresses from one side of the net to the other. This manner of holding fast the end of the net occasions the drawback, that the line of tying (the longitudinal line seen from above) does not always form a right angle with the cross direction in which

the meshes pass the knot-tier, and this takes place especially when the fastening of each series of meshes is near completion, said position of the tying line is a great hindrance to the correct formation of the knots. According to my invention I construct the net holder in such a manner, that it adjusts itself automatically as the tying of a series of meshes progresses, so that the tying line is always parallel to the bar —23—, *i. e.* the tying-line remains always in the same position. For fulfilling this purpose the inclined bar —23—, which continues upwards to a point close behind the knot-tier, is embraced by a shoe —24— to the upper side of which is jointed a frame —25— by means of a horizontal cross bolt —26—. Said frame forms a guide for a roller slide —27—, on the longitudinal bolt —28— of which is turnably arranged a clip —29— having a detachable cross-needle —30—. Upon the latter is threaded in the completed end of the net as indicated in Figs. 7 and 8, and as during the tying operation the tying-line travels from one side of the net to the other, the slide —27— travels in the direction of the arrow (Fig. 8), so that the tying-line always occupies the same position and direction parallel to the bar —23—. After the completion of a series of meshes the clip —29— is simply turned around on the bolt —28— and the tying of the next series of meshes may begin, after the holder —24—30— has been moved half a mesh length (one knot distance) down the bar —23—. In order to effect this latter movement, the shoe —24— carries a pointer —31—, adjustable vertically of the bar and the front, sharp, inwardly bent end of which may project into notches made on the side of the bar —23—. In order to effect a ready and exact displacement in the different cases, rows of notches are arranged on the bar, for instance 5 spaces as shown, corresponding to 5 different sizes of mesh. The pointer is placed on the row, which suits for the mesh size in question, and the displacement is then effected by simply drawing back the shoe —24—, until the pointer —31— falls into the next notch.

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

1. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edges between which the shuttle yarn is deposited, a lower vertically movable hook and a thread hook arranged behind the rear upper edge projection and preventing the yarn sliding down at the back of the tier, in combination with a mesh-feeder movable in the tier-opening aforesaid, and with a shuttle and means for operating the latter.

2. A knot-tying device for net making ma-

chines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edges between which the shuttle yarn is deposited, a lower vertically movable hook and a side projection following from the front to the rear edge projection and serving to facilitate the sliding-down of the thread at the fore edge of the tier during its backward oscillation, in combination with a mesh feeder, movable in the tier-opening aforesaid, and with a shuttle and means for operating the latter.

3. A knot-tier device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edges between which the shuttle yarn is deposited, a lower vertically movable hook and a side projection following from the front to the rear edge projection and serving to facilitate the sliding-down of the yarn at the front edge of the tier during its backward oscillation, said side projection being provided with a stop and with a curved recess, in combination with a mesh-feeder movable in the tier-opening aforesaid, and with a shuttle and means for operating the latter.

4. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edge between which the shuttle yarn is deposited, a lower vertically movable hook and a fixed pin arranged immediately beneath said movable stop and serving to prevent the yarn from springing off from the stop after having been caught by the same, in combination with a mesh-feeder movable in the tier-opening aforesaid, and with a shuttle and means for operating the latter.

5. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edge between which the shuttle yarn is deposited, a lower vertically movable hook, in combination with a shuttle, means for operating the same, a mesh-feeder movable in the tier-opening aforesaid, a knot-catching needle near the knot-tier, a cross-pivot carrying the needle and having pointed ends one of which fits a recess in the over-hanging arm of the machine and an adjustable screw, the concave end of which carries the other pointed end of the cross-pivot so that the needle is pivoted to swing easily laterally.

6. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edge between which the shuttle yarn is deposited, a lower vertically movable hook, in combination with a shuttle, means for operating the same, a mesh-feeder movable in the tier-opening

aforesaid, and with a lever for catching and following the down-hanging bight of the shuttle yarn.

7. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edge between which projections the shuttle yarn is deposited, a lower vertically movable hook, in combination with a shuttle, means for operating the same, a mesh-feeder movable in the tier-opening aforesaid, and with a lever for catching and following the down-hanging bight of the shuttle yarn, and a friction spring pressing upon said lever for braking the same.

8. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edge between which projections the shuttle yarn is deposited, a lower vertically movable hook, a side projection following from the front to the rear edge projection and serving to facilitate the sliding down of the thread or yarn at the front edge of the tier during its backward oscillation, said side projection being provided with a stop and a curved recess, a thread hook arranged behind the rear upper edge projection and preventing the thread or yarn from sliding down at the back of the tier, and a fixed pin arranged immediately beneath the said movable hook and serving to prevent the yarn from springing off from the last-mentioned hook after having been caught by the same, in combination with a mesh-feeder movable in the tier-opening aforesaid, and with a shuttle and means for operating the same.

9. A knot-tying device for net making machines comprising an oscillatory knot-tier having an opening therethrough, two projections at its upper edge between which projections the shuttle yarn is deposited, a lower vertically movable hook, a side projection following from the front to the rear edge projection and serving to facilitate the sliding down of the thread or yarn at the front edge of the tier during its backward oscillation, said side projection being provided with a stop and a curved recess, a thread hook arranged behind the rear upper edge projection and preventing the thread or yarn from sliding down at the back of the tier, and a fixed pin arranged immediately beneath the said movable hook, and serving to prevent the yarn from springing off from the last-mentioned hook after having been caught by the same, in combination with a shuttle, means

for operating the same, a mesh-feeder movable in the tier-opening aforesaid and having its outer end bent to conform to said curved recess of the knot-tier, a lever for catching and following the down-hanging bight of the shuttle yarn, a friction spring pressing upon said lever for braking the same, a knot-catching needle near the knot-tier, a cross-pivot carrying the needle and having pointed ends one of which fits a recess in the over-hanging arm of the machine, and an adjustable screw, the concave end of which carries the other pointed end of the cross-pivot so that the needle is pivoted to swing easily laterally.

10. A net making machine, comprising knot-tier means, in combination with a net-holder having a frame and a slide carried by said frame and having means for holding the completed end of a net.

11. A net making machine, comprising knot-tier means, in combination with a net-holder having a frame and a slide carried by said frame, a clip rotatably carried by said slide, and a needle thereto attached.

12. A net making machine, comprising knot-tier means, in combination with a net holder having a shoe slidably arranged upon a bar, a frame movably connected with the shoe, and a slide carried by said frame and having means for holding the completed end of a net.

13. A net making machine, comprising knot-tier means, in combination with a bar having dissimilar lines of notches along its length, a shoe slidably arranged upon said bar and having an adjustable spring pointer which engages the notches of any one of said lines, and means, freely connected with and slidably carried by said shoe for holding the completed end of a net.

14. A net making machine, comprising knot-tier means, in combination with a bar having dissimilar lines of notches along its length, a shoe slidably arranged upon said bar and having an adjustable spring pointer which engages the notches of any one of said lines, a frame movably connected with the shoe, a slide carried by said frame, a clip rotatably connected with the frame, and a needle carried by said clip.

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

CORNELIUS LIE.

Witnesses:

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