No. 675,350. Patented May 28, 1901.

A. GOSS.

MACHINE FOR TWISTING IN WARP THREADS IN LOOMS.

(Application filed Mar. 2, 1900.)

(No Model.) 3 Sheets—Sheet 1.

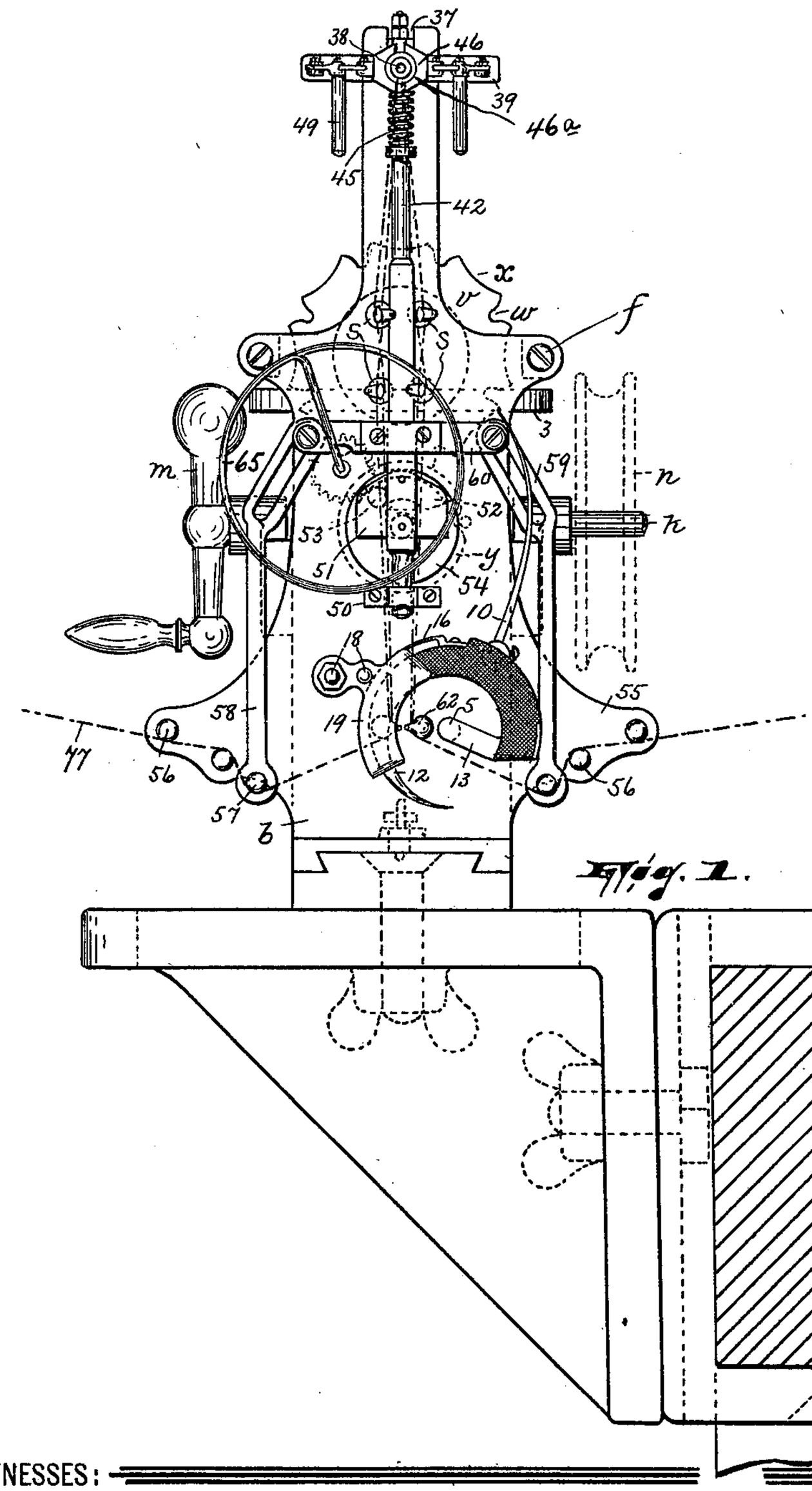

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

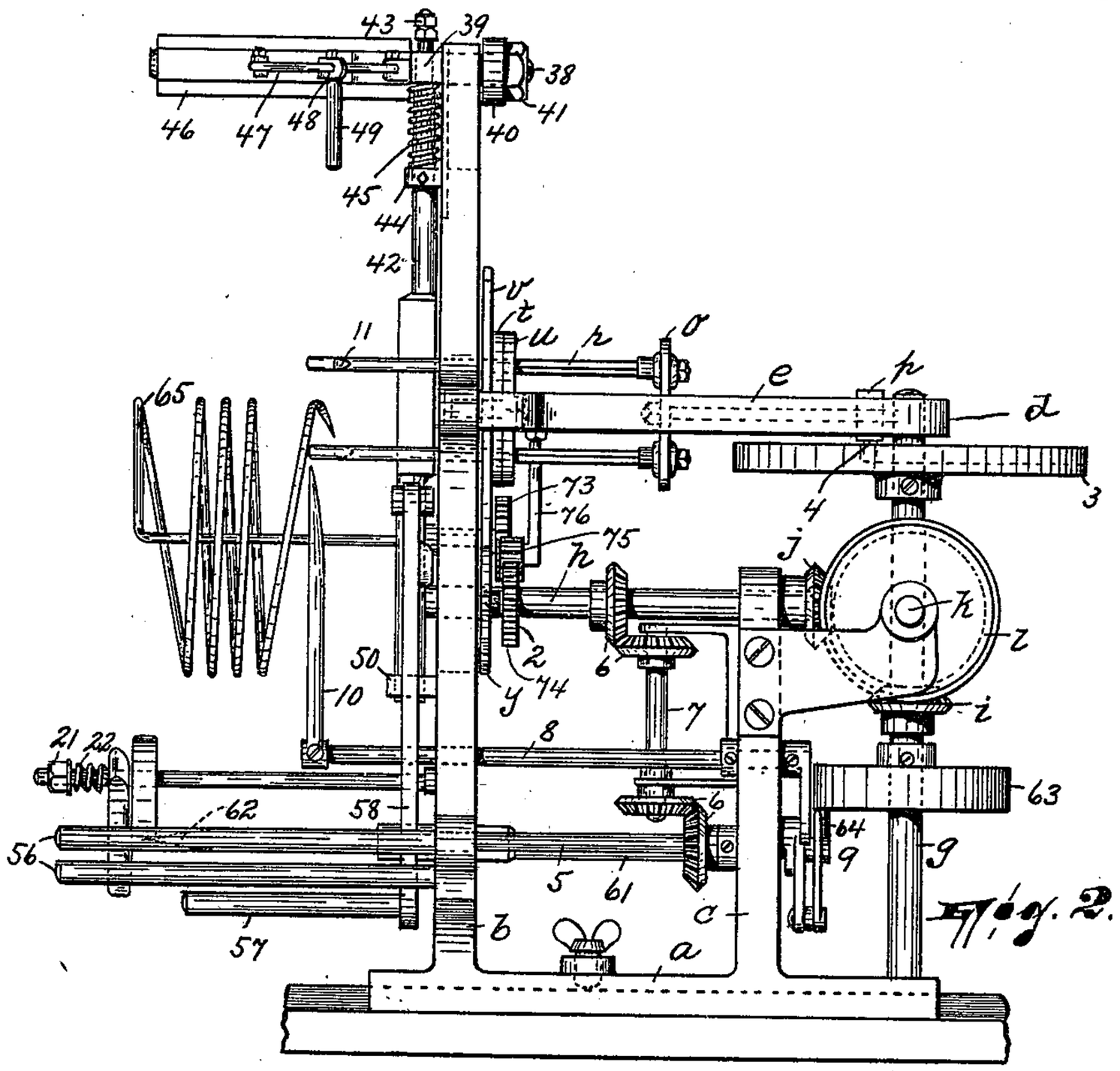

Fig. 2.

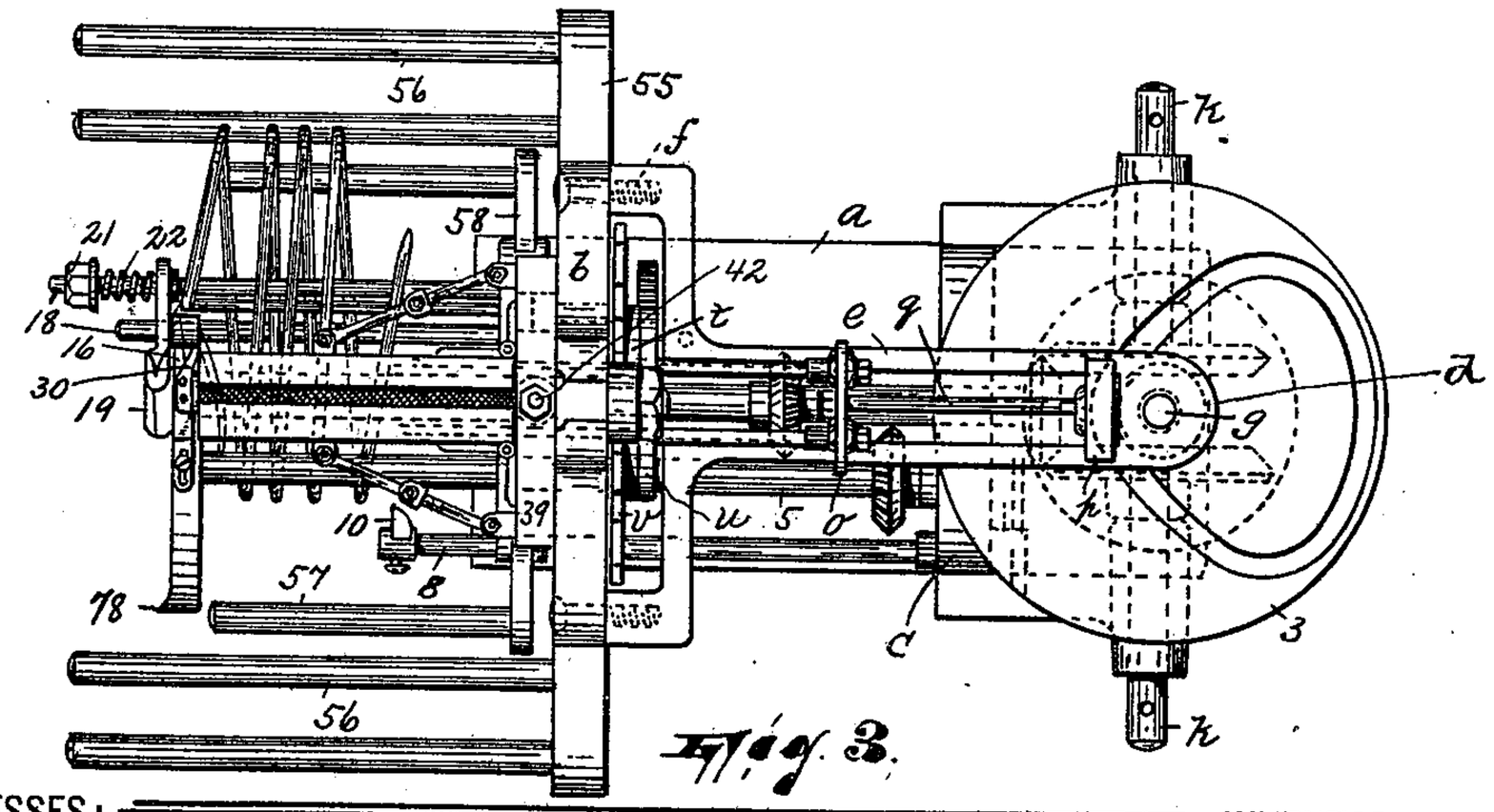

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

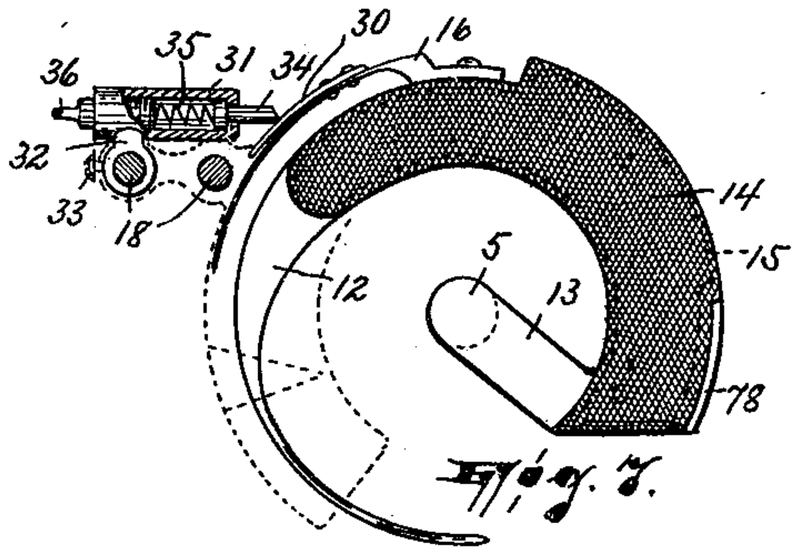

Fig. 7.

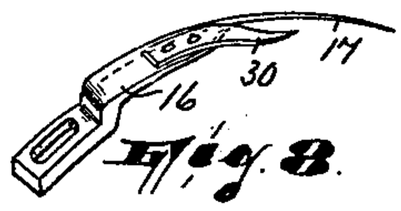

Fig. 8.

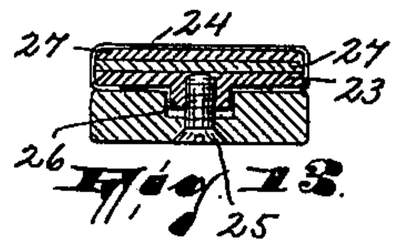

Fig. 13.

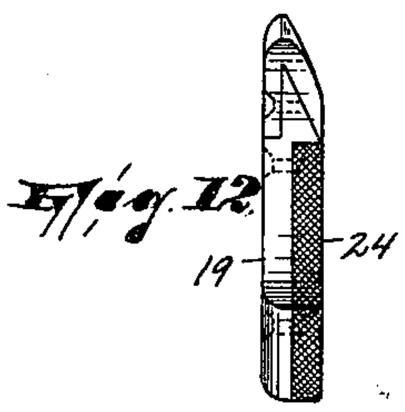

Fig. 12.

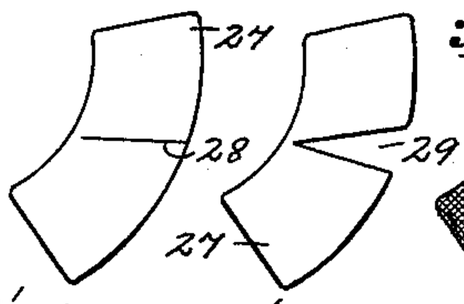

Fig. 11.

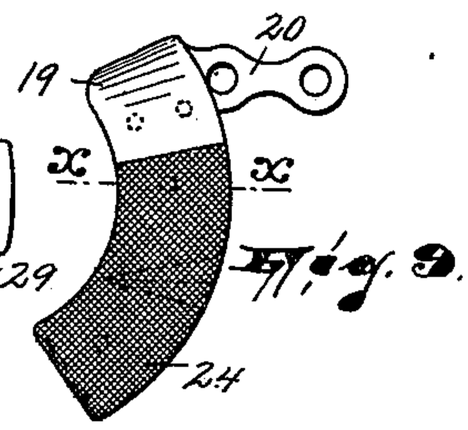

Fig. 9.

Fig. 10.

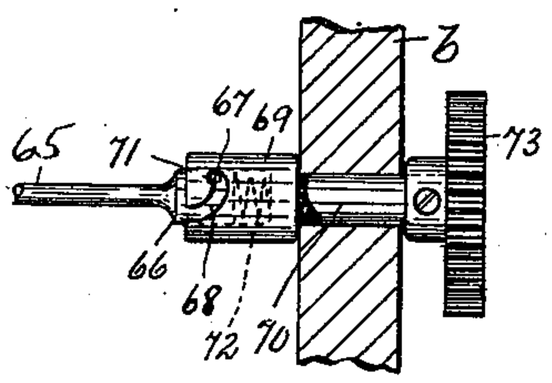

Fig. 5.

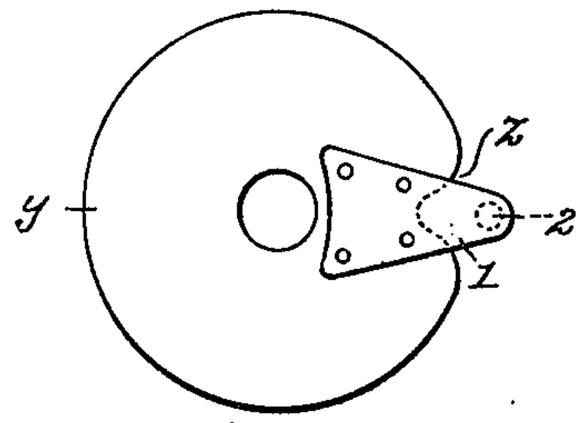

Fig. 4.

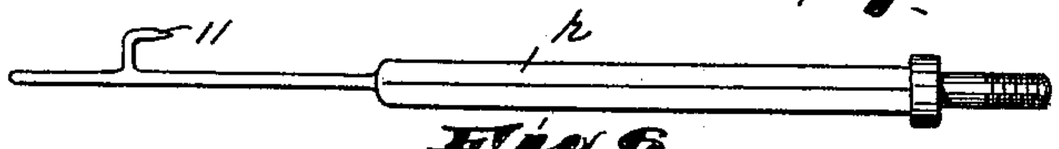

Fig. 6.

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UNITED STATES PATENT OFFICE.

ALBERT GOSS, OF LAKEVIEW, NEW JERSEY.

MACHINE FOR TWISTING-IN WARP-THREADS IN LOOMS.

SPECIFICATION forming part of Letters Patent No. 675,350, dated May 28, 1901.

Application filed March 2, 1900. Serial No. 7,080½. (No model.)

To all whom it may concern:

Be it known that I, ALBERT GOSS, a citizen of the United States, residing in Lakeview, county of Passaic, and State of New Jersey, have invented certain new and useful Improvements in Machines for Twisting-In Warp-Threads in Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to twisting-machines; and it has reference particularly to that shown and described in my United States Letters Patent granted May 1, 1900, No. 648,738, upon which it constitutes an improvement.

In my present invention I improve upon that which is the subject-matter of the above-mentioned patent by providing in lieu of the finger therein described as serving auxiliarly to separate the threads and to hold back the main body thereof while those separated are twisted a device which not only works more smoothly and is otherwise more practical, but which acts to constantly keep several threads separated from each other and from the main body of threads while at the same time advancing them one after another into the control of the twisting-machine; by employing in combination with the above and auxiliary to the main thread-separating mechanism a vibrating finger serving in holding back the main body of the threads; by altering slightly the twisting mechanism proper, so as to insure the perfect twisting of the threads at every operation; by supplementing the thread-cutting mechanism with an additional edge and with a sharpening device, so as to insure the perfect cutting of the threads at all times and reduce the necessity for frequent attention to keep it in order; by elastically or yieldingly arranging the thread-sustaining means so that the tension of the threads is maintained constant, and by alterations in a portion of the frame of the machine, so as principally to make the machine more compact and simplify its construction.

The invention consists in the improved twisting-machine and in the combination and arrangement of the various parts thereof, substantially as will be hereinafter pointed out and finally embodied in the clauses of the claim.

The invention is fully illustrated in the accompanying drawings, wherein—

Figure 1 is a front view of my improved twisting-machine, shown as adjustably mounted in an operative position upon a support provided for it and secured to some suitable beam of a loom. Fig. 2 is a view in side elevation of my improved machine. Fig. 3 is a top plan view of said machine. Fig. 4 is a plan view of a certain cam. Fig. 5 is a detail view of the mounting for the thread-separating device. Fig. 6 is a plan view of one of the hook-bars which constitute the main thread-separating mechanism. Fig. 7 is a face view of the movable member of the twisting mechanism, showing in dotted lines the other member of said mechanism and also showing the cutter and the sharpening means therefor. Fig. 8 is a perspective view of said cutter. Fig. 9 is a face view of the stationary member of the twisting mechanism. Figs. 10 and 11 are plan views of certain parts of said stationary member. Fig. 12 is a side view of the device shown in Fig. 9, and Fig. 13 is an enlarged sectional view on the line *x x* in Fig. 9.

The main frame of the machine consists of a bed-plate *a* and two uprights *b c*, which uprights may form integral portions of the plate and the one of which, *b*, is higher than the other.

d is a bracket which extends horizontally and rearwardly from the upright *b*, said bracket being bifurcated, so as to form a pair of parallel guides *e*, and having its extremities spread apart and secured to the rear face of the upright, as by screws *f*. The free outer end of this bracket provides a bearing for the upper end of a vertical shaft *g*, which is stepped in the bed-plate, and in the two uprights is journaled another shaft *h*, which shaft and the shaft *g* carry bevel-gears *j i*, respectively. Rotary motion is imparted to these shafts from either of a pair of shafts *k*, each carrying a bevel-gear *l*, that is in mesh with the gears *i* and *j*, and one of said shafts being adapted to carry a crank *m*, while the other is adapted to carry a pulley *n*, whereby

either manual or machine power may be utilized for driving.

A reciprocating frame, consisting of a plate *o* and a block *p*, guided in said frame, and a rod *q*, connecting said plate and block, is carried by the bifurcated frame, being adapted to reciprocate therein.

r represents hook-bars which have bearings at their rear ends in the plate *o* and which are mounted in sleeves *s*, that are journaled in the upright *b*. The hook-bars, as shown in Fig. 6, have their main portions—that is to say, the portions thereof which the sleeves receive—squared, and the sleeves fit them. They are thus adapted to reciprocate as well as to revolve. As described in my above-mentioned patent, the sleeves *s*, and consequently the hook-bars, are rotated from an internally-toothed gear *t*, which is disposed between a disk *u*, suitably secured to the upright *b*, and said upright, through the medium of a series of pinions which the hook-bars respectively penetrate and which the internally-toothed gear incloses, said pinions being operatively connected with the sleeves through a suitable notch and spring-actuated pawl mechanism. The gear-wheel *t* carries a star-wheel *v*, having peripheral and alternate notches and shallow recesses *w x*, said star-wheel being adapted to be intermittently actuated by a pin-wheel *y*, (see Fig. 4,) having a recess *z* formed in its edge portion and provided with a radial arm *l*, carrying a pin 2, disposed opposite the notch. The pin is adapted to engage the notches *w* of the star-wheel to turn the latter, while the periphery of the pin-wheel is adapted to engage the shallow recesses of said star-wheel to maintain the same stationary between such times as the pin actuates it.

The frame *d* is reciprocated by means of a cam 3, having a cam-slot with which a pin 4, carried by said frame, engages, said cam being mounted on the shaft *g*.

5 is a shaft which is journaled in the uprights *b* and *c* and which is operatively connected with the shaft *h* through the medium of intermeshing bevel-gears 6, mounted on said shafts and upon an auxiliary connecting-shaft 7. 8 is a rock-shaft, also journaled in said uprights and adapted to be vibrated by the shaft 5 through the medium of a series of interconnected levers 9, particularly described in my above-mentioned patent. The shaft 8 penetrates the upright *b* and at its outer end it carries a narrow tapering finger 10, which when viewed from the front of the machine has a slight curve. The finger is long enough so that as it vibrates its extremity moves into close proximity with the nearest hook-bar. There are two pairs of hook-bars, the one being preferably disposed directly beside the other. Said hook-bars are provided near their outer ends with hooks 11, which in each pair project in relatively opposite directions, as best seen in Fig. 1. The shaft 5 likewise penetrates the upright *b* and at its outer end it carries the movable member of the twisting mechanism proper. This device consists of a curved plate 12 in the form of a hook and carried by an arm 13, constituting a radial portion of said hook and projecting from the shaft. The free end of the hook is sharply tapered and it has a curvature to one side—that is to say, toward the upright *b*—as well as a curvature in the direction of rotation of the hook with the shaft. Upon the outer face of the plate 12 is disposed a shoe 14, said shoe preferably consisting of a strip of kid or other similar material offering a sufficient gripping-surface, which strip is secured in position by means of another plate 15, (outlined in dotted lines in Fig. 7,) around whose edges the edges of the rubber strip extend, being clamped between the two plates.

Near the forward end of the shoe 14 the edge of the plate 12 and also of the plate 15 is cut away, and in the recess formed is secured a cutter, (shown in Fig. 8,) said cutter consisting of a curved blade 16, which extends concentrically with the plate 12 and terminates in an elongated point or spur 17. It should be remarked that this spur does not follow the direction of the hook in so far as the lateral projection thereof is concerned and that the edge of the blade adjacent the upright *b* is the cutting one.

18 designates a pair of parallel rods which project outwardly from the upright *b*, being disposed in a horizontal plane. These two rods carry the stationary member of the twisting mechanism, the same consisting of a curved plate 19, having an arm 20, that is penetrated by the two rods, there being a nut 21 at the end of one of the rods and a spring 22 between said nut and the arm, and said spring acting to render the plate yielding. Upon the acting face of the device is secured, by means of another curved plate 23, a kid strip 24, the two plates being clamped together by a screw 25, penetrating a coengaging boss and recess 26 of said plates. Between the kid strip and the plate are disposed two layers 27 of elastic material, preferably rubber, the outer one having about midway its length a single-cut incision 28, extending inwardly from its convex edge, and the inner one having a similarly-disposed V-shaped incision 29.

It should be remarked that the movable member of the twisting mechanism which has been already described should also be provided with one or more layers of rubber without the incisions, disposed between the kid strip and the plate.

The two members of the twisting mechanism are disposed concentrically with reference to the shaft 5, with which the movable one rotates, and thus since they are adapted to contact with each other their engagement is rendered most efficient for effecting the twisting of the threads. It is of course understood that the rubber and kid strips con-

stituting the acting faces of the members wipe the one upon the other, the uniformity of the contact being augmented by virtue of the yielding arrangement of the stationary member.

In addition to the blade 16 for the movable member of the twisting mechanism I have provided an auxiliary blade 30, that is carried by said first-named blade and acts therewith somewhat like a pair of scissors.

In order that the cutter just described may be kept in order, I have provided a sharpening device which consists of a cylindrical holder 31, having an integral bracket 32, whereby it is adjustably secured with a set-screw 33 to one of the rods 18, said holder being adapted to carry a sharpening-stone 34, normally actuated by a delicate spiral spring 35, inclosed in the holder and rendered adjustable by means of a set-screw 36, mounted in the rear end of said holder. This device is so arranged that in each revolution of the movable member of the twisting mechanism the edge of the auxiliary cutter is wiped by the sharpening-stone, as best seen in Fig. 7.

The upper end of the upright *b* is provided with a vertical slot 37, in which is adapted to reciprocate a horizontal spindle 38, which penetrates a cross-arm 39, the portion of the spindle which works in the slot being squared and the rear end of said spindle carrying a washer and nut 40 and 41, respectively.

42 is a vertical reciprocating bar whose upper end is reduced and threaded and penetrates both the spindle 38 and the cross-arm 39, its upper end being provided with nuts 43.

44 is a collar secured upon the spindle, and coiled about said spindle between this collar and the cross-arm is a spiral spring 45. This spring tends to press the cross-arm and spindle upwardly against the nuts 43. (In the drawings, however, the cross-arm is spaced from the nuts, the spring being thereby slightly compressed.) On both sides of the spindle grips 46 are hinged on the cross-arm, said grips being adapted to coact with the spindle to form a compound clamp and being for this purpose provided with longitudinal channels 46ª, receiving the spindle. In order to operate the grips, I have connected each of them with the cross-arm by means of jointed levers 47, the joint between these levers consisting of a coupling 48, carrying an operating-handle 49. The lower end of the bar 42 is reduced and is guided in a block 50. This bar carries an integral block 51, having in its rear face a curved slot 52, with which engages a pin 53 on a disk 54, that is secured upon the front end of the shaft *h* and provides bearings therefor in the upright *b*.

The upright *b* is provided near its base with two laterally-projecting arms 55, in each of which there are mounted two parallel rods 56, the one slightly higher than the other. Over these two sets of rods the old and new warps are adapted to extend substantially in the manner shown in Fig. 1. In my present machine the arms 55 are considerably shorter than they are in the machine covered by my patent, and, as above stated, each set of rods comprises two instead of three, as formerly. 57 represents other rods disposed parallel to the rods 56 and mounted in the lower ends of vertical reciprocating bars 58, said bars having slotted extremities 59 at their upper ends, whereby they are adjustably suspended from a cross-bar 60, that is carried by the bar 42.

61 is a longitudinally-reciprocating shaft which is mounted in the two uprights *b* and *c* and the forward end of which carries parallel thread-guides 62, whose free ends are tapered and project into approximate contact with each other. The shaft 61 is reciprocated by means of a cam 63, which the shaft *g* carries and which has a slot with which a pin 64 on the rear end of said shaft engages.

65 is a device for auxiliarily separating the threads, feeding them one after another into the control of the twisting mechanism, at the same time holding several threads separated from the main body of threads and from each other ready to be twisted and for keeping the waste ends separate from said main body of threads. This device consists of a hook of which one end is straight and forms the axis or shaft of said device, while its body portion is coiled about the shaft, thus forming, as does also, it will be observed, the free end portion of the plate 12, a cam-like surface which is disposed progressively with reference to the direction of length of the axis of the device and against which the threads may take, as hereinafter described, in effecting their transmission into the control of the twisting mechanism. The other end of said hook is sharpened, so as to enter between the threads with facility. The free end of the shaft is formed with an enlargement 66, having two diametrical pins 67, adapted to enter curved slots 68 in a cup 69, that is carried upon the free end of a shaft 70 and is adapted to receive said enlargement, said slots communicating at their inner extremities with recesses 71, in which after the enlargement is well in place in the cup they are securely held by a spiral spring 72. The shaft 70 is journaled in the upright *b*, and secured to its rear end is a pinion 73, that is driven by intermeshing pinions 74 75, the former of which is secured on the shaft *h* and the other of which is journaled in a bracket 76, suspended from the bracket *e*. Through this gearing the helical hook is therefore rotated in the direction in which the shaft *h* is rotated. The extreme convolutions of the helical hook have a greater pitch than the intermediate ones. The one reaches, approximately, as far as the vertical plane, in which are disposed the coacting faces of the twisting mechanism, while the other, which forms the point of the hook, extends slightly nearer to the upright *b* than are the hooks 11, when they are in their extreme outermost position.

In order to operate the machine, the same

is disposed in the position most convenient with reference to the ends of the old warp, to which the new warp is to be attached. The old and new warps are passed into the machine, as shown in dotted lines in Fig. 1, from opposite sides thereof, each extending under its outermost rod 56 and then over the next rod 56 to the guides 57 and 62, under which it passes. From the guides 62 the warps extend upwardly and are secured, the one one side and the other the other side, of the spindle 38, by means of the grips 46. It should be remarked that the threads of each warp are divided into two sets, comprising the alternate threads of the warp, and that these two sets are arranged to intersect each other and are placed into the machine in this position, the intersection of the two sets of threads (when the warps are in position in the machine) in each warp being disposed between the upper and lower hook-bar of each pair of hook-bars which between the guides 62 and the clamping device project between, and thus keep separated the two sets. This is most clearly shown in Fig. 1. The device 65 is made detachable, as above described, principally so that it may be removed, and thus be out of the way when the threads are being arranged. In view of the description above set forth as to the arrangement of the threads it will be seen that the two sets of threads in each warp being so disposed with reference to the hooks on the hook-bars (which it should be remembered are in each pair of said hook-bars on relatively opposite sides thereof) that said hooks act to hold or keep back that set of which the first or outermost thread is the second thread of the warp, while the other set, which is not engaged by said hooks, is the one having the first or outermost thread of the warp. This thread in each warp will be free to separate from the others so long as a tension that tends to dispose it in a straight line is effected and the other threads are held back by the retracted hook-bars and by virtue of their intersecting disposition relatively to each other. In other words, the hook-bars hold back one set of threads, while this set of threads holds back all the threads of the other set, except the first or outermost one, which is the first or outermost thread of the entire warp. Rotary motion being imparted to the shaft *g* from either of the shafts *k*, said shaft *g* will be driven, carrying with it in its rotations the cam 3, which in an obvious manner will impart a reciprocating movement to the frame which reciprocates the hook-bars. It being assumed, therefore, that the tension on the warps is being uniformly maintained by the spring 45 and that the rotation of the shaft *h* imparts through the cam *y* and star-wheel *v* an intermittent semirevolution to each of the hook-bars *r* as they assume their most advanced positions, the outermost thread in each warp will be left separated from the others after the hooks complete their semirevolutions and retract, taking with them the main body of each warp. It will be apparent in view of what has been above stated that the alternate reciprocating and rotary movements of the hook-bars effect a successive release or separation of threads in each warp from the main body thereof. When one thread in each warp has been thus separated, the finger 10 is oscillated, so as to interpose itself between said thread and the main body of threads to hold back the latter. It will be seen that this oscillation of the finger is effected from the shaft 5 through the medium of the series of interconnected levers 9 and rock-shaft 8. As the threads to be twisted separate from the main body of threads the helical hook, driven from the shaft *h* through the intermediate gearing, engages the two freed threads, (one from each warp,) and as it revolves forces them in an obvious manner laterally toward the twisting mechanism. The deflecting motion imparted by the hooks to the threads is sudden at the beginning and at the end thereof, because the pitches of its first and last convolutions are greater than those of its intermediate ones. Thus each pair of threads moves with comparative rapidity as it enters and as it leaves the helix, so that in the first instance it is abruptly forced away from the main body of threads, while in the other instance it is abruptly deflected into the control of the twisting mechanism. The hook will of course keep as many pairs of threads separated from each other and from the main body of threads and ready to be successively twisted as it has convolutions. The number of convolutions which the hook is shown to have in the accompanying drawings is believed to be that most practical; but it may be varied, if necessary. Besides keeping the pairs of threads separated from each other and from the main body of threads it will be seen that the helical device also acts to keep the waste ends (produced by the cutting operation hereinafter described) removed from said main body of threads. While the finger 10 is in its lowermost or substantially horizontal position the hook or spur of the movable member of the twisting mechanism proper is brought around in the rotation of the shaft 5, so as to take against the nearest pair of separated threads held by the helix and deflect them into a position where they will take between the cutting edges of the knives or cutters carried by said hook or spur and down in front of the acting face of said movable member of the twisting mechanism, thus ultimately bringing said threads, after a continued movement has aided the knives in cutting them, between the rubbing-faces of the said members of the twisting mechanism. As the movable member of the twisting mechanism continues to revolve the twisting of the ends of the threads is effected. Ultimately, moreover, the twisting being so far partly effected, the twisted free end thus formed on the joined threads is carried around by the rotation of

the movable member and twisted around one of the threads that have heen joined—*i. e.*, the thread marked 77 in Fig. 1. The twisting being thus completed leaves the free end that would otherwise be formed wound neatly around the finished thread. In order that this operation may be properly performed, I have provided the rubber strips 27 with the incisions already referred to, so that the pressure of the thread 77 will form a depression in the kid strip where said incisions occur, wherein said thread will lie until the loose twisted ends are brought around to it, whereupon being twisted in with them the acting face of the movable member will roll the whole out of the depression.

Should the joined thread have any tendency to stick to the face of the movable member of the twisting mechanism, it will be detached therefrom by means of a deflector 78, which I mount upon the rear end of the plate 14 of said member.

It should be remarked at this point that while the cutting and twisting operation is progressing the guides 62 are advanced to their extreme outward positions, so that the threads being twisted will be kept under the control of said guides just as the main body of them are; but since the points of the guides approximately contact with each other, as already described, the upwardly-deflected portions in each thread are brought close enough together so that the twisting operation is facilitated. The reciprocation of the guides is of course effected by the cam 63, the pin 64, and the shaft 61, carrying said guides.

It has been found in practice that the threads to be separated tend to cling to the main body of threads and that this can be overcome if the threads are moved longitudinally over some stationary part—as, for instance, the hook-bars and the rods 56 and 62. I have provided means for lowering the clamp which sustains the threads and also, consequently, said threads. This means consists of the bar 42, which carries the clamp and which by virtue of the block 51, having the curved slot 52, which receives the pin 53 on the disk 54, carried by said shaft, can be lowered as the shaft rotates. Of course the dropping of the clamp tends to reduce the tension on the threads; but in the vertically-movable rods 57, carried by the bars 58, I have provided means for compensating for this.

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

1. In a thread-uniting or other similar mechanism, the combination, with a frame, of means for sustaining the threads or other filaments to be united in separated disposition, and a revoluble spiral element comprising a plurality of convolutions and adapted to successively engage and deflect the separated threads, substantially as described.

2. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with thread-sustaining means, of a thread-uniting mechanism, and a revoluble spiral element comprising a plurality of convolutions and adapted to successively engage and deflect the threads to be united from the main body of threads into the control of said uniting mechanism, substantially as described.

3. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with thread-sustaining means, of a thread-uniting mechanism, a revoluble spiral element adapted to deflect the threads to be united from the main body of threads into the control of said uniting mechanism, and means for holding back the main body of threads, substantially as described.

4. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with thread-sustaining means, of a thread-uniting mechanism, a revoluble spiral element adapted to deflect the threads to be united from the main body of threads into the control of said uniting mechanism, and a vibratory device adapted to hold back the main body of threads, substantially as described.

5. In a machine for twisting together end to end, and thus uniting, threads or other filaments, the combination, with a frame and with thread-sustaining means, of a twisting mechanism, a spiral hook adapted to deflect the threads to be united from the main body of threads into the control of said twisting mechanism, a vibratory finger adapted to hold back the main body of threads, and means for actuating the twisting mechanism, the hook, and the finger, substantially as described.

6. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with thread-sustaining means, of a thread-uniting means, means for deflecting the threads to be united from the main body of threads into the control of said uniting mechanism, and a vibratory and pivoted finger adapted to hold back said main body of threads, substantially as described.

7. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with means for sustaining the threads or other filaments to be united in separated disposition, of a revoluble spiral element adapted to successively engage and deflect the separated threads, substantially as described.

8. A device for deflecting threads or other filaments laterally from one position to another, said device consisting of a revoluble coiled hook comprising a plurality of convolutions and having one end free and adapted to enter between and engage the threads, said hook being adapted to be sustained at its other end, substantially as described.

9. In a machine for uniting end to end, threads or other filaments, the combination,

with a suitable support, of a shaft journaled in said support, a revoluble coiled hook having one extremity free and adapted to enter between the threads, the other extremity of said hook constituting its axis or shaft, and means for coupling said shafts together, substantially as described.

10. In a machine for uniting end to end threads or other filaments, the combination, with a suitable support, of a shaft journaled in said support, a spiral device, one extremity of said device constituting the axis or shaft therefor, the end of said axis or shaft having a head, projections on said head, a socket carried by the other shaft and adapted to receive said head, said socket having recesses and communicating slots adapted to receive the projections, and a spiral spring arranged in said socket and adapted to impinge against the head to maintain said projections in the recesses, substantially as described.

11. The combination, with a suitable support and with thread-sustaining means, of a plurality of revoluble spiral thread-deflecting devices disposed in operative proximity to each other, and a thread-uniting mechanism comprising two coacting members, one of said members constituting a portion of one of said spiral devices, substantially as described.

12. The combination, with a suitable support and with thread-sustaining means, of a plurality of revoluble spiral thread-deflecting devices disposed in operative proximity to each other, and a twisting mechanism comprising two members adapted the one to wipe against the other, one of said members constituting a portion of one of said spiral devices, substantially as described.

13. The combination, with a suitable support and with thread-sustaining means, of a plurality of revoluble spiral thread-deflecting devices, a thread-uniting mechanism comprising two coacting members, one of said members constituting a portion of one of said spiral devices, thread-guides movable into operative proximity to said thread-uniting mechanism, and power-transmitting means connecting said spiral devices and the thread-guides, substantially as described.

14. In a machine for uniting threads or other filaments, the combination, with a suitable support, of stationary thread-guides, movable thread-guides, and a spring-actuated thread-sustaining means, said thread-sustaining means and the movable guides being connected for movement in substantially the same direction, substantially as described.

15. In a machine for uniting end to end threads or other filaments, the combination, with a suitable support, of thread-guides carried by said support, other thread-guides movable transversely to the direction of extension of the threads, and a spring-actuated thread-sustaining means mounted in said support, substantially as described.

16. In a machine for uniting end to end threads or other filaments, the combination, with a suitable support, of thread-guides carried by said support, a reciprocating frame mounted in said support, other guides comprised in said frame, and a spring-actuated thread-sustaining means also mounted in said frame, substantially as described.

17. In a machine for uniting end to end threads or other filaments, the combination, with a suitable support, of thread-guides carried by said support, a reciprocating frame mounted in said support, other guides comprised in said frame, a spring-actuated thread-sustaining means also mounted in said frame, and devices adapted to be engaged by the threads and being stationary with reference to said frame, substantially as described.

18. In a machine for uniting end to end threads or other filaments, the combination, with the frame, of means for successively releasing the threads from the main body thereof, a thread guide or guides, and a reciprocatory spring-actuated thread-sustaining means, said thread-releasing means being interposed between the sustaining means and the guides, substantially as described.

19. A twisting mechanism for twisting-machines consisting of two members, the one of which is revoluble and movable relatively to the other, a flexible strip carried by one of said members and adapted to wipe against the other member, and an elastic strip or strips interposed between said member and its flexible strip, said elastic strip having a recess extending inwardly from one edge thereof and situated under said flexible strip, substantially as described.

20. A twisting mechanism for twisting-machines consisting of two members the one of which is stationary and the other of which is revoluble, kid strips carried by said members and adapted to wipe against each other, each member comprising plates clamped together and receiving the edges of its respective strip between them, and another strip or strips arranged between the kid strip and the plates of one of said members, said last-named strip or strips having an incision or incisions, substantially as described.

21. A twisting mechanism for twisting-machines consisting of two members the one of which is stationary and the other of which is revoluble, kid strips carried by said members and adapted to wipe against each other, each member comprising plates clamped together and receiving the edges of its respective strip between them, a rubber strip or strips arranged between the kid strip and the plates of one of said members, said rubber strip or strips having an incision or incisions, substantially as described.

22. In a twisting mechanism, the combination of two members, one of said members being revoluble and adapted to wipe against the other, and a cutting attachment carried by one of said members and comprising two knives having their edges convergently arranged, substantially as described.

23. The combination, in a twisting mechanism, of a revoluble member, a knife carried thereby, a holder operatively arranged with reference to said knife, and a spring-actuated stone mounted in said holder and adapted to wipe against said knife, substantially as described.

24. In a thread-uniting machine, the combination, with the frame, of a thread-sustaining means, thread-uniting means, thread-separating means, and a revoluble spiral device having one end free and being operatively disposed between said thread-uniting means and the thread-separating means, said spiral device being adapted to introduce its free end successively between the threads so as to bring the same into operative engagement with its convolutions, substantially as described.

25. In a thread-uniting machine, the combination, with the frame, of a thread-sustaining means, thread-uniting means, thread-separating means, and a revoluble spiral device operatively disposed between said thread-uniting means and the thread-separating means, said spiral device having several convolutions each adapted to engage a thread, and the first and last convolutions thereof having a greater pitch than the other convolutions, substantially as described.

26. In a thread-uniting machine, the combination, with the frame, of a thread-sustaining means, thread-uniting mechanism, means for deflecting the threads to be united from the main body of threads into the control of the thread-uniting mechanism, said means being adapted to simultaneously engage a plurality of pairs of threads to be united, and a thread guide or guides, said thread guide or guides being adapted to coact with said deflecting means and being movable in the direction of movement of the threads toward said uniting mechanism, substantially as described.

27. In a thread-uniting machine, the combination, with the frame, of a thread-sustaining means, thread-uniting mechanism, means for deflecting the threads to be united from the main body of threads into the control of the thread-uniting mechanism, said means being adapted to simultaneously engage a plurality of pairs of threads to be united, and thread-guides, one or more of said thread-guides being adapted to coact with said deflecting means and being movable into operative proximity to said uniting mechanism, substantially as described.

28. In a thread-uniting machine, the combination, with the frame, of a reciprocatory frame comprising thread-sustaining means, thread-uniting mechanism, means for deflecting the threads to be united from the main body of threads into the control of the thread-uniting mechanism, thread-guides movable in the direction of movement of the threads toward said thread-uniting mechanism, stationary thread-guides projecting from said main frame, and other guides interposed between said movable guides and the stationary guides and carried by said reciprocatory frame, said frame and last-named guides being adapted to reciprocate transversely of the other guides, substantially as described.

29. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with means for sustaining the threads to be united in separated disposition, of a thread-uniting mechanism, and a revoluble spiral element adapted to successively engage and deflect the threads to be united from the main body of threads into the control of said uniting mechanism, substantially as described.

30. In a machine for uniting end to end threads or other filaments, the combination, with a frame and with thread-sustaining means, of a thread-uniting mechanism, and a revoluble spiral element adapted to successively engage and deflect the threads to be united from the main body of threads into the control of said uniting mechanism, substantially as described.

31. A device for deflecting threads laterally from one position to another, said device consisting of a revoluble coiled hook having one end free and adapted to enter between the threads, said hook being adapted to be sustained at its other end, substantially as described.

32. The combination, with a frame, of a thread-sustaining means, a thread-deflecting device having an axial movement and formed to present to the threads a cam-like surface disposed progressively with relation to the direction of the length of the axis of said device, and a thread-separating mechanism movable in a line substantially parallel with said axis to withdraw the main body of threads from the separated ones, substantially as described.

33. The combination, with a frame, of a thread-sustaining means, a thread-separating mechanism movable transversely to said threads to withdraw the main body of threads from the separated ones, and a revoluble coiled element adapted to successively engage and deflect the separated threads, the axis of said element being substantially parallel to the line of movement of said mechanism, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 10th day of February, 1900.

ALBERT GOSS.

Witnesses:
ALFRED GARTNER,
JOHN W. STEWARD.