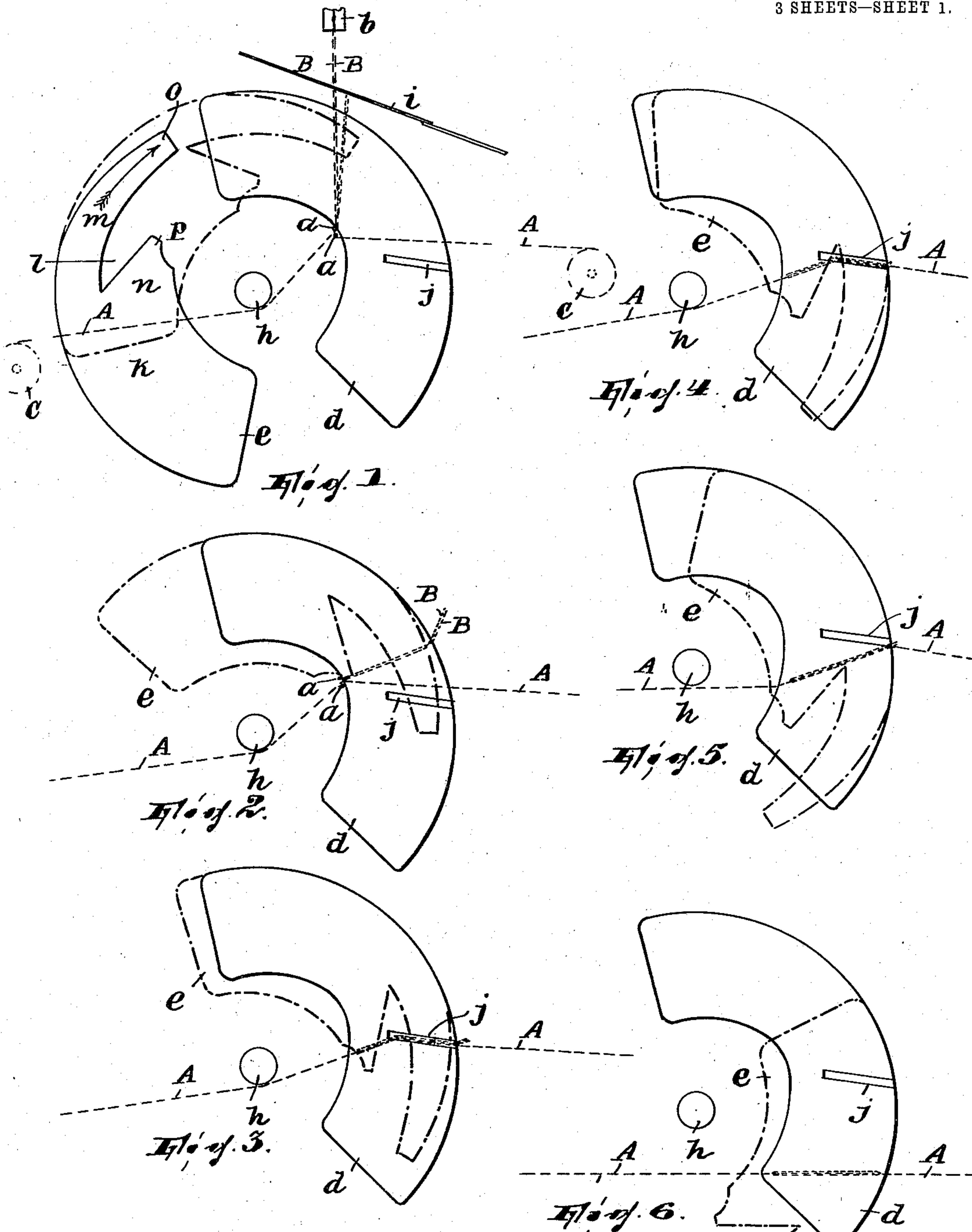


W. R. LANDFEAR.
METHOD OF JOINING THREADS BY TWISTING.
APPLICATION FILED JUNE 9, 1908.

911,886.

Patented Feb. 9, 1909.

3 SHEETS—SHEET 1.



WITNESSES

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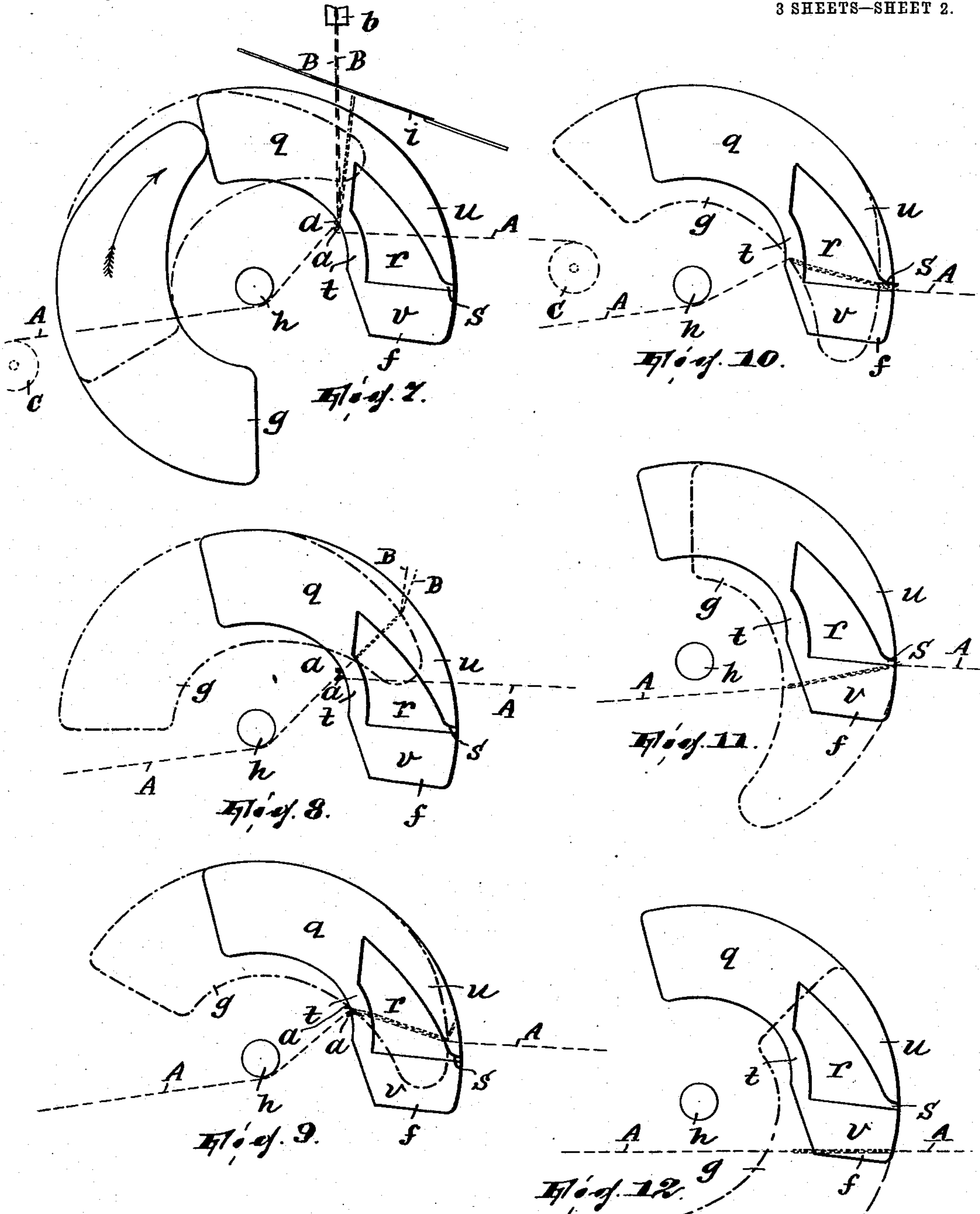
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3 SHEETS—SHEET 2.



WITNESSES

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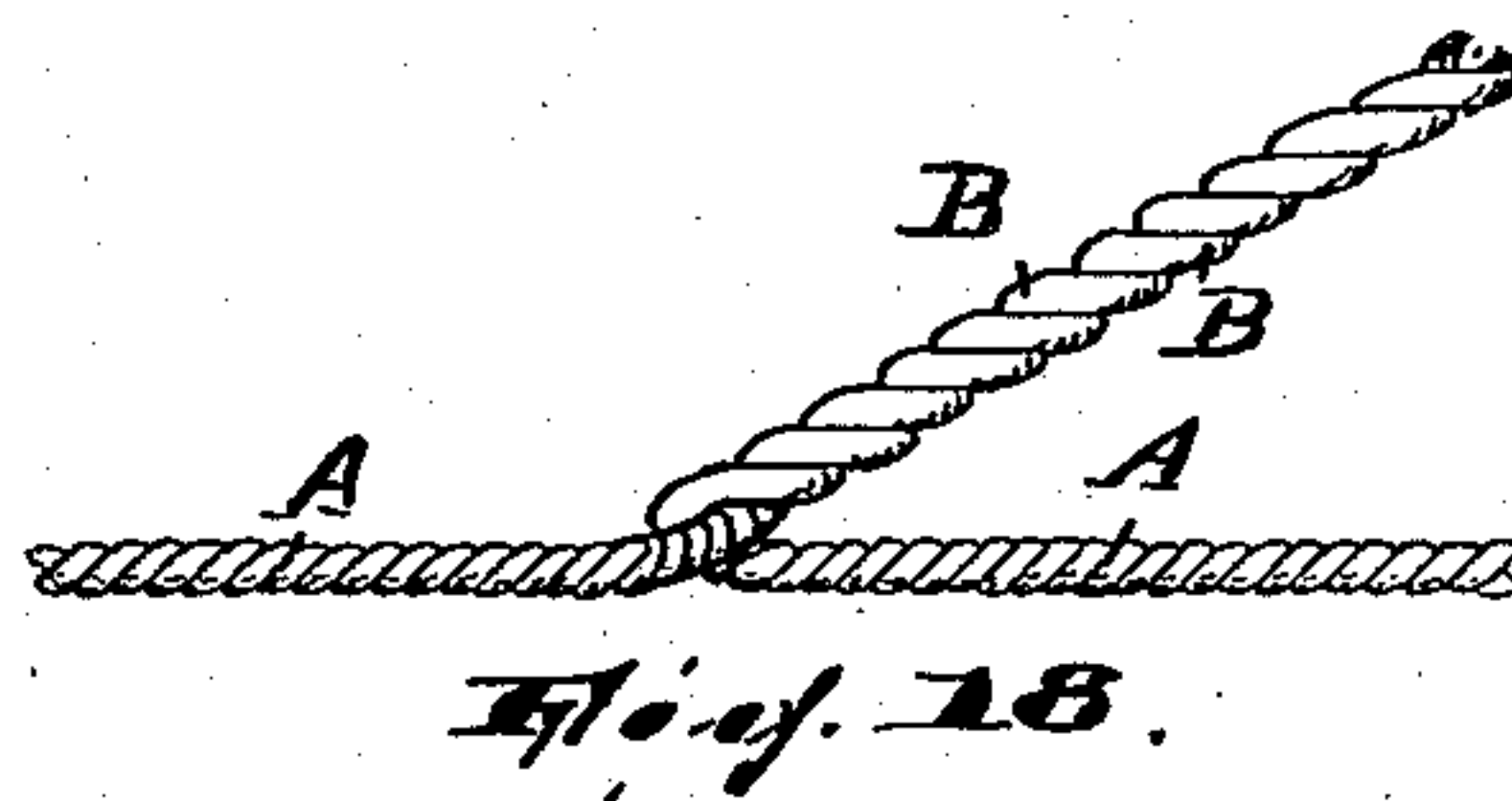
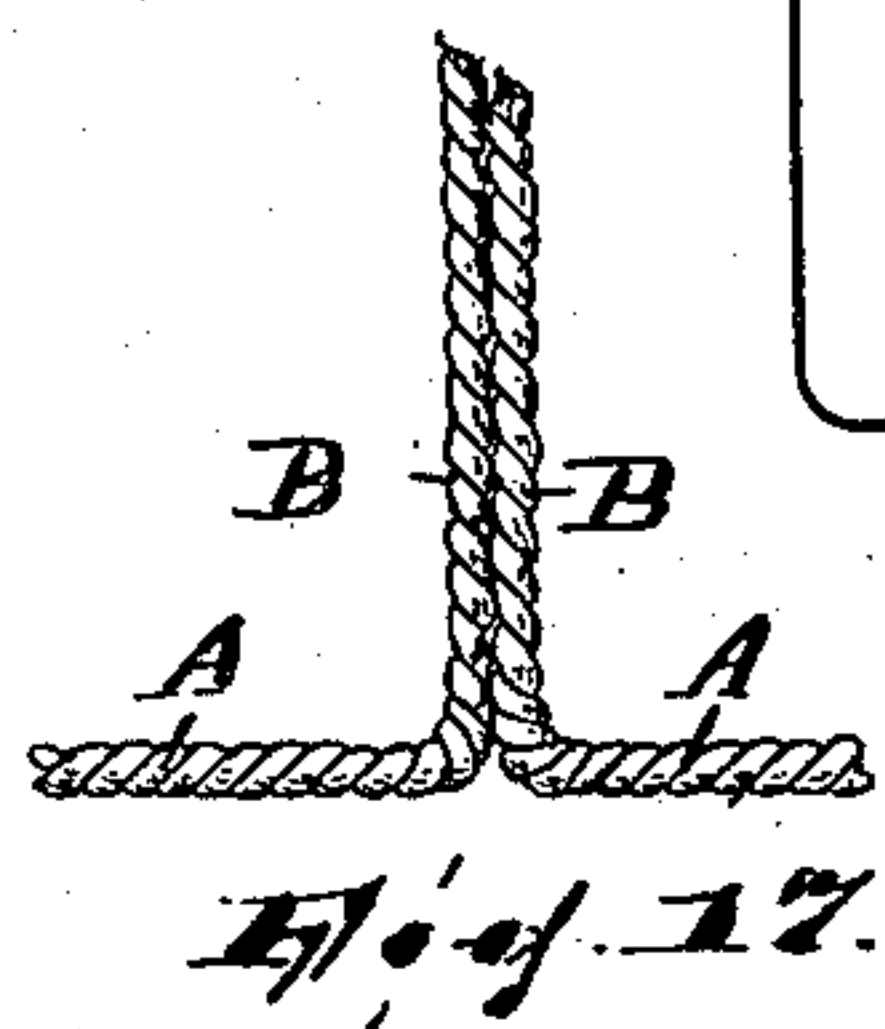
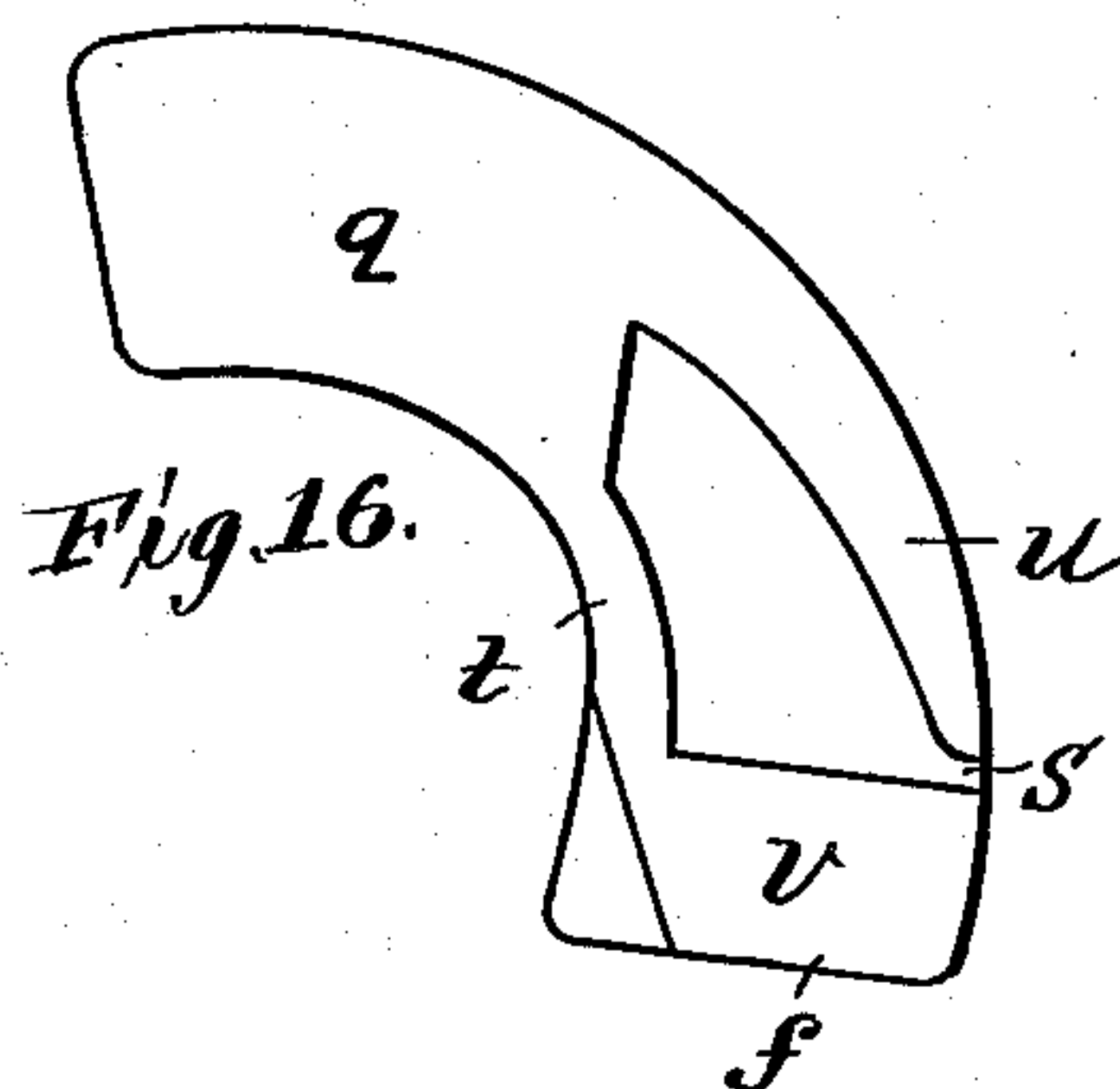
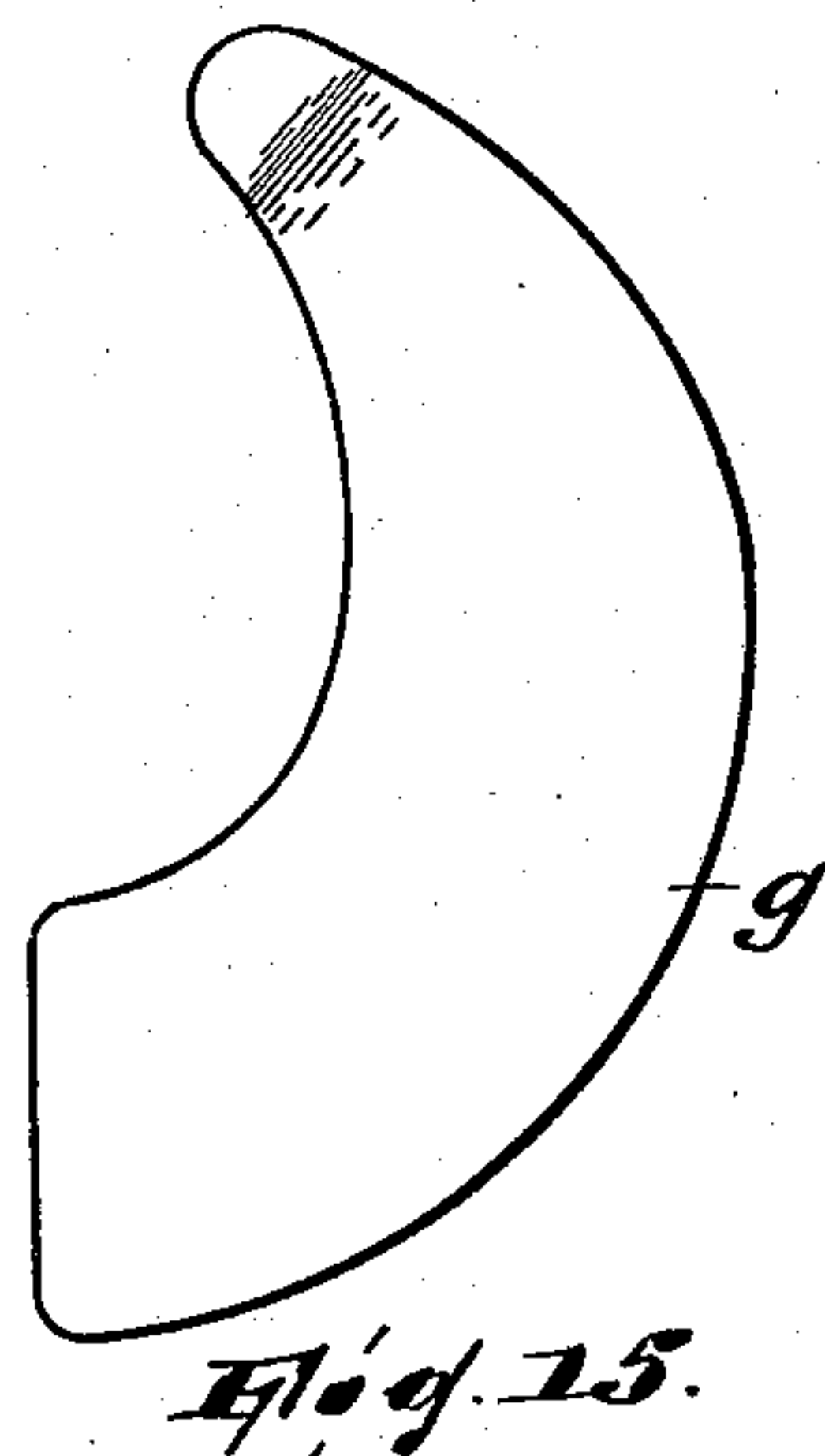
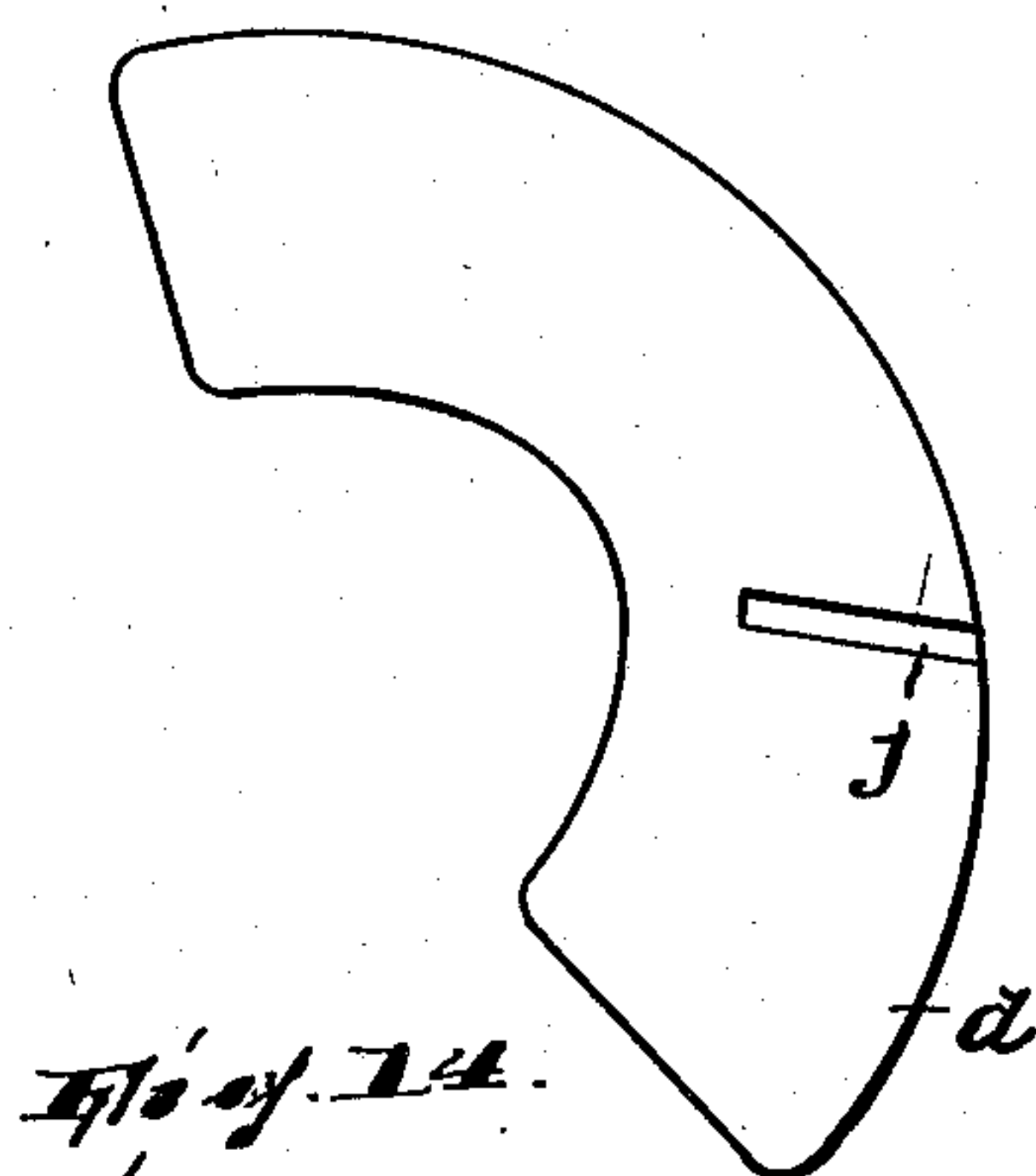
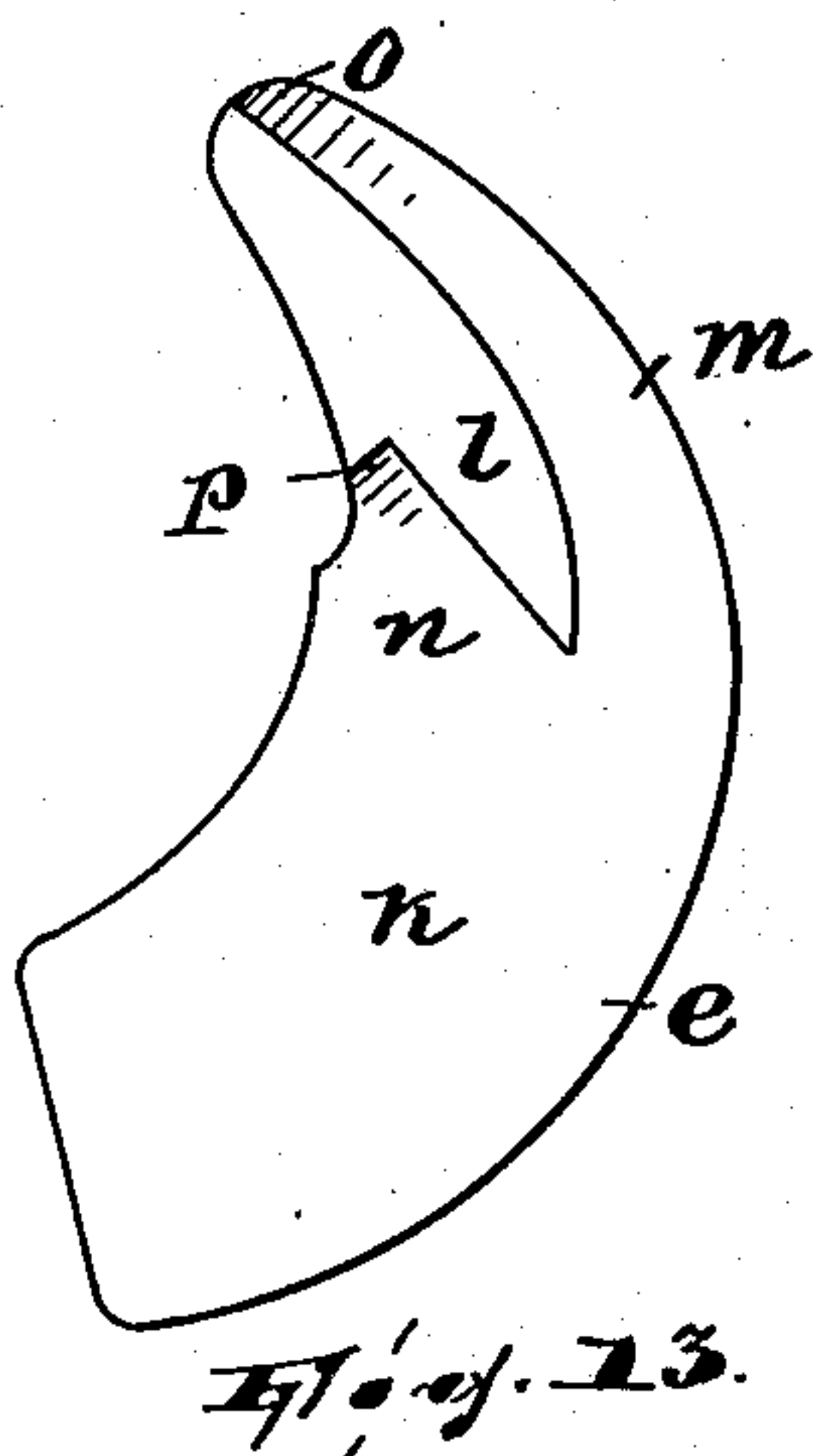
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3 SHEETS—SHEET 3.



WITNESSES

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METHOD OF JOINING THREADS BY TWISTING.

No. 911,886.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed June 9, 1908. Serial No. 437,531.

To all whom it may concern:

Be it known that I, WILLIAM R. LANDFEAR, a citizen of the United States, residing in Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Method of Joining Threads by Twisting; 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 letters of reference marked thereon, which form a part of this specification.

This invention relates to the art of piecing together threads or other filaments, and it has reference particularly to the operation known in weaving as "twisting-in", that is, an operation in which, when it becomes necessary to replenish the warp in a loom, the end-portions of the threads of the new warp are so intertwisted with those of the old warp that a single, continuous thread is produced the twist in which will pass through the eyes of the heddles of the harness. The twisting-in operation involves first twisting together the extremities of each old and new warp-thread to be joined, they at this time projecting in substantially a common direction, and then twisting the intertwisted extremities about the body-portion of either thread, but usually the new thread, with the object of facilitating drawing the twist thus produced through the heddle eye.

My present invention has for its object so to effect the joining of the end-portions of the threads as to produce a more compact, substantial, durable and otherwise perfect twist, and this object I have found may be accomplished by keeping under observation the fact that twisted strands tend to retain their twisted relation, or at least respond but indifferently to any tendency to untwist, when they are twisted together in a direction reverse to the direction of twisting present in one of them. I have therefore found it essential to the formation of a twist of the kind mentioned and possessing the qualities desired that the first twisting application should be definitely at substantially the free end of the extremities-portion of the threads and the second twisting application definitely at substantially the point of juncture between the twisted extremities-portion and the body-portions of the threads.

In practice, and by preference, the second twisting application is but the beginning of an operation which resolves itself sooner or later into a rolling of the twisted strands into a compact twist, until the ultimate product is so finished off that it possesses a regular, even, tapering form, well adapted for the purpose in hand.

The experiments out of which this invention has been evolved have had in view U. S. Letters Patent Nos. 648,738, 675,350, 686,724, 695,566 and 810,711, in which is shown a twisting mechanism which comprises, with means for holding an old and new warp thread so that their extremities project substantially in the same direction, two members one of which is rotative against the other and in its movement coöperates with the other first to twist the extremities about each other and then to twist the thus-intertwisted extremities about the body-portion of one of the threads. I therefore illustrate my invention in the accompanying drawings by a twisting mechanism of this nature which I have devised for the purpose of carrying out the invention, two different forms of said mechanism being illustrated.

In said drawings, Figures 1 to 6 show two threads, one from the old and one from the new warp, in successive stages of the operation of twisting them together, with one form of the appliances directly concerned in the operation in their several relative positions; Figs. 7 to 12 show substantially the same as Figs. 1 to 6 except that a different pair of twisting members is illustrated; Figs. 13 and 14 are acting-face views of the moving twisting member and the stationary twisting member of Figs. 1 and 6 and Figs. 15 and 16 are similar views of the corresponding parts in Figs. 7 to 12; Figs. 17, 18 and 19 show the two threads (1) before twisting, (2) during the twisting together of their extremities, and (3) during the twisting together of the twisted extremities and the body-portion of one of the threads.

It may be remarked that the parts in Figs. 1 to 12 are shown therein as they appear from the inside of the machines in the several patents mentioned.

Referring first to Figs. 1 to 12, A, A designate the body-portions of two threads, one from the old warp and one from the new warp, to be joined, and B, B designate the extremities of said threads, the threads be-

ing held in substantially the relation shown by suitable means, comprising a fork whose thread-holding portions are indicated at *a, a* (said fork corresponding to the fork 59 in the Letters Patent No. 810,711, aforesaid), by a suitable clamp *b* gripping the upturned extremities B, B of said threads and by the beams *c*.

In Figs. 1 to 6, one member of the twisting mechanism is marked *d*, while the other or rotary member is marked *e*; in Figs. 7 to 12 one member of the twisting mechanism is marked *f*, and the other or rotary member marked *g*.

In all the Figs. 1 to 12, *h* designates the center of rotation for the rotary member *e* or *g*; incidentally the body part A of one of the threads is shown as deflected by the shaft forming this center with respect to the body part A of the other threads, but this has no significance in so far as my invention is concerned.

i designates a knife corresponding to the knife 29 in the Patent No. 810,711, *supra*.

Referring to the several patents above mentioned it will be seen that as the rotary member wipes over the other member of the twisting mechanism and just after it has begun to twist the extremities B, B around each other, the knife operates to sever the extremities; from that time on the portions of the extremities below the knife are held, of course, only by the gripping action of the two twisting members.

Referring now to Figs. 17 to 19, the extremities B, B are, according to my invention, first caused to be twisted by the twisting members around each other as shown in Fig. 18, the application of the twisting operation being substantially at their severed ends; thereupon, the thus-twisted extremities-portion of the threads is twisted around the body-portion A of one of the threads in a direction reverse to that of the twist in the extremities, such second twisting beginning where the extremities merge into the body-portion A, A. It will be observed that, while these two twists are relatively reverse to each other, the rotary member of the twisting mechanism does not change its direction of rotation. The theory of this is that although the direction of movement of the rotary member remains constant, the application of the twisting operation in the first instance is at the free ends of the extremities B and in the second instance at substantially their point of juncture with the body-portions.

It will be understood that the acting faces of the twisting members are formed of some composition, containing rubber for instance, whereby the same will actively twist threads placed between them around each other when the one is caused to wipe over the other.

Referring, now, to Figs. 13 and 14: the stationary member *d* is an arc-shaped pad having a plain acting face except for an elongated recess *j* formed to extend from its outer edge toward but not to its inner edge and standing slightly below the plane of the body-portion A of the right-hand thread. The rotary member *e* is a tapering arc-shaped pad having its acting face *k* cut away, as at *l*, from the advance end thereof back, leaving the curved tapering portion *m* of the acting face on the outside of the recess thus produced and, on the inside of said recess, the obtuse angular tapering portion *n*, the points *o* and *p* of said portions *m* and *n* being both beveled so as to ride up on the threads to start the respective twists and the latter standing relatively back of the former.

When the member *e* is rotated against member *d*, the twisting operation proceeds as follows: The point *o* of the portion *m* of the acting face of member *e* rides over the extremities B, B of the threads, and, as it wipes against member *d*, starts the twist at a point just below the knife *i*; once the twisting members sufficiently grip the extremities B, B, the knife severs them. The rolling and consequent twisting together of the extremities B, B, now continues, such rolling causing them continually to change their radial position relatively to the fork-points *a—a*, the lower one of which now holds both threads. This operation continues until the point *p* of the portion *n* of the acting face of member *e* begins to ride over the extremities and roll or twist them around the body-portion of the right-hand threads A, upon which the fork points *a—a* recede (the same as in the patent above referred to), leaving the threads unsupported by the fork.

It will be observed, on reference to Fig. 2, that the point *p* of portion *n* of face *k* begins the twisting of the extremities around the body-portion of the right-hand thread A at a point close to the juncture of said extremities with said body portion; the obtuse formation of the portion *p* of the acting face of member *e*, as said member continues to rotate, results in the twist thus being formed being subjected to a gradually widening wiping action which works outwardly from said juncture. The twist of the extremities around the body-portion A of the right hand thread being now more or less complete, the twist is rolled by member *e* into the recess *j* of member *d*; one of the principal purposes of this recess is to produce a pause in the rolling of the outer portion of the twist because, since now the plain or unrecessed body-portion of the acting face of member *e* is about to finish the twisting, if some means were not interposed to prevent it, there would be a tendency to untwist, owing to the fact that the outer perimeter of mem-

ber *e* moves more quickly through the same number of degrees in its circular path than its inner perimeter. The twist having, as to its outer portion, dropped into the recess *j*, the member *e* for a time wipes over such outer portion idly, although the inner portion continues to be rolled by the flat faces of the twisting members; this (at first) limited rolling begins sooner or later to affect gradually more and more of the outer portion of the twist, because the rolling inner portion in its advance gradually pulls the outer portion out of the recess *j* (see Figs. 4 and 5). From then until the member *e* entirely clears the member *d*, the action of the two members on each other is one having for its object to roll or "iron out", rather than to produce further twisting, in the threads.

In Figs. 15 and 16 the rotary member *g* is a substantially plain or flat tapering pad. The fixed member *f* is substantially the same as the pad of the stationary member of the said twisting mechanism except that the lower portion of its acting face *q* has a substantially triangular recess *r* terminating at its lower right hand corner in a notch *s*. At *t* and *u*, both sides of said recess, and below the latter, as at *v*, the acting face is continued intact.

When the member *g* is rotated against member *f*, the twisting (Figs. 7 to 12) produced on the threads is substantially the same as that described with reference to Figs. 1 to 6. That is to say, member *g* first twists the extremities B, B together, the twist being produced by member *g* first wiping over the portion *u* of the acting face of member *f*; subsequently the member *g* wipes over the portion *t* of said acting face to begin the operation of twisting the extremities around the body-portion A of the right hand thread. By the time the extremities have been fully twisted around the body portion of the right hand thread A, the twist falls into the notch *s* and abuts against the lower edge of the triangular recess *r*, which produces a pause in so far as the outer portion of the twist is concerned while the inner portion of the twist continues to be rolled between the faces of the members. Finally the inner portion, in its rolling action, gradually draws more and more of the outer portion of the twist over the lower edge of the recess *r*, until the twist entirely clears said recess, from which time on the action of the two members on the twist is to iron out or finish it, the twist being rolled over the portion *v* of the acting face of member *e*.

It is to be understood that, while the extremities may at the start of the step of twisting them together have their tips projecting somewhat from the twisting members, the twisting operations sooner or later

cause a contraction in the length of the twist formed, so that these tips work back between the faces of the twisting members, becoming ultimately a part of the tapering tail end of the twist.

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

1. The method of joining threads together end to end, by twisting, which consists in first arranging the threads with their extremities projecting in approximately the same direction, second, effecting a twisting of the extremities on each other, applying the twisting medium at or near the free ends of the extremities, and, third, effecting a twisting of the twisted extremities-portion of the threads and the body-portion of one thread on each other in the same direction as the first twisting, applying the twisting medium in this instance at or near the other end of the twisted extremities-portion of said threads, substantially as described.

2. The method of joining threads together end to end, by twisting, which consists in first arranging the threads with their extremities projecting in approximately the same direction, second, effecting a twisting of the extremities on each other, applying the twisting medium at or near the free ends of the extremities, third, effecting a twisting of the twisted extremities-portion of the threads and the body-portion of one thread on each other in the same direction as the first twisting, applying the twisting medium in this instance at or near the other end of the twisted extremities-portion of said threads, and, fourth, rolling and thus condensing the twist produced, substantially as described.

3. The method of joining threads together end to end, by twisting, which consists in first arranging the threads with their extremities projecting in approximately the same direction, second, rolling the free ends of said extremities around each other whereby to twist the extremities on each other, and, third, rolling the other end of the twisted extremities-portion of the threads and the contiguous part of the body-portion of one of the threads around each other in the same direction as the first rolling whereby to twist the twisted extremities-portion and said body-portion on each other, substantially as described.

4. The method of joining threads together end to end, by twisting which consists in first arranging the threads with their extremities projecting in approximately the same direction, second, rolling the free ends of said extremities around each other whereby to twist the extremities on each other, third, rolling the other end of the twisted extremities-portion of the threads and the contiguous part of the body portion of one

of the threads around each other in the same direction as the first rolling whereby to twist the twisted extremities-portion and said body-portion on each other, and, fourth,
5 causing the second rolling to gradually operate, from its starting point, on substantially the full length of the twist being formed, substantially as described.

In testimony, that I claim the foregoing, I have hereunto set my hand this 29th day of 10 May 1908.

WILLIAM R. LANDFEAR.

Witnesses:

JOHN W. STEWARD,
ALBERT NANNES.