(No Model.)

5 Sheets—Sheet 1.

F. L. VEERKAMP, C. F. LEOPOLD & W. DARKER.

BRAIDING MACHINE.

No. 391,929. Patented Oct. 30, 1888.

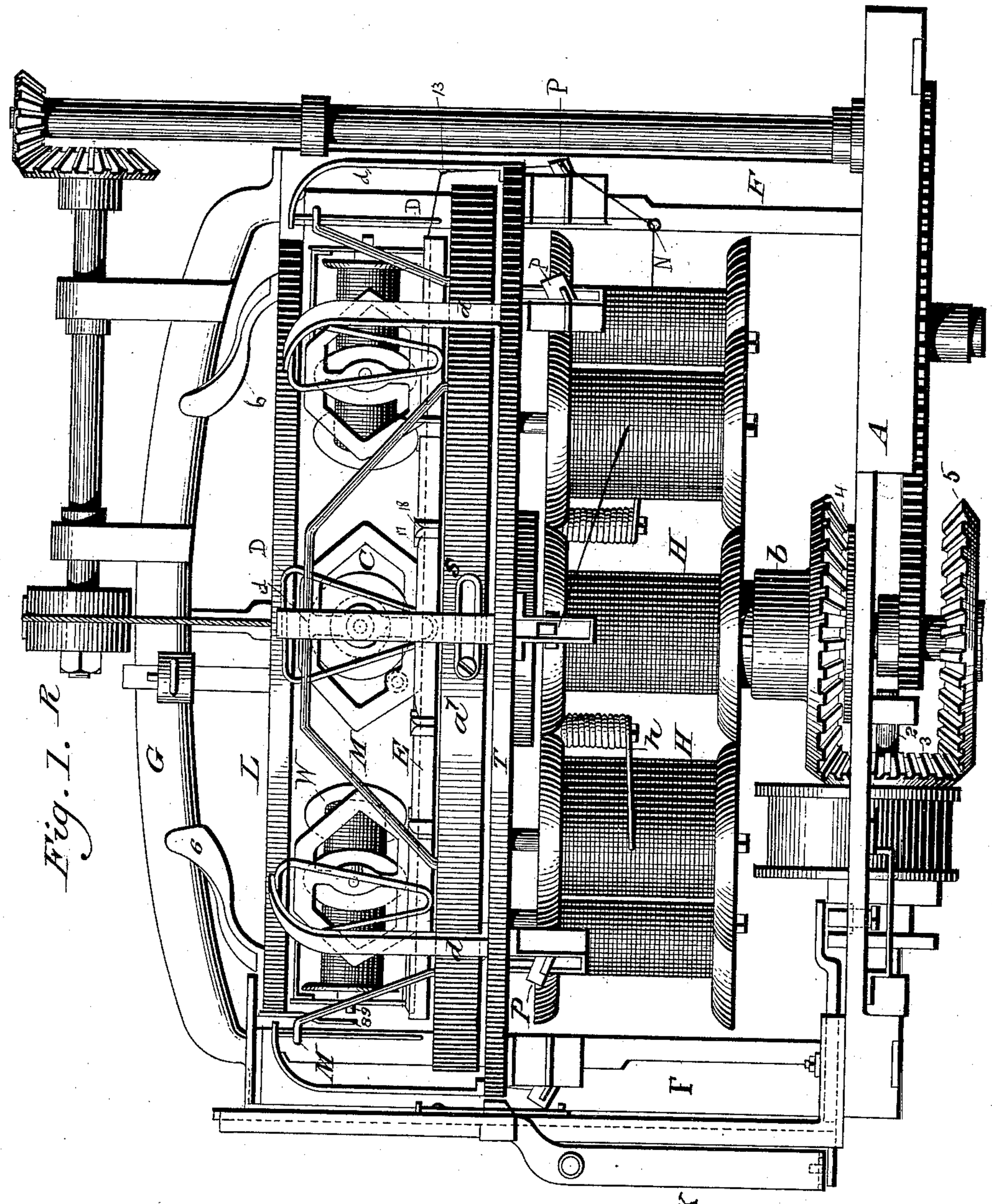

Fig. 1.

WITNESSES:

P. F. Eagle.

Henry A. McKinnon,

INVENTORS.

F. L. Veerkamp, C. F. Leopold.

and Wm Darker,

by their Atty

A. J. Hauer

(No Model.) 5 Sheets—Sheet 2.

F. L. VEERKAMP, C. F. LEOPOLD & W. DARKER.

BRAIDING MACHINE.

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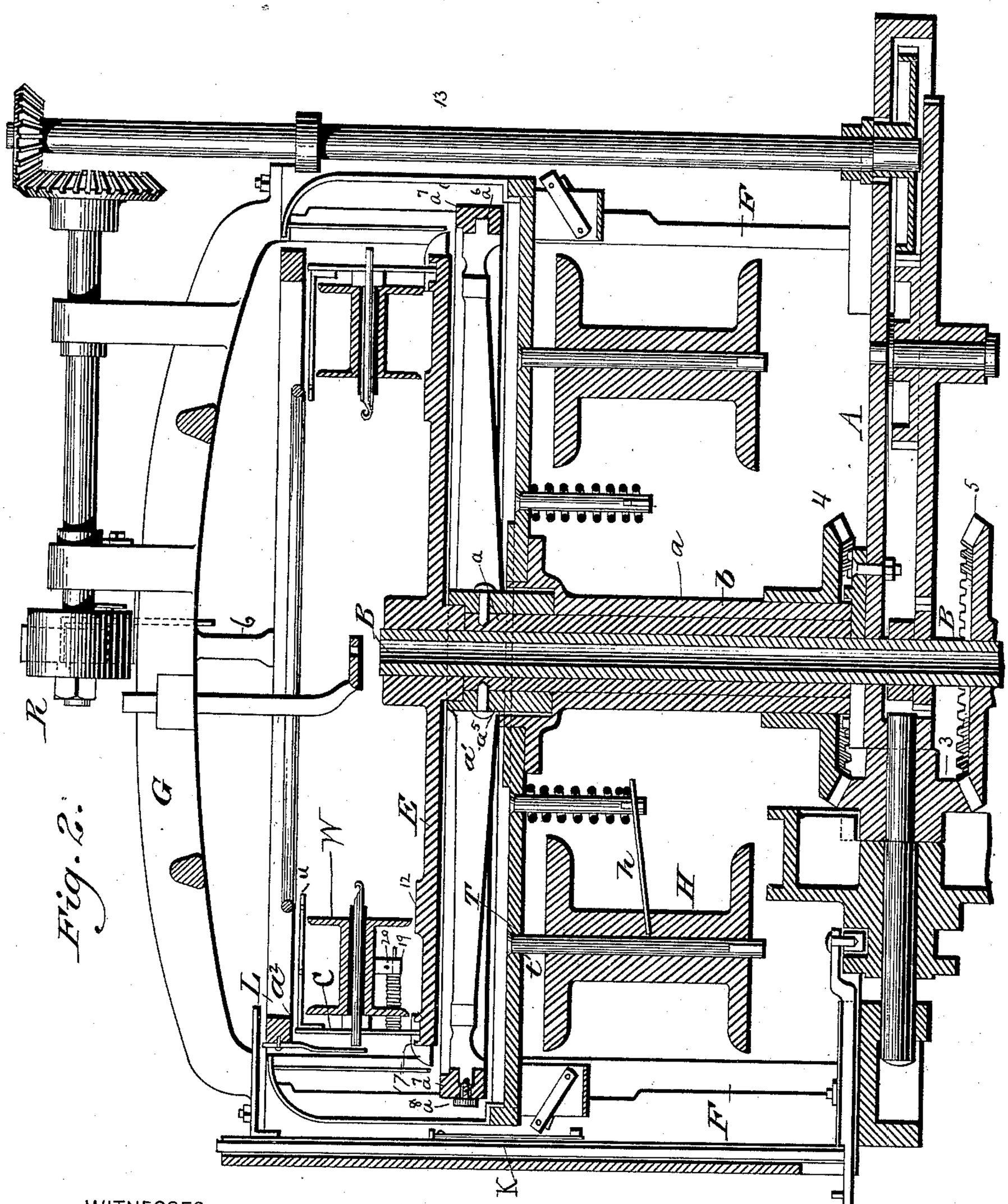

Fig. 2.

WITNESSES:

P. F. Eagle,
Henry A. MacMurray.

INVENTORS.

F. L. Veerkamp, C. F. Leopold,
and Wm Darker,
by their atty
H. J. Haslam

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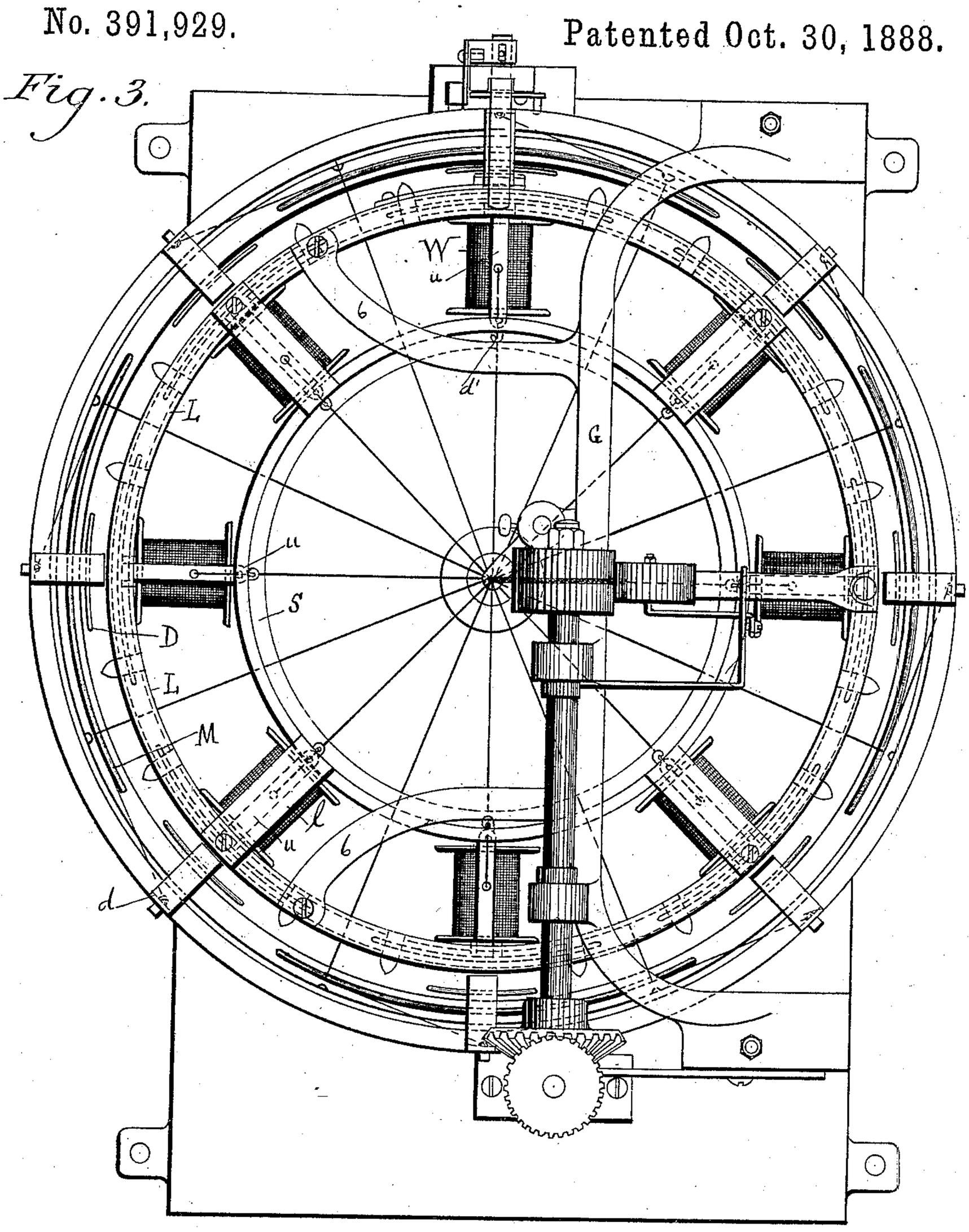
5 Sheets—Sheet 3.

F. L. VEERKAMP, C. F. LEOPOLD & W. DARKER.

BRAIDING MACHINE.

No. 391,929. Patented Oct. 30, 1888.

Fig. 3.



WITNESSES:

Henry A. Wise Thurman.

R. M. Evans.

INVENTORS,

F. L. Veerkamp, C. F. Leopold.

and Wm Darker,

by H. J. Hecker.

ATTORNEY.

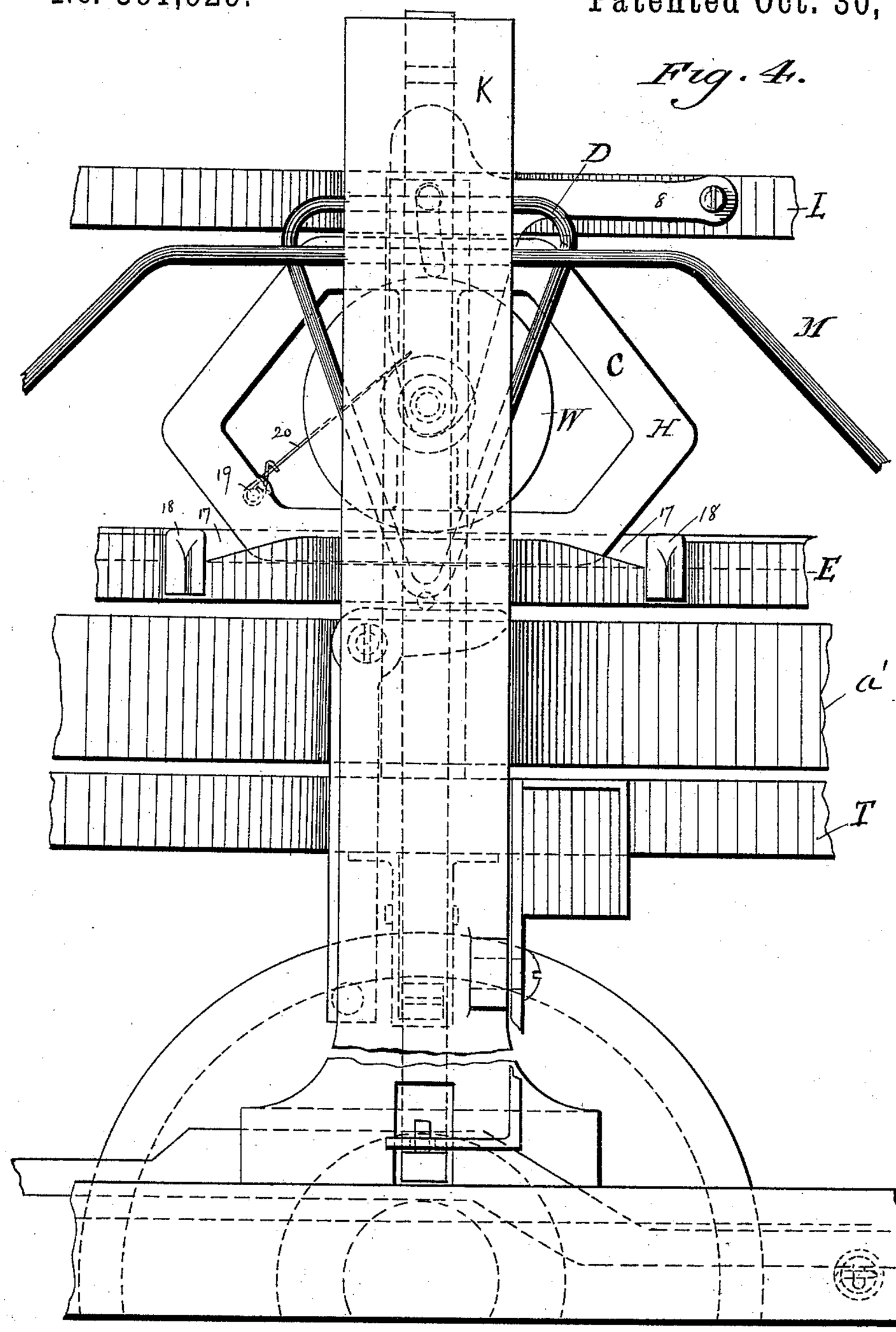
(No Model.) 5 Sheets—Sheet 4.

F. L. VEERKAMP, C. F. LEOPOLD & W. DARKER.

BRAIDING MACHINE.

No. 391,929. Patented Oct. 30, 1888.

Fig. 4.



WITNESSES:

Henry A. MacMurray,

R. W. Evans.

INVENTORS,

F. L. Veerkamp, C. F. Leopold,

and Wm. Darker,

by H. J. Hunter

ATTORNEY.

(No Model.) 5 Sheets—Sheet 5.

F. L. VEERKAMP, C. F. LEOPOLD & W. DARKER.

BRAIDING MACHINE.

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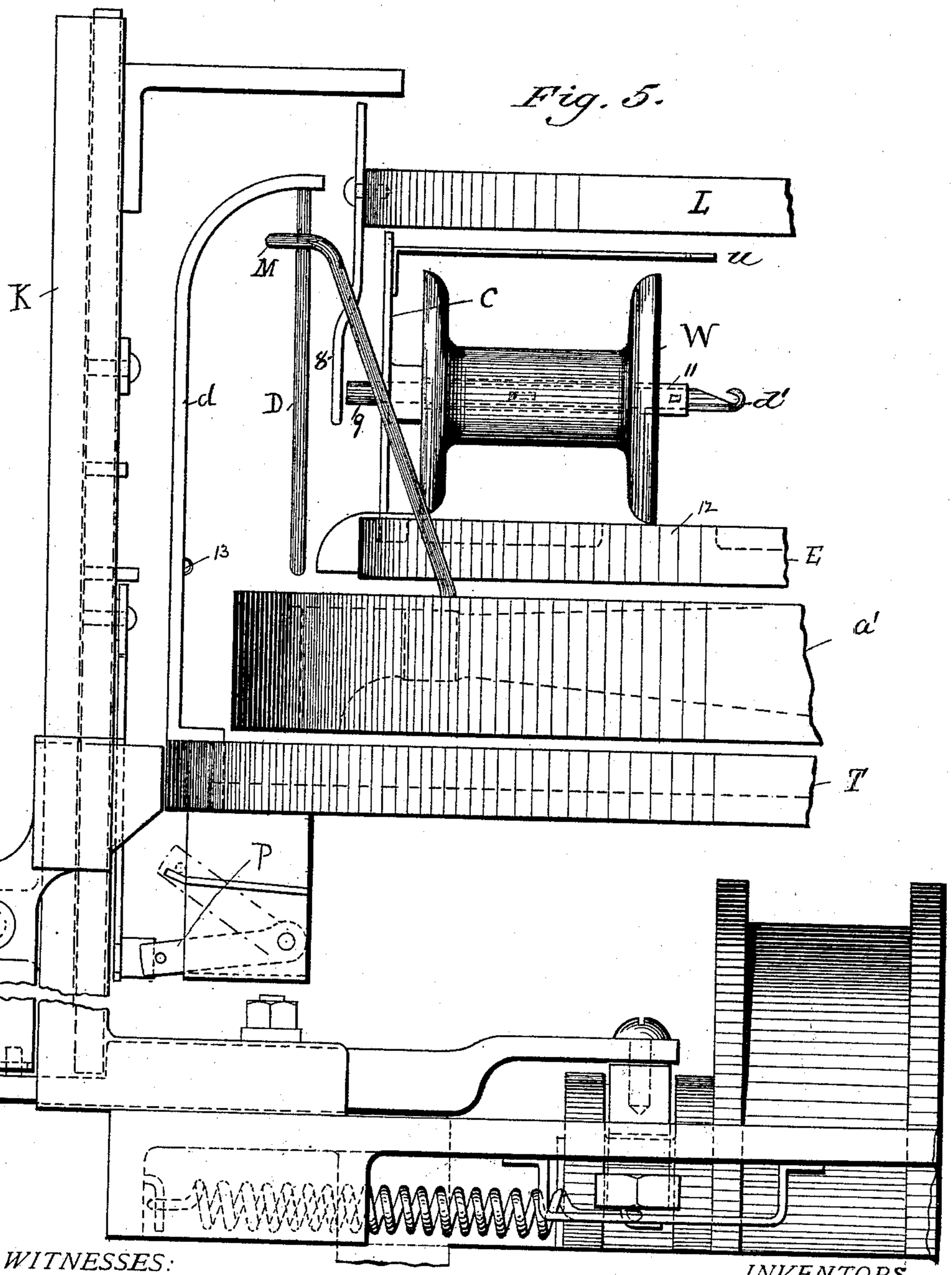
Fig. 5.



WITNESSES:

Henry A. Huestmann.

A. M. Evans.

INVENTORS.

F. L. Veerkamp, C. F. Leopold, and Wm. Darker,

by A. D. Seutar.

ATTORNEY.

UNITED STATES PATENT OFFICE.

FLORENZ L. VEERKAMP, CHARLES F. LEOPOLD, AND WILLIAM DARKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE BOSTON BRAIDER COMPANY, OF NEW HAMPSHIRE.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 391,929, dated October 30, 1888.

Application filed April 4, 1887. Serial No. 233,641. (No model.)

To all whom it may concern:

Be it known that we, FLORENZ L. VEERKAMP, CHARLES F. LEOPOLD, and WILLIAM DARKER, citizens of the United States, residing in the city of Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Braiding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to rotary braiding-machines of that class in which two sets of bobbins move in contrary directions to each other in concentric annular paths, but in different planes; and it consists of improvements in and additions to the machine for which Letters Patent No. 277,523, dated May 15, 1883, were granted to us.

Our present improvements in said machine consist of novel mechanisms employed for directing the course of the lower threads and in a novel combination of the upper and lower thread supplying and guiding devices, whereby a greater speed of the machine is obtained with increased product, less friction produced, and which construction permits of a reverse motion of the machine when a thread breaks or when otherwise desired; also, in the upper-thread-supplying devices and the mechanism for supporting and carrying the same.

In the accompanying drawings, in which similar letters of reference refer to like parts in the several views, Figure 1 is a front elevation of our improved machine, and Fig. 2 a vertical section thereof; Fig. 3, a top view; Fig. 4, an enlarged front elevation of a portion of the machine, including the upright bar which contains and supports the stopping device, which is partly in dotted lines; and Fig. 5 is an enlarged side view of a portion of the machine, showing the upper-thread supplying and carrying devices and lower-thread-carrying guides and their arrangement relatively to the stopping mechanism, which is also shown in this figure.

As stated in our former patent, to which reference has been made, our machine is designed to operate on the principle of having upper and lower thread supplying devices not in themselves movable, but supported and carried around by revolving bearers or holders moving in contrary directions to each other in concentric annular paths, but in different planes, the platting of the upper and lower threads being done by intermediate guides, one movable and one stationary.

In the present improved machine our object has been mainly to simplify the moving parts, and hence in the construction of our improved machine we dispense with the system of upper-bobbin carriers, whose inner ends rested on a disk at the upper end of the central tubular shaft, B, and whose outer ends moved in a groove in an upper revolving ring secured to the lower-bobbin holder, and we simplify this portion of the mechanism by detaching the said annular ring from the lower-bobbin holder, so that it will remain stationary and perform the single function of guiding and holding the bobbin-carriers on the carrier-bearer; and, dispensing with upper bobbins and bobbin-carriers of the form shown and described in our said former patent, we substitute therefor ordinary spools of proper size, as shown in Fig. 5, arranged in a carrier constructed as hereinafter described, thus also decreasing the number of moving parts and the consequent friction arising therefrom. The threads are platted, as before, by carrying the lower threads successively over and under each alternate upper spool by means of push-prongs or thread-carrying guides and over stationary guides; but the push-prongs are transferred from the grooved ring to the lower-bobbin-holder plate, so that the device which supplies the lower braiding-threads also carries them and directs their course. The stationary guide-arms, while remaining attached to the stationary annular plate, as before, are made of double form, so that the thread will be guided backward as well as forward on reversing the motion of the machine, and so unravel the braided cord as accurately as it was braided and without tangling it, which motion is frequently an important desideratum in the accidental breaking of one or more of the upper or lower threads. The upper bobbins and bobbin-carriers are

entirely different from the corresponding devices of the former machine. The bobbin used is an ordinary spool of the requisite size, and it is simply slipped onto a sleeve projecting inwardly from the center of the outer edge or vertical side of the bobbin-carrier, which is constructed of a thin metal plate tapering to a blunt point at each end, while from the top of said vertical edge and at right angles therewith, and also parallel with said projecting sleeve, extends an arm or cover pierced with two thread-holes, and also projecting inwardly from near one of the ends of said vertical side is an arm carrying a flap-spring to bear against the thread on the spool, and a hooked rod fits in the sleeve. The carrier-bearer is also grooved annularly near the edge and cut away slightly at the points where the thread passes under the carrier, and with abutments or bars in the groove to restrain the carrier from moving laterally. As the bobbin is raised up somewhat above the base of the carrier-bearer by being supported on the sleeve, the carrier-bearer is provided with an annular raised portion to support the inner edge of the bobbin itself sufficiently to keep it and its carrier in a true horizontal position. The stopping mechanism remains precisely as before. The arms of the bobbin-carriers, which were set loose by breaking of a thread, are supplied in this machine by the hooked rod which passes through the sleeve of the bobbin-carrier, and which acts in the same manner. In order to take up lost motion produced by a reverse motion of the machine on breaking of a thread, the stationary rim which holds the guide-arms is made in two parts, or, rather, it rests on or against the projecting arms of an inner rim, and opposite one or more of these projecting arms the outer rim is laterally slotted, and a set-screw in such slot enables the outer rim to be moved the length of the slot and tightened again at any point therein. The complex tension-springs N of the old machine are found to be unnecessary in this construction and are dispensed with in connection with these improvements, a single tension-wire in addition to that bearing against the spool being found sufficient for most purposes. Thus it will be seen that the lower-bobbin holder or skeleton plate, being revolved in one direction, carries around not only the lower-thread-supplying devices, but also carries the push-prongs which guide these threads over the stationary guide-arms, bringing them at proper intervals, due to the relative location of the parts, over and under the upper-thread-supplying devices in proper succession, the carrier-bearer which carries said upper-thread-supplying devices being revolved at the same time, but in an opposite direction, by means of the driving mechanism, which, however, remains the same for all the moving parts, as in the former machine.

In order to enable others skilled in the art to construct and use our machine, we will proceed to describe more particularly all these parts and the new arrangement and combination of them which differ in construction, combination, and arrangement from the corresponding parts described in our former patent.

The frame-work of the machine consists of a base, A, having in its center a hollow cylindrical upright projection or tube, *a*, on the outside of which is placed a revolving sleeve, *b*, and through both sleeve and tube extends an upright tubular shaft, B. From the base of the machine arise two uprights, F, with a cross-arm, G, to support the take-up device R and afford a bearing to the shaft which operates the same, and from the arm G project two or more arms, 6, which support the annular ring L. An upright shaft gears with the main shaft to drive the take-up device.

The machine is driven by a main shaft, 2, having on its inner end a bevel gear-wheel, 3, working into a bevel gear-wheel, 4, secured to the revolving shaft *b*, and the inner tubular shaft, B, is operated by a bevel-gear, 5, connecting it with the gear 3 on the main shaft.

As in our former machine referred to, the lower-thread-supplying devices consist of an annular skeleton plate, T, secured to and driven by the revolving sleeve *b*, while the spokes *t* of this plate have downwardly-projecting rods, upon which the lower bobbins are placed, a movable supporting-pin being inserted in the end of the rod after the bobbin is put in place thereon. Tension-springs *h*, pressing against the bobbins, prevent them from delivering the thread too freely as the bobbins are carried around.

The additional complicated tension mechanism for the lower threads described in our former patent is dispensed with as unnecessary in the new combination of the parts, and in lieu thereof the thread passes directly from the bobbin to a loop on the end of a single wire, *n*, projecting downward from the rim T; thence under the dropper P, which remains as before, (but is exclusively a part of the stopping mechanism and not a tension device in this construction;) thence upward and through a loop, 13, on the inside of the upright bar *d*, which carries the push-prong or moving guide D, (which latter carries it over the stationary guide-arms M,) and thence to the braiding-point. On the top of the outer edge of this plate T arise uprights *d*, curved inwardly at the top and supporting downwardly-projecting push-prongs or thread-carrying guides D. These are bent wires, preferably made in the form of a triangle, with the point downward, as shown in Figs. 1 and 4, as this form more easily sheds the threads when moved in either direction. The said skeleton plate or lower-bobbin holder T, the intermediate stationary plate, *a'*, which supports the guide-arms M, the carrier-bearer E, and the upper ring, L, are arranged relatively to each other in the order named, one above the other, while the circumference of each is so proportioned that the lowest is the largest, and so on, gradually decreasing in cir-

cumference relatively, and so that the parts permit the passage of the lower threads and do not interfere with each other in that respect while in motion.

The stationary rim plate or support for the guide-arms M remains as before, except that it is made in skeleton form, preferably, instead of a solid annular plate; and it consists of a central hub, a^5, with spokes or arms a' reaching into an annular groove, a^6, on the inside of the outer rim, a^7, whereby the latter is supported. (See right-hand side of Fig. 2.) This rim, which is a plain annular ring, otherwise than as stated, is slotted laterally (see Fig. 1, and also left-hand side of Fig. 2) at one or more points, S, through the groove a^6 and opposite the ends of said projecting arms or spokes, and a set-screw, a^8, is passed through said slot into the end of one of the spokes, which fits in the groove, thus adjustably fastening the rim to the spokes, the purpose of this construction being to adjust the rim on the spokes or arms of the central hub or plate laterally to take up lost motion on a reversed motion of the machine. The inner hub or plate of said rim a^7 is secured, as before, to the hollow upright tube or projection a of the frame-work of the machine. To the rim of the said stationary plate a' are permanently secured the guide-arms M, which are constructed of a wire bent at an upward angle from the starting-point on the plate a', thence flattened, and again bent downward to the second point of fastening on the said plate, as shown in Fig. 1, and this form affords an easy passage for the threads in either direction when carried over them by the moving push-prongs.

The carrier-bearer E is secured, as before, to the revolving tubular shaft B, and consists of an annular plate with an annular groove on its upper surface near the outer edge, in which groove 17 the upright sides or edges C of the bobbin-carriers rest to sustain them in position; also abutments or bars 18, to keep the said bobbin-carriers a proper distance from each other and in proper position relatively to the other parts. Said groove may be dispensed with, however, and a rim used in place thereof, consisting of the outer sides or edges of the groove 17, the place of the other side or edge of said groove being supplied in that event by a downward annular projection, a^2, on the ring L, and supporting thereby the other side of the outer vertical edge, C, of the bobbin-carrier. (See Fig. 2). It is also preferable to round the extreme edges or corners of the sides of the groove 17 between the abutments 18, so that the lower threads, brought to that point by the push-prongs, may slide more easily and surely beneath the bobbin-carriers. As the bobbins are supported in their carriers horizontally, and would thus be elevated above the upper flat surface or base of the carrier-bearer when in position on the sleeve of the bobbin-carrier, the said carrier-bearer is provided with an annular raised portion, 12, to support the inner edge of the bobbin itself sufficiently to keep it and its carrier in a true horizontal position.

In lieu of the upper revolving grooved ring, L, formerly used, the said ring in this machine is detached from the other parts and made stationary. It is supported from the cross-bar G by arms 6, and serves simply to keep the bobbin-carriers in position in the carrier-bearer. It is a plain flat ring without grooves, unless and only when provided with an inward annular projection, a^2, to take the place of one side of the groove 17, as above mentioned; but it is provided with arms l, supporting an inner ring, S, which latter is thus located immediately over the top of the bobbin-carriers and keeps them from flying upward and out of position. However, the ring L may itself be made wide enough for this purpose.

The bobbin-carriers are radically different in construction from that of our former machine. They are constructed as shown in detail in Fig. 5, which is a side view, as seen also in Fig. 4, which is an outside end view, and as seen also in top view in Fig. 3. The essential features thereof consist of a thin metal plate, which forms the outside edge, C, with blunt triangular ends, (see Fig. 4,) and this part fits loosely in the groove 17 of the carrier-bearer. The center of this vertical edge or side is pierced with a small hole, in which is fitted a sleeve, 11, projecting inwardly, with a pin about half-way of its length, which pin plays in a slot in the rod d', which thus allows the latter longitudinal play in the said sleeve. This rod d' is hooked or looped at its inner end, and on the said sleeve the upper bobbin is slipped and revolved. The bobbin used is an ordinary spool of the requisite size. From the vertical outside edge, C, of the bobbin-carrier and at the top part thereof extends inwardly an arm or cover pierced with two thread-holes, which may be connected by a groove, (see Fig. 3,) this arm u being above and in a line with the sleeve 11, so that the bobbin W being slipped onto the sleeve, the said arm covers the bobbin and holds it in place, while the thread from the bobbin is passed up through the first hole in the arm along the groove therein, down through the next hole, and finally around the hook of the rod d', and thence to the braiding-point. Said bobbin-carrier is also provided with an arm or pin, 19, projecting inwardly from the inner side of the said outside upright edge, which pin or arm carries a flap-spring, 20, to bear against the thread on the bobbin-spool, preventing it delivering too freely. (See Figs. 2 and 4.)

The stopping mechanism remains precisely the same as in our former machine described in said Letters Patent No. 277,523, and reference being made thereto the said stopping mechanism need not be again described herein. The said stopping mechanism is brought into action by a release of the droppers P on the breaking of a lower thread, and by the rod d' being set loose and flying out by centrifugal force on the breaking of an upper thread, and

said droppers P and rods *d'* coming in contact with the upright rod K or projections thereon, said projection, as respects the upper thread, being in the form of a striker, S, which is merely a piece of metal of the requisite length pivoted to the side of the stationary ring L and swinging loosely on the pivot, (see Figs. 4 and 5,) and by such contact lifted to strike the outer arm of the rod K and elevate the latter, resulting in throwing the machine out of gear, as previously described and set forth in said former patent.

The operation of the machine is as follows: The lower-thread-supplying bobbins having been placed in position, the thread therefrom is brought up to the braiding-point, as described, while the upper-thread-supplying bobbins are placed in position and the thread therefrom directed also to the braiding-point, as described. The machine being then set in motion, the upper and lower thread supplying devices are revolved in contrary directions from each other, which causes the lower threads to be propelled by the moving push-prongs of the lower-bobbin holder over the stationary guide-arms, the effect of which is to bring each alternate lower thread over and under each alternate upper thread by its passing beneath the bobbin carrier which supplies the latter, and the result is a corded braid, to be taken up from the central braiding-point by the take-up device R shown in the drawings.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with intermediate stationary guide-arms, M, constructed and arranged substantially as described, and means for supporting the same, of a revolving carrier-bearer and set of bobbin-carriers for supplying a set of upper braiding-threads, lower-thread-supplying devices provided with guides or push-prongs D for directing the course of the threads delivered therefrom, and mechanism for revolving said upper and lower thread supplying devices in contrary directions from each other in concentric annular paths, but in different planes, whereby said lower threads are guided by the devices which supply the same and by said stationary guide-arms over and under each alternate upper braiding-thread, substantially as set forth.

2. The combination, in a rotary braiding-machine, with a revolving carrier-bearer and a set of bobbin-carriers mounted thereon and supplying upper braiding-threads, of a stationary guiding-ring, L, located above said carriers, lower-thread-supplying devices provided with guides or push-prongs for directing the course of the threads delivered therefrom, intermediate stationary guide-arms and mechanism for supporting the same, and mechanism for supporting and revolving said carrier-bearer and lower-thread-supplying devices, substantially as set forth.

3. The combination, in a rotary braiding-machine, with an upper stationary guiding-ring, L, a revolving carrier-bearer, E, constructed with an annular groove, 17, and rounded abutments 18, as described, for supporting and carrying a set of bobbin-carriers supplying a set of braiding-threads, of said bobbin-carriers C and mechanism for supporting and revolving said carrier-bearer, substantially as set forth.

4. The bobbin-carrier provided with a vertical edge having triangular ends, cross-arm or cover *u*, bobbin-sleeve 11, and a tension-spring, substantially as described.

5. In a rotary braiding-machine, the combination, with upper and lower thread supplying devices and mechanism for revolving the same in contrary directions to each other in concentric annular paths, but in different planes, of stationary guides for the lower threads, and supporting devices therefor arranged intermediate between the upper and lower thread supplying devices, consisting of an annular rim, a^7, grooved on its inner side, a skeleton plate or spokes, *a'*, fitting in said groove, and a central supporting fixed tube, *a*, said rim being slotted at one or more points S on the periphery thereof and through said groove, and provided with a set-screw, a^8, passing through said slot and groove into the central plate or spokes, whereby the rim may be adjusted laterally thereon, substantially as described.

In testimony whereof we have hereunto affixed our signatures this 30th day of November, A. D. 1886.

FLORENZ L. VEERKAMP.
CHARLES F. LEOPOLD.
WILLIAM DARKER.

Witnesses:
FRANCIS S. BROWN,
H. T. FENTON.