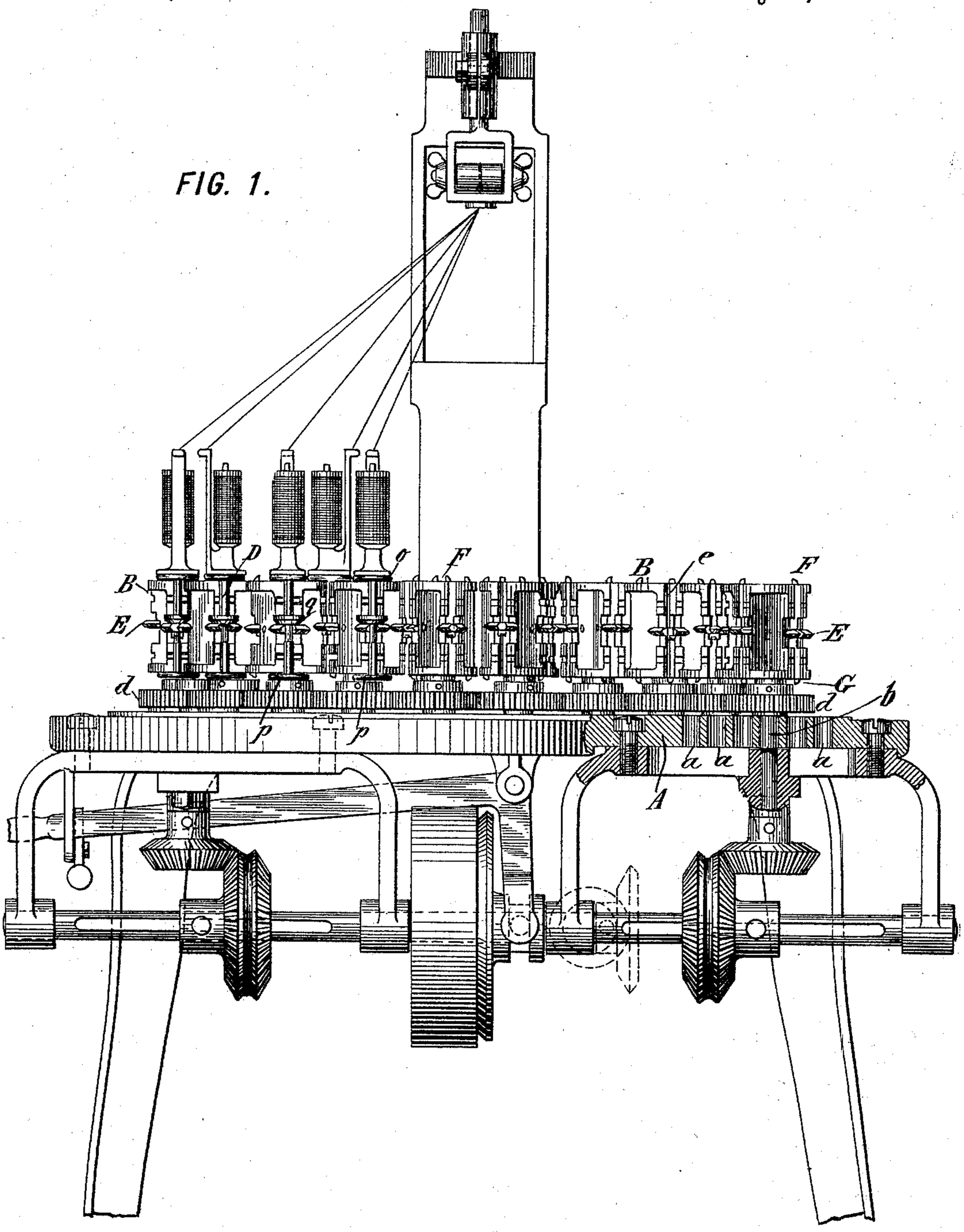
(No Model.) 4 Sheets—Sheet 1.

A. BAYLER.

BRAIDING MACHINE.

No. 500,685. Patented July 4, 1893.

FIG. 1.



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Inventor:
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his Attorneys

(No Model.)

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A. BAYLER.

BRAIDING MACHINE.

No. 500,685. Patented July 4, 1893.

FIG. 2.

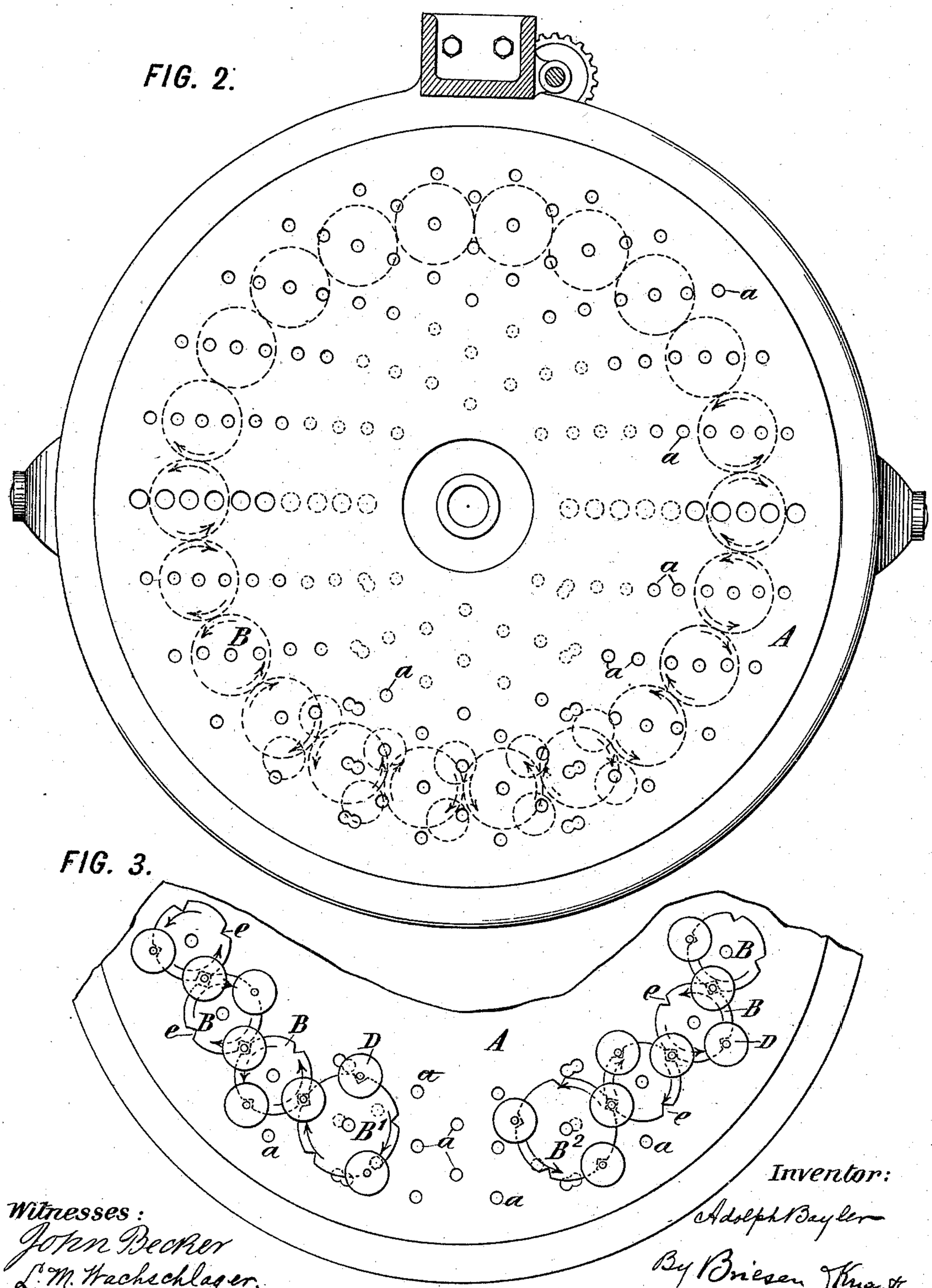

FIG. 3.

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(No Model.) 4 Sheets—Sheet 3.

A. BAYLER.

BRAIDING MACHINE.

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FIG. 4.

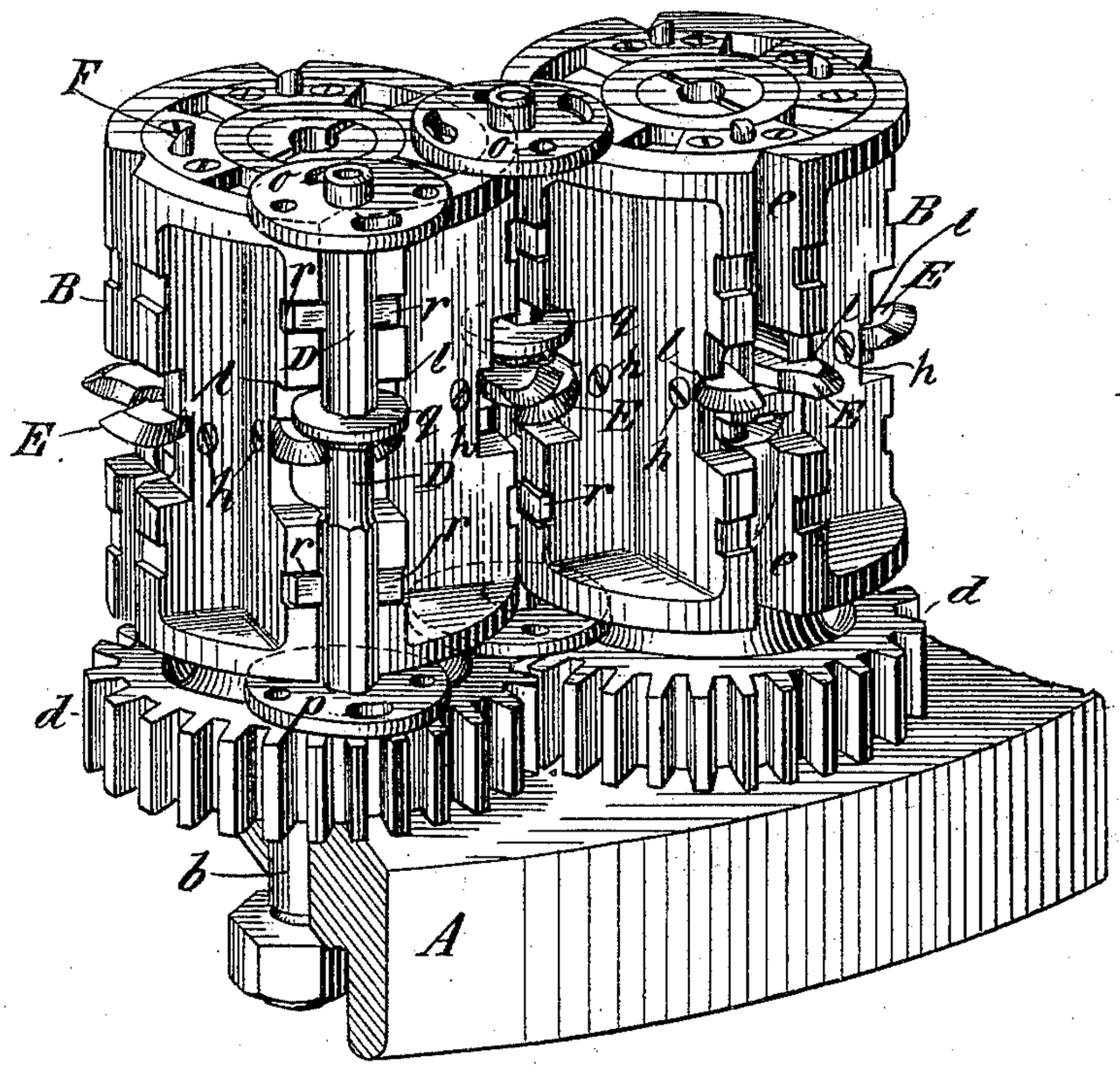

FIG. 5.

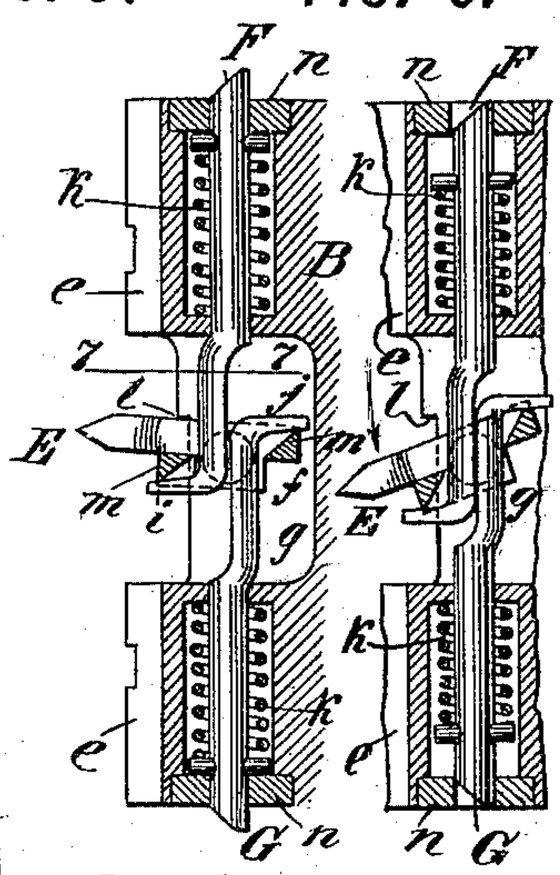

FIG. 6.

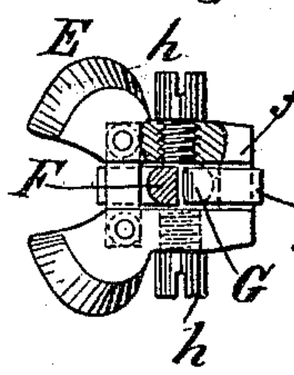

FIG. 7.

FIG. 8.

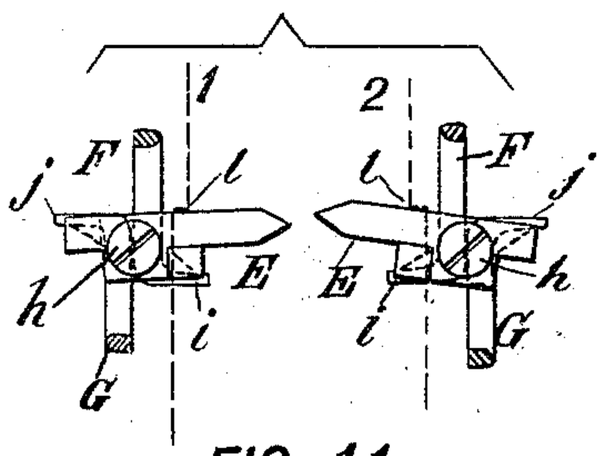

FIG. 9.

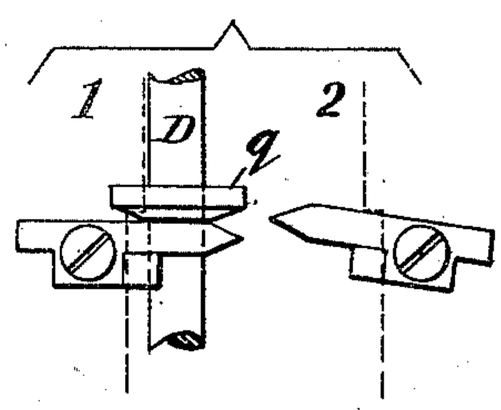

FIG. 10.

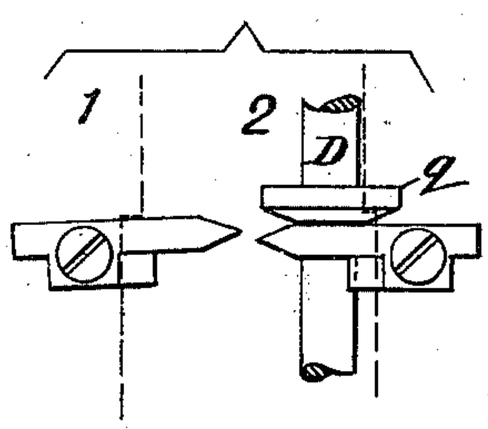

FIG. 11.

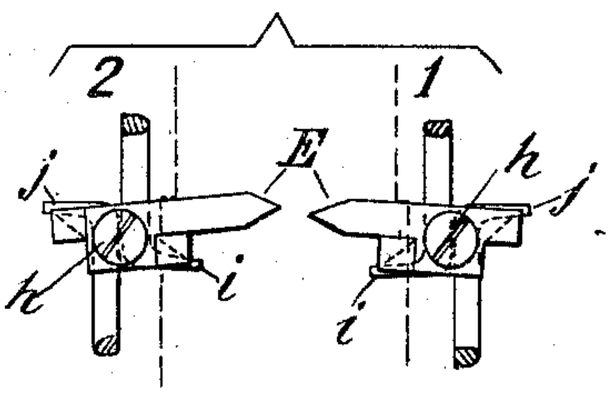

FIG. 12.

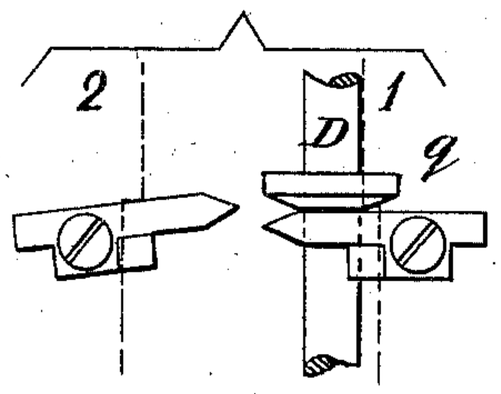

FIG. 13.

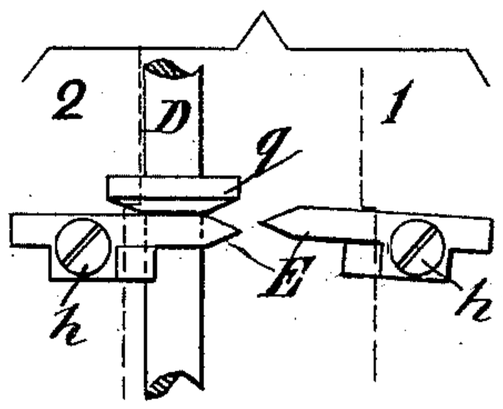

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FIG. 14.

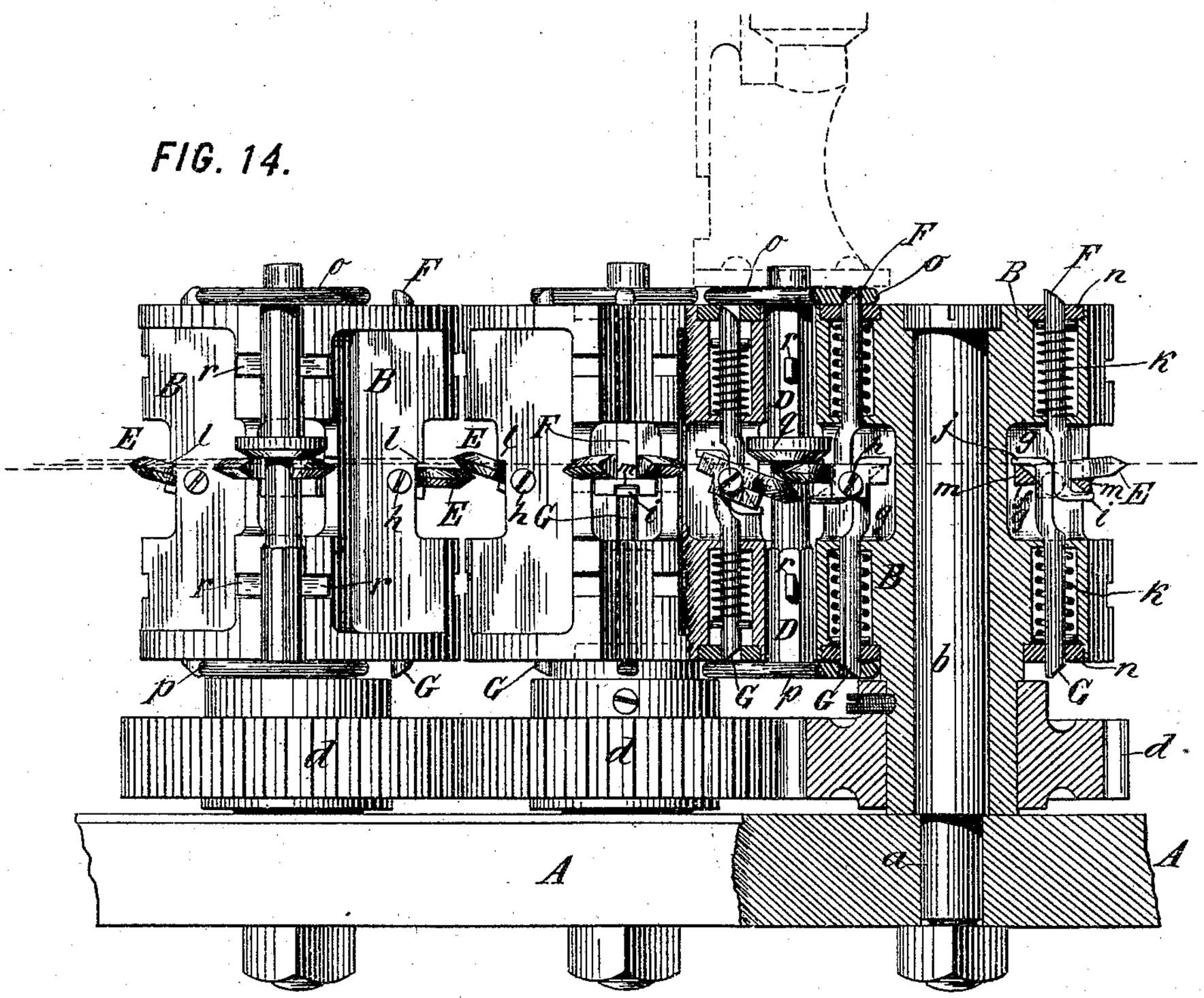
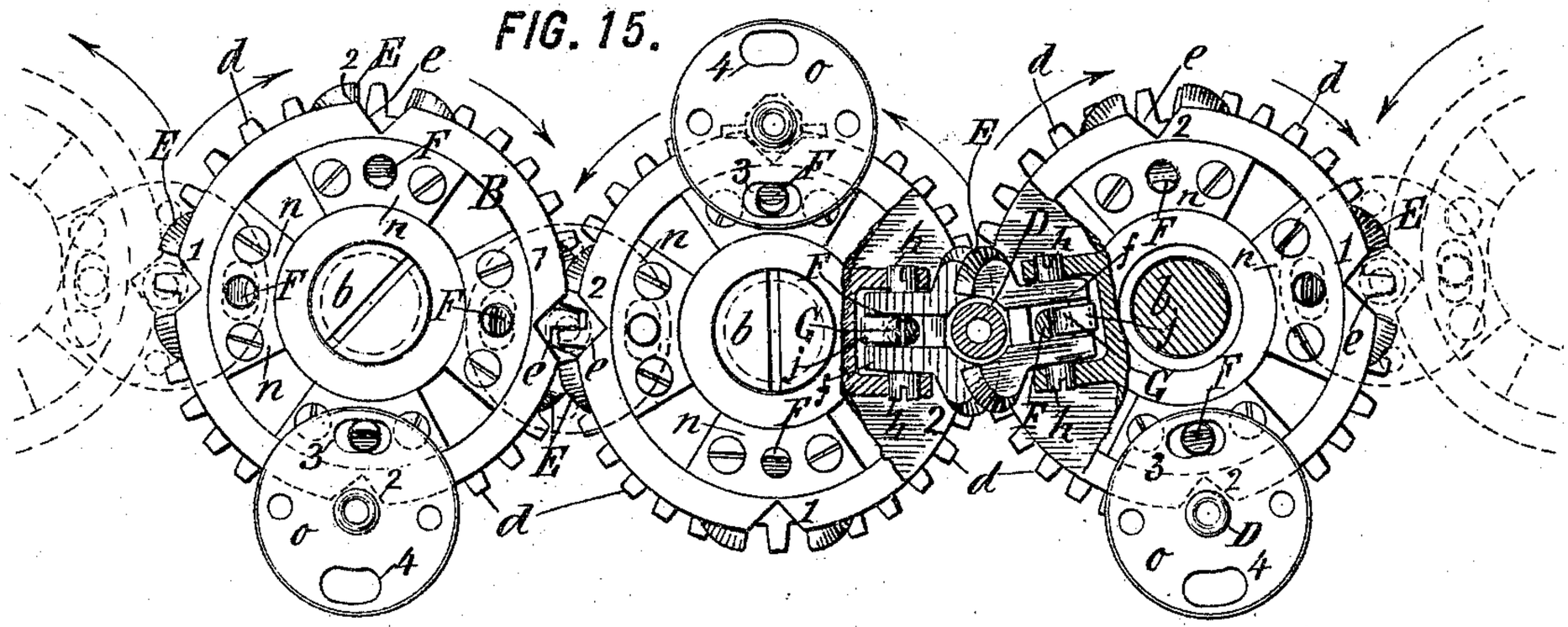


FIG. 15.



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UNITED STATES PATENT OFFICE.

ADOLPH BAYLER, OF NEW YORK, N. Y., ASSIGNOR TO LOUIS RAFFLOER, OF SAME PLACE, AND CHARLES H. SCHOTT, OF BROOKLYN, NEW YORK.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 500,685, dated July 4, 1893.

Application filed December 2, 1892. Serial No. 453,815. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH BAYLER, residing at New York, in the county and State of New York, have invented an Improved Braiding-Machine, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a front elevation of my improved braiding machine. Fig. 2 is a diagrammatic plan view, partly in section, of the bed-plate of my improved braiding machine. Fig. 3 is a similar view of part of said bed-plate, showing several carriers and spool-holders in position. Fig. 4 is an enlarged perspective view of two adjoining carriers. Figs. 5 and 6 are vertical sections through one wall of a carrier showing the locking and unlocking mechanism in different positions. Fig. 7 is a horizontal section on the line 7—7 Fig. 5. Figs. 8, 9, 10, 11, 12 and 13 are diagrams showing different relative positions of approaching unlocking latches of two carriers. Fig. 14 is an enlarged face view, partly in section of the machine; and Fig. 15 an enlarged top view, partly in section, of part of the machine.

This invention relates to a new braiding machine in which the spool-holding carriers are geared together and provided with spool-holders which when the carriers are rotated are adapted to be transferred from one carrier to the other, thereby avoiding the necessity of using a slotted bed-plate, as heretofore frequently required; and in this connection the invention consists in the new locking and unlocking mechanism as applied to said rotary carriers for causing the delivery by any one carrier of the spool-holders supported by it to an adjoining carrier as soon as the latter reaches contact with such spool-holder, all as hereinafter more fully described.

In the drawings the letter A represents the bed-plate of the machine. This bed-plate, as Fig. 2 clearly shows, is no longer provided with the sinuous slots that are frequently employed in braiding machines as guides for the traveling spool-carriers. In lieu of these slots the bed-plate of my machine has series of holes *a* (see Fig. 2) so arranged that the spool-holding carriers may be set into larger or smaller circles on the same bed-plate or into other suitable relation to one another so as to produce means for adapting the same machine to braiding with a larger or smaller number of threads. Thus if the dotted larger circles shown in Fig. 2 represent the spool-holding carriers as used in one example on the same bed-plate A, it will be seen that said bed-plate is adapted to operate twenty-two carriers at one time, while if it be assumed that the shafts of the carriers are set into the holes nearest the center of the bed-plate, the same machine will hold but eight carriers, and thus with the same bed-plate and framing I can adapt the same machine to braiding with a larger or smaller number of threads, where heretofore it was necessary in machines employing slotted bed-plates to employ a separate machine for every variation in the number of threads used in braiding, or else to employ different bed-plates on the same framing.

Each carrier B (see Figs. 14 and 15) is an upright nearly cylindrical block firmly mounted upon a vertical shaft *b* which extends downward from the carrier body and is fitted into one of the holes of the bed-plate A, as clearly shown in Fig. 4 of the drawings.

Above the bed-plate, or if desired below the same, the shaft *b* of each carrier is provided with a toothed wheel *d* which gears into similar wheels of the two adjoining carriers. This is clearly indicated in Figs. 14 and 15 of the drawings, Fig. 14 also showing, on the right-hand side, the full length of shaft *b* that holds the carrier and that sets into an aperture of the bed-plate A. Each of these carriers B is provided with four, more or less, vertical grooves along its periphery. These grooves are marked *e* in the drawings, and the said grooves *e* are so proportioned as to their depth that the upright shank D which extends from the lower end of the spool-carrier may be received between any two carriers B B in their grooves *e e*, whenever two of said grooves are contiguous or aligned with each other.

At about the middle of each groove *e* (speaking of its length) is pivoted in each carrier a peculiar latch E, of which a detail top view appears in Fig. 7. This latch has a shank *f* which enters into a recess *g* of the carrier B

(see Fig. 6) and which by pins *h* is pivoted in the carrier B. The shank *f* of the latch E is perforated or eye-shaped, and through it pass the shanks of two upright bolts F and G. The upright bolt F extends upwardly and the other bolt G extends downwardly, as shown in Fig. 5. The bolt F, after passing through the aperture of the shank *f* of the latch E, has beneath said shank a hook or lateral enlargement *i*, and in like manner the other bolt G has above the shank *f* a hook or lateral enlargement *j* (see Fig. 5). Each of these bolts is connected with a coiled or other spring *k*, there being one such spring to each bolt, said springs tending to draw the bolt F upward and the bolt G downward. The hook *i* of the upwardly projecting bolt projects forward, and the hook *j* of the downwardly projecting bolt projects rearward of the pivot *h* of the shank *f* of the latch E; so that the tendency of the springs *k k* will be not only to push the bolts F and G out, but also to tilt the latch E on its pivot upward, meaning that its outer projecting end shall be tilted up under the influence of the springs to the fullest possible extent. This extent is limited by a shoulder *l*, shown in Figs. 5 and 6, against which shoulder these springs *k* draw the latch E, whenever said springs are permitted to exert their full influence upon said latch. In the same position of parts the upper end of the bolt F projects slightly above the top of the carrier B, and the lower end of the bolt G projects slightly below the carrier B, as shown in Fig. 5. These projecting ends of these two bolts are beveled, as clearly shown, the bevel facing outward, as indicated in Fig. 4, so that each bolt may be pushed inward—that is, the upper bolt pushed down and the lower bolt pushed up—whenever a horizontally sliding obstacle reaches contact with these beveled ends of the bolts and moves toward the center of the carrier B.

In order to permit the vibration hereinafter described of the latch E and yet maintain proper connection between said latch and the bolts F G, so that no lateral strain shall be brought upon the bolts, I have caused each hook *i j* to bear upon a knife edge *m* of the shank *f* of the latch. This is fully represented in Figs. 5 and 6, these figures showing that the hook *j* bears upon an upper knife edge *m* and the hook *i* upon a lower knife edge *m*, and a comparison of Figs. 5 and 6 also showing that, whether the latch E points upward, as in Fig. 5, or downward as in Fig. 6, these narrow contact edges maintain proper contact with the bolts F and G without causing lateral strain. It goes without saying that the carrier B is provided with proper chambers for the reception of the springs *k*, which chambers after said springs have been inserted are closed by suitable plates *n* that are screwed into position as indicated in Fig. 4.

I have already stated that the springs *k* crowd the latch E in the normal position against a fixed shoulder or shoulders *l*. It remains to observe, before I describe the relation of the different latches in the different carriers to one another, that the outer end of each latch—that which projects farthest from the carrier—is beveled, as appears clearly from the drawings, Figs. 5 and 6. It also appears from Fig. 5 that in the normal position this beveled free end of the latch E points slightly upward, the shoulder *l* being situated so as to permit this. But the extent of the upward inclination of the different latches on the same carrier differs in alternate latches. As already mentioned each carrier has four, more or less, grooves *e*. It is necessary for the purpose of this invention that each carrier shall have an even number of such grooves *e*, either two, four, six, &c. In the drawings, Fig. 15, each carrier is represented as having four such grooves *e*. As I regard these grooves, I may number them with odd and with even numbers, say, 1, 2, 1, 2, and the carriers are so meshed, as Fig. 15 shows, that when two grooves of two carriers face each other, as they do in Fig. 15, the odd numbered groove of one carrier faces the even numbered groove of the other. Now I have so placed the shoulders *l* near these different grooves that those pertaining to the odd numbered grooves are slightly lower than those pertaining to the even numbered grooves. This will perhaps more clearly appear from an inspection of Fig. 14 of the drawings, in which three horizontal dotted lines are shown near the left-hand side, and the latch E nearest the left is in an odd numbered groove 1, and points with its extreme outer end into the middle one of these three lines; whereas the latch on the left hand end of the next carrier B, which is the central carrier of Fig. 14, is raised so that its extreme free end enters the upper one of these three dotted lines. In other words, the shoulder *l* for determining the upward inclination of the latch E in each even numbered groove 2 is placed a little higher than the shoulder *l* in the odd numbered grooves. It follows that whenever during the rotation of the carriers in opposite directions a latch E of one carrier meets the latch E of the adjoining carrier, that latch which is carried in the odd numbered groove will be slightly below that which is carried in the even numbered groove and will on meeting the latter be slightly depressed, as is represented in Fig. 14, at that part of said figure where two latches are shown in contact, the lower latch there shown being depressed from the position originally occupied by it, thus allowing the two latches that meet to pass one another and preventing them from interfering with the rotation in opposite directions of the carriers.

When I have stated that the latches are by the springs crowded against the shoulders *l*, I have reference to their position when no shank D is in engagement with them.

I will now describe what happens when the shank D carrying the spool is held in a car-

rier. The shank D is an upright bar having a disk *o* near its upper end, and another disk *p* near its lower end, these disks being so far apart from one another that when the shank is in position on a carrier, the disk *o* will be directly on top and the disk *p* directly below the bottom of such carrier. The disk *o* has slots 3 and 4 (see Fig. 15) of which one, when the spool-holder is carried, receives the bolt F as a locking instrumentality. In like manner the lower plate *p* has similar slots, one of which receives the lower bolt G. Thus by the bolts F and G entering these slots in the plates *o p*, the spool-holder—or rather its shank D—is locked to a carrier. The shank D has furthermore between its extremities a disk or shoulder *q* which, whenever such shank is pressed into a groove *e* of the carrier, bears directly upon the top of the latch E, slightly depressing the same, but not sufficiently far as to allow the bolts F G to be withdrawn from the disks *o p*. The degree of depression of the latch by the inserted disk *q* of the shank D is well illustrated in Figs. 9 and 12, as contrasted with Figs. 8 and 11 respectively. Thus Fig. 8 shows two latches E E on adjoining carriers in the odd and even grooves *e* respectively, the latch E pertaining to the groove 1 being represented as slightly below the latch E that pertains to the groove 2. The same appears from Fig. 11, which represents the latches of Fig. 8 simply in the reversed position.

Fig. 9 shows that when the left-hand latch of Fig. 8 is brought under cover of a disk *q*, it is depressed still farther than it was in Fig. 8, but still remains the lower latch. Fig. 12, however, shows that when the latch which was the upper latch is brought under cover of a disk *q* of shank D, this upper latch is thereby depressed sufficient to become now the lower. Hence, whenever a groove in a carrier B which is not filled by a shank D meets a groove of another carrier which has a shank D, the latch E of the empty groove will always be higher than the latch E of the filled groove; (Figs. 10 and 13 simply serve to make this fact still more apparent) for upon this important fact depends the operation of my machine.

It is evidently the purpose of a machine of this character to cause the spool-holders to travel in a sinuous line around the machine. Hence it is necessary that, whenever a spool-holder is brought by one carrier into contact with another, it will be at once received by the second and let go by the first of these carriers, and that this will be the invariable result, no matter in what direction a carrier turns, nor in which groove the spool-holder is received. The spool-holder, I will assume, is pressed into a groove *e*, so that its disks *o p* snap over the bolts F G and receive them in their slots. By this means the spool-holder is locked to the particular carrier. When now this carrier brings this spool-holder opposite another carrier, the latch E which is under the disk *q* of the particular spool-holder in question, will be the lower latch, the other latch E in the empty groove of the other carrier being higher, as necessarily follows from what has been stated in connection with Figs. 9, 12, 10 and 13. Now as in turning the carriers in opposite directions the higher latch E meets the lower latch E, which is below the disk *q*, it will depress the said lower latch still further, as shown in the sectional part of Fig. 14,—so far indeed as to draw the bolts F G, that thus far held the spool-holder, out of the slots of the disks *o p*. This occurs when the bolts F G of the new carrier have already entered the empty slots of the same spool-holder. To make my meaning clear in this connection, I will refer more particularly to what is shown in Fig. 15. The middle carrier of that figure shows that it is engaged with a spool-holder on the side which is uppermost in Fig. 15. Now as this middle carrier moves in the direction of the arrows shown, it carries the said spool-holder to the left; meanwhile the carrier B which stands to the left of this central carrier is turned in the opposite direction and gradually brings the groove *e*, which is represented as on the uppermost edge of Fig. 15, toward the right. The central carrier engages the disks *o*, *p* by means of its bolts F G, entering the slots 3 of said disks *o p;* but as the motion of the carriers continues, the disks *o p* will gradually lap over the adjoining carrier B on the left and will receive the bolts F G of this adjoining carrier finally into their slots 4, and just at about that time the latch E of the central cylinder having been depressed by the latch E of the cylinder at the left, the said spool-holder is released from the central cylinder and received and carried along by the left-hand cylinder; and this happens when ever a spool-holder on one carrier is met by an empty groove on the other carrier.

For the purpose of insuring the proper location of the slots 3, 4, with reference to the bolts F G, I provide each shank D with projecting guide-pins *r* which enter proper creases or horizontal grooves on the carriers, as shown in Fig. 4.

I deem it an essential feature, therefore, of this invention that each carrier has the latches E E in its successive grooves *e* so located that the latch pertaining to one groove will be slightly higher than that pertaining to the next following groove, and this again slightly lower than that in the next following groove, &c., so that the latches of empty grooves meeting one another may pass one another without stopping the rotation of the carrier, and that whichever latch is depressed by the disk *q* of the spool-holder will stand still lower, though but slightly so, than the latch which normally is lowest.

I have described this machine, and especially the carriers that have the even numbers of latches of which one set is inclined normally to a higher plane than the other set,

with reference to a circular braiding apparatus such as is shown in Fig. 2, where a complete ring of carriers is intergeared. When, however, flat braid is to be made, this circle is at one place interrupted, as is indicated in Fig. 3, and at the extreme ends of the curve described by the carriers there may be in some instances carriers B′ and B² (see Fig. 3) which have an uneven number of notches. When such carriers having an uneven number of notches are used at the end of the row of regular carriers B that have the even number of notches and the unequal set of latches, I provide these carriers B′ and B² with latches that stand with their free ends in a plane midway between the highest and lowest latches of the regular carrier, being higher than the lower latches and lower than the higher latches, and being thus able to pass both kinds without producing end contact.

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

1. The combination of the carrier B, having two or more grooves *e*, with the pivoted latches E E, and with the bolts F G controlled by said latches, all arranged so that the latch pertaining to one groove or set of grooves of the carrier shall be slightly higher than the latch pertaining to the remaining groove or set of grooves and so that the latches of empty grooves meeting one another may pass over one another without stopping the rotation of the carriers, substantially as described.

2. In a braiding machine, the carrier B having upright grooves *e* for the reception of the shanks of the spool-holders, shoulders *l* on each side of said grooves the shoulders *l* pertaining to one groove or set of grooves being higher than the shoulders *l* pertaining to the adjoining groove or set of grooves, latches E adapted to abut against said shoulders and locking mechanism operated by said latches, substantially as and for the purpose specified.

3. In a braiding machine, the series of carriers B B intergeared so as to turn in alternately opposite directions, each of said carriers having upright grooves *e*, a set of bolts F G for each groove, and a pivoted latch E connected with said bolts in each groove, the latches in the alternating grooves being held by the bolt-springs in slightly different normal elevations, in combination with the shanks D of the spool-holders, said shanks having locking disks *o p* and latch-depressing disk *q*, all the parts being arranged as described, namely, so that every latch which is depressed by a disk *q* of the shank D shall thereby stand lower than every latch which is not so depressed, as set forth.

4. In a braiding machine, the combination of the carrier B with the latch E pivoted therein, said latch having perforated shank *f*, and with the bolt F having hook *i* and bolt G having hook *j*, the contact edges *m* of the latch with the hooks of the bolts being substantially knife edges as and for the purpose specified, so that the latch may swing on its pivot without straining the bolts laterally.

5. In a braiding machine, the combination of the carrier B with mechanism substantially as described for rotating it, adjoining carriers and mechanism for rotating them in opposite directions, spool-holding shanks D, having disks *o p* that are adapted to straddle and be locked on the carriers, latches E on said carriers and mechanism for actuating said latches, all arranged to permit the locking at one time of the said disks to one carrier only, substantially as described, and all as specified.

6. The spool-carrying-shank D having projecting disks *o*, *p*, each disk being adapted to receive a locking bolt at two opposite places, said shank having intermediate of said disks a projecting disk or shoulder *q*, and being adapted for engagement with a series of grooved carriers B having latches E E that control the locking bolts, that engage both disks *o p* of the spool-carrying shank, substantially as and for the purpose specified.

7. The spool-carrier D having locking shoulders *o p* adapted to straddle the carriers and to receive bolts on diametrically opposite sides and having intermediate shoulder or disk *q*, and guide-pins *r*, combined with the carrier B having upright groove *e*, recesses for the guide-pins *r*, a latch adapted to enter beneath the disk *q*, and bolts controlled by said latch, as set forth.

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