No. 828,176. PATENTED AUG. 7, 1906.

C. L. BAILEY, DEC'D.

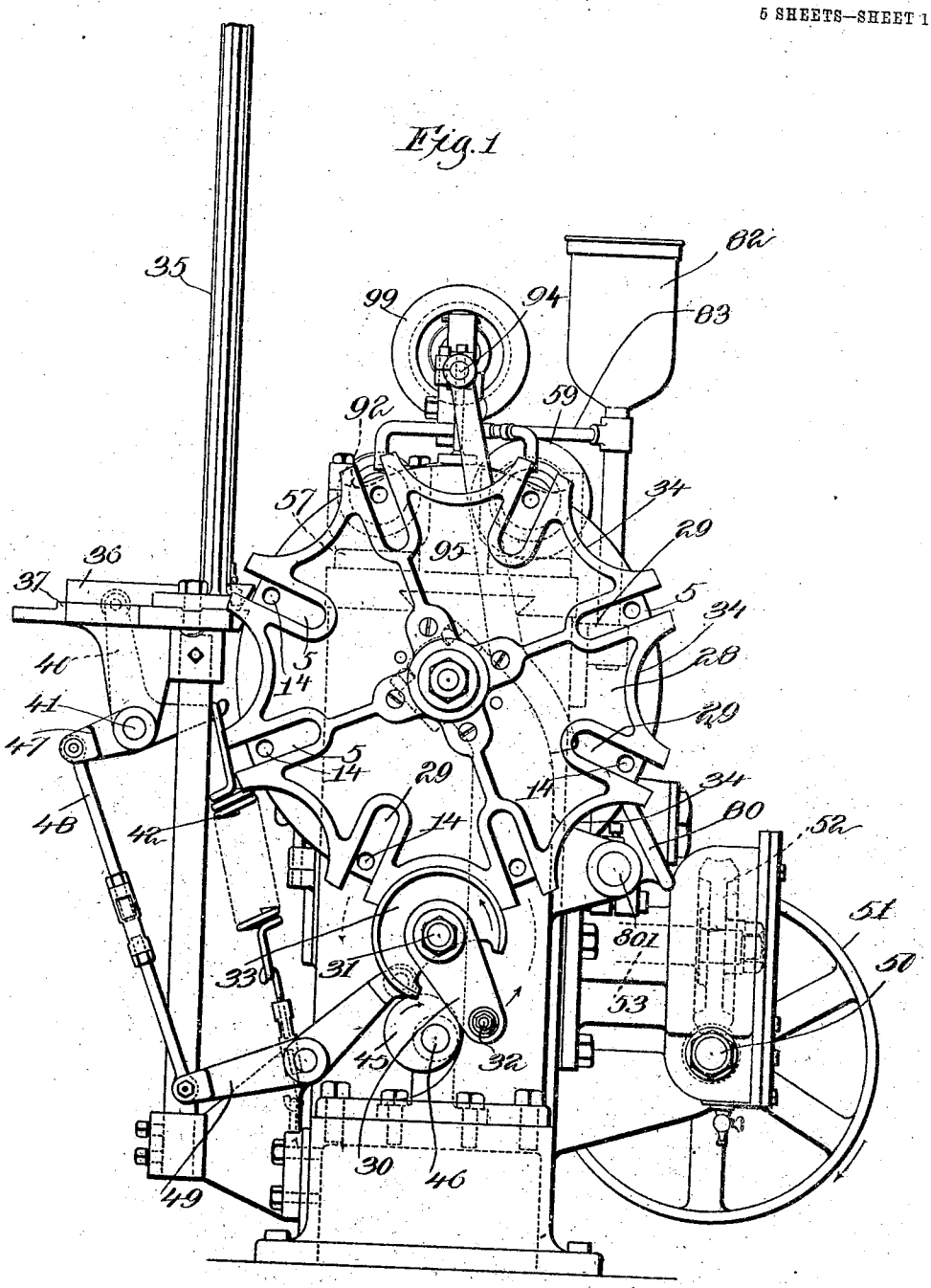
E. H. BAILEY, ADMINISTRATRIX.

MACHINE FOR BORING BOBBINS.

APPLICATION FILED JAN. 21, 1905.

5 SHEETS—SHEET 1.

Fig. 1



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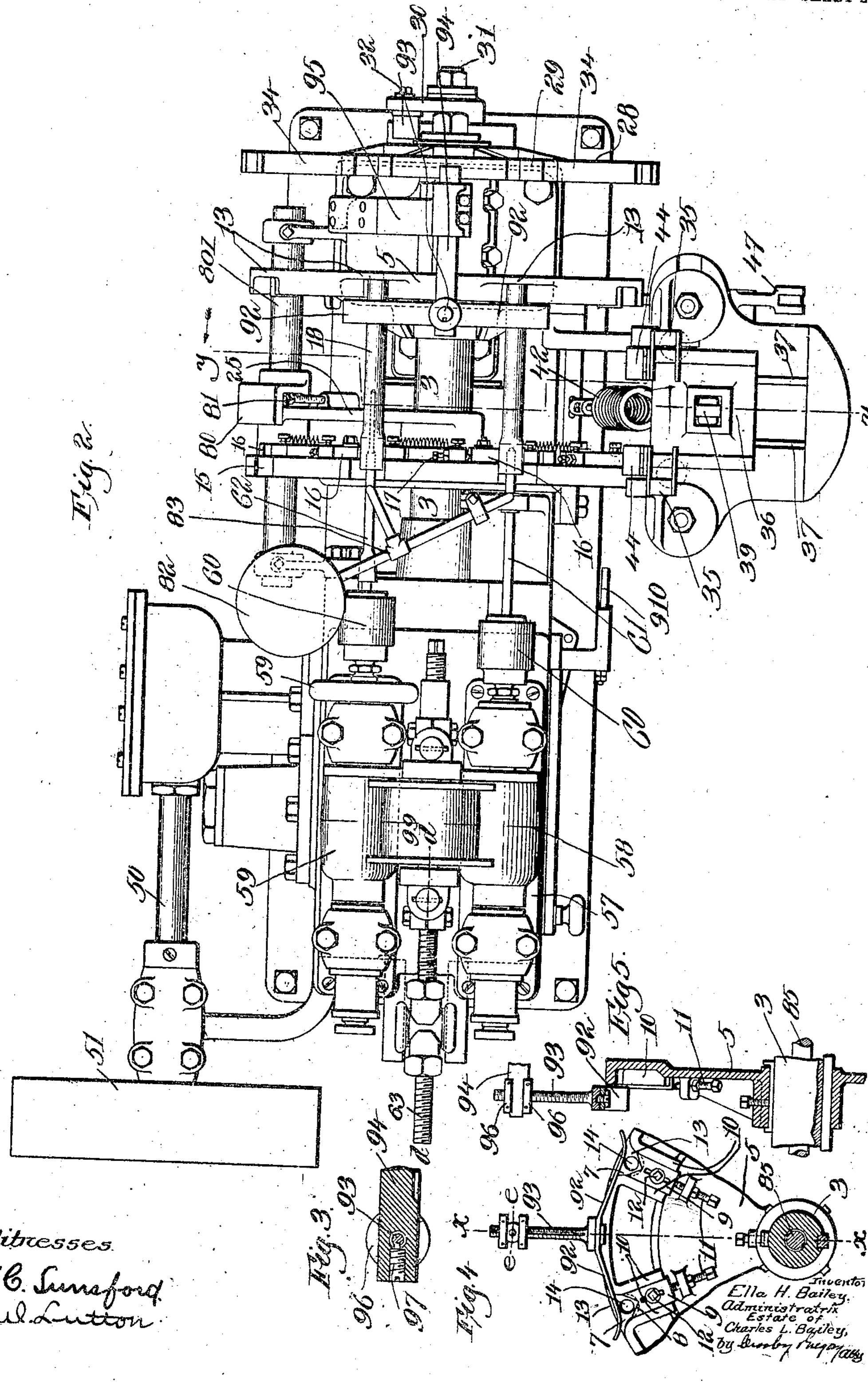

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5 SHEETS—SHEET 3.

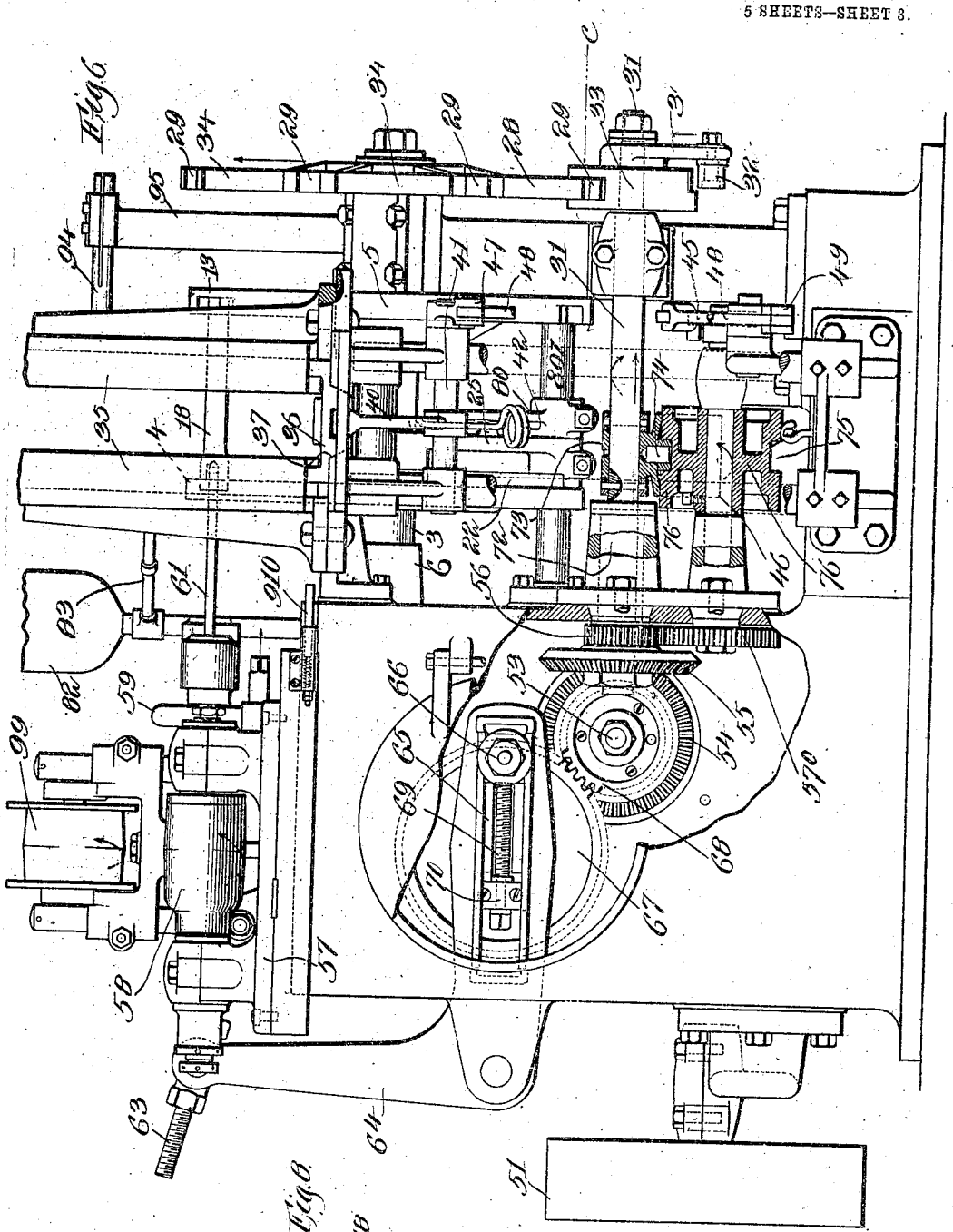

Fig. 6

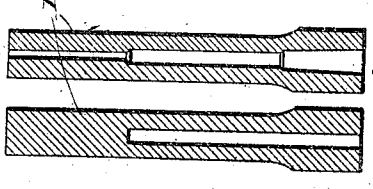

Fig. 7

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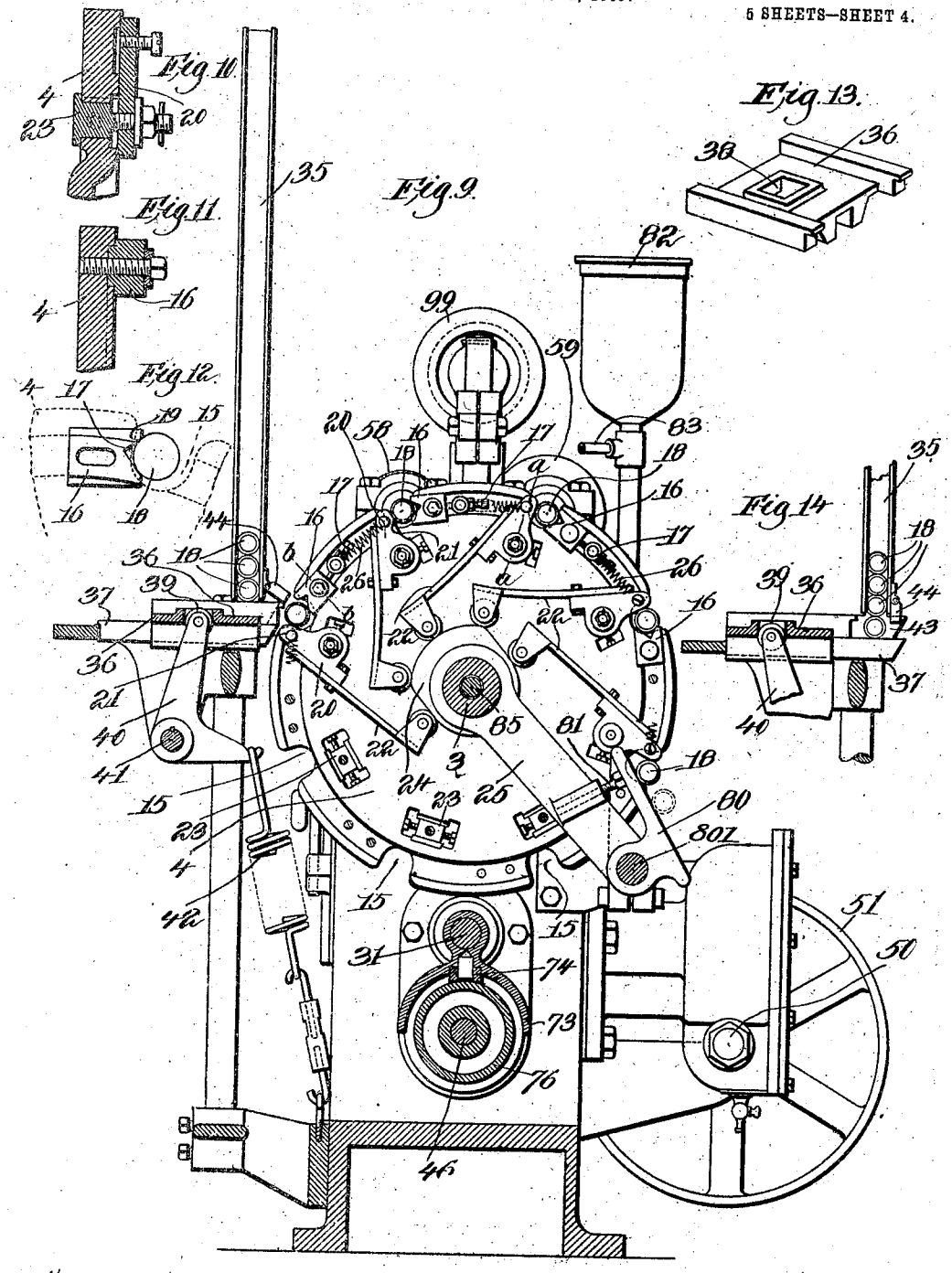
5 SHEETS—SHEET 4.



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APPLICATION FILED JAN. 21, 1905.

5 SHEETS—SHEET 5

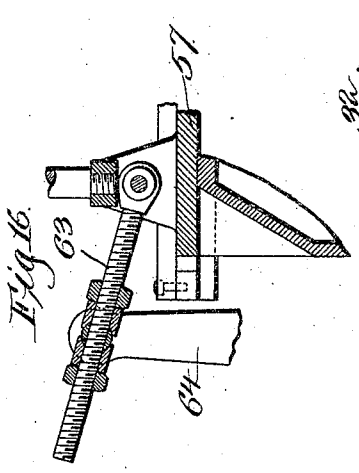

Fig. 16.

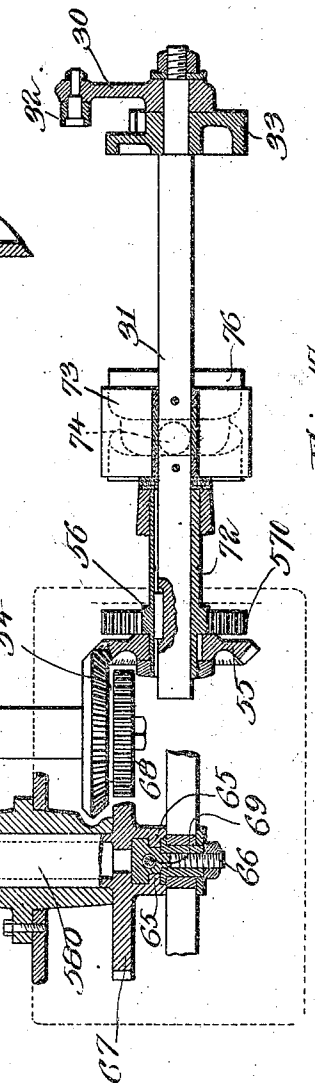

Fig. 15.

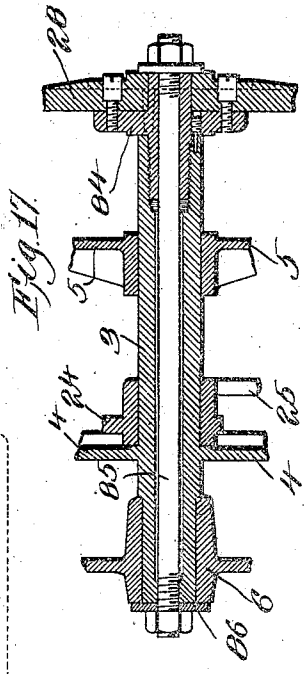

Fig. 17.

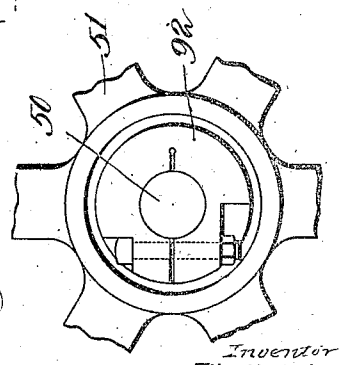

Fig. 18.

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UNITED STATES PATENT OFFICE.

ELLA H. BAILEY, OF WATERBURY, CONNECTICUT, ADMINISTRATRIX OF CHARLES L. BAILEY, DECEASED, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

MACHINE FOR BORING BOBBINS.

No. 828,176. Specification of Letters Patent. Patented Aug. 7, 1906.

Application filed January 21, 1905. Serial No. 242,051.

To all whom it may concern:

Be it known that CHARLES L. BAILEY, deceased, (ELLA H. BAILEY, administratrix, residing at Waterbury, Connecticut,) did invent an Improvement in Machines for Boring Bobbins, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention relates to a machine for boring bobbins—such, for instance, as are used in loom-shuttles, spinning-machines, winding-machines, &c.

In the manufacture of these bobbins they are first roughly turned out to approximately the desired shape and are then bored longitudinally to permit them to be placed on the spindles of the loom-shuttles or spinning-machines. After this boring operation they are further treated to put them into their finished condition.

The present invention relates solely to the boring operation; and it has for its object to provide a novel machine for accomplishing this, which machine is automatic in its action.

The invention comprises a bobbin-carrier adapted to support and hold the bobbins while being bored, boring devices, automatic means to feed bobbins to the bobbin-carrier, and actuating means for the latter whereby the carrier is moved relative to the boring devices to bring first one bobbin and then another into position to be bored.

In the preferred embodiment of the invention the hole in the bobbin is bored at two operations, during the first of which a hole of uniform diameter is bored part way through the bobbin and during the second of which the hole is completed and given its final and desired shape.

The bobbin-carrier preferred is a rotary carrier and has an intermittent or step-by-step movement.

The two drills for performing the two described operations are mounted on a carriage movable toward and from the bobbin-carrier. During the first step forward of the bobbin-carrier the first bobbin is brought into position to be acted upon by one of the drills, and while the carrier is at rest the drill-carriage is moved up and the hole drilled. While the carriage is receded, the bobbin-carrier is advanced another step, thus carrying the first bobbin into position to be operated on by the second drill and carrying a second or fresh bobbin into position to be operated on by the first drill. While the bobbin-carrier is in this position, the carriage is again moved forward and the two drills operate simultaneously on the two bobbins, one drill boring the initial hole in one bobbin and the other drill giving the final shape to the hole of the other bobbin.

Suitable automatic feeding mechanism is employed to feed the unbored bobbins singly to the bobbin-carrier, and the bobbin-carrier during its step-by-step movement carries these bobbins into position to be acted upon first by one and then the other of the drills.

All of these various operations are automatic, and so long as the hopper of the feeding mechanism is supplied with unbored bobbins the boring operation will be carried out.

Referring to the drawings, Figure 1 is an end view of a machine embodying the invention. Fig. 2 is a top plan view thereof. Fig. 3 is a section, on an enlarged scale, on the line *e e*, Fig. 4. Fig. 4 is a detail of the means for holding the tips of the bobbins in the bobbin-carrier while said bobbins are being bored. Fig. 5 is a section on the line *x x*, Fig. 4. Fig. 6 is a side view of the machine looking toward the right, Fig. 1. Figs. 7 and 8 are sections of the bobbin, showing different stages of the boring operation. Fig. 9 is a section on the line *y y*, Fig. 2. Fig. 10 is a section, on an enlarged scale, on the line *a a*, Fig. 9. Fig. 11 is a section, also on an enlarged scale, on the line *b b*, Fig. 9. Fig. 12 is a detail of one of the gripping-jaws on the bobbin-carrier. Fig. 13 is a perspective view of the pusher of the feeding mechanism. Fig. 14 is a vertical sectional view through the feeding mechanism, showing the parts in a different position from the parts shown in Fig. 9. Fig. 15 is a horizontal section on substantially the line *c*, Fig. 6, showing the arrangement of driving-gear for the mechanism. Fig. 16 is a section on the line *d d*, Fig. 2. Fig. 17 is a section through the shaft or spindle on which the bobbin-carrier is supported. Fig. 18 is a detail of the driving-pulley.

As stated above, the machine comprises a bobbin-carrier, actuating means therefor, boring devices, and means to feed the bobbins automatically to the bobbin-carrier.

Bobbin-carrier.—The bobbin-carrier will first be described. The form of bobbin-carrier herein shown is a rotary carrier having an intermittent or step-by-step rotation. It is mounted on a shaft 3 and comprises two disks 4 and 5, fast to said shaft. The shaft is journaled in any suitable bearings 6 in the frame of the machine and is driven by mechanism presently to be described. The disks 4 and 5 each have means for supporting one end of a bobbin, the disk 4 being constructed to support the butt-ends of the bobbins and the disk 5 the tip ends thereof. Said disk 5 is provided at its periphery with a plurality of outwardly-opening recesses 7, (see Figs. 2, 4, and 5,) in which the tips of the bobbins are adapted to rest. These recesses 7 are illustrated as having the adjustable seats 8 on which the bobbins rest, said seats being formed by the notched ends of adjustable blocks 9, which are suitably guided between parallel flanges 10 on the face of said disk 5. Each block is adjusted radially by means of a suitable adjusting-screw 11 and is held in place by a bolt 12 passing through a slot therein. Each recess 7 has the end wall 13, against which the end of the bobbin abuts, as seen in Figs. 2 and 4, and said end wall is provided with an aperture 14, through which the point of the drill may pass as it emerges from the bobbin upon completing the boring operation.

The disk 4, which supports the butts of the bobbins, is provided with a plurality of notches 15 in its periphery in which the bobbins 18 rest. Said disk is also provided with means to grip the bobbin occupying each recess 15 while the boring operation is progressing. Said means is herein illustrated as a pair of gripping-jaws located at each recess, one jaw of each pair being stationary and the other pivoted.

The stationary jaws are designated by 16, and each is shown as adjustably secured on the disk by means of an adjusting-screw 17. One stationary jaw is shown on an enlarged scale in Fig. 12, from which it will be seen that the gripping-face of said jaw is notched, as at 17, to partially receive the bobbin 18. Said jaw is provided with the biting edge or corner 19. The pivoted jaws are designated by 20, and each comprises a head 21 and a tail or arm 22. Each jaw is pivoted on a suitable fulcrum-block 23, carried in a slot in the disk 4, and preferably the fulcrum-blocks are adjustable, as seen in Fig. 9. The tail 22 of each pivoted jaw carries a roll which bears on a stationary cam 24, said cam being supported by the shaft 3, but loosely mounted thereon, so that the shaft can turn therein. The cam is held stationary by a suitable arm 25, the lower end of which is fast to the frame of the machine. Each of the pivoted jaws is acted upon by a suitable spring 26, which tends normally to open said jaw away from its corresponding stationary jaw 16.

From the above it will be seen that as during the rotation of the disk 4 the tails 22 of the pivoted jaws wipe over the raised portion of the cam 24 said jaws will be closed toward the corresponding stationary jaws, and as said tails pass off from the rise 24 the springs 26 will open said jaws away from the stationary jaws.

The gripping mechanism above described operates to hold the butt-ends of the bobbins while the boring operation is proceeding. In order to steady the tip ends of the bobbin, a steadying device is provided, herein shown as yielding arms 92, carried by a suitable stem 93, as best seen in Figs. 4 and 5. These yielding arms are positioned so that as the bobbin-carrier rotates the tip ends of the bobbins pass under and engage them, the bobbins being thus in engagement with the arms while the boring operation is proceeding. The said arms therefore operate to firmly hold the tip ends of the bobbins in the recesses 7 while said bobbins are being bored. The stem 93 passes through a supporting-arm 94, adjustably carried by a suitable stand or bracket 95, and said stem 93 is preferably screw-threaded, so that it can be adjusted up and down in the arm, thereby to secure the requisite pressure of said arms upon the bobbins as the latter pass beneath the arms. As herein shown, the stem 93 is held in its adjusted position by suitable locking-nuts 96, and it is held from rotating in the arm 94 by a screw 97, the tip end of which engages a slot or keyway in the stem.

The bobbin-carrier thus far described is given an intermittent or step-by-step movement. One good way of accomplishing this is by means of the star-wheel mechanism, (shown best in Fig. 1,) which comprises a cam-disk 28, secured to the shaft 3 and provided with a plurality of radially-arranged grooves or slots 29, and the arm 30, fast on the shaft 31 and carrying a pin 32, to enter and coöperate with the slots 29 to advance the disk 28 one step at a time. The disk is held stationary while the pin 32 is passing from one slot 29 to the next one by the concentric disk 33, which occupies a recess 34 in the periphery of the disk 28.

Bobbin-feeding mechanism.—The unbored bobbins 18 are placed in a suitable hopper 35, from which they are fed one by one to the bobbin-carrier. At the bottom of the hopper is situated a pusher 36, (shown best in Figs. 9, 13, and 14,) which plays back and forth upon suitable ways 37, carried by the frame. Said pusher has a central opening 38, in which is received a roll 39 on the end of an

actuating elbow-lever 40, which lever is fast to a rock-shaft 41, carried by the frame, and is acted upon by a suitable spring 42, which tends normally to throw it forward or toward the bobbin-carrier. When said pusher is in its forward position, the bottom bobbin in the hopper rests on it, as shown in Fig. 9, while when said pusher is retracted, as shown in Fig. 14, the bottom bobbin drops down in front of the pusher. If now the pusher is moved forward, this lowest bobbin is pushed by the same out through the gateway 43 in the hopper and into the bobbin-carrier, the butt-end of the bobbin dropping into the notch 15 and the tip end into the recess 7 in the disk 5.

44 designates a suitable pivoted gate, which normally closes the gateway 43, but which is moved out of the way, as shown in Fig. 9, upon the forward movement of the pusher.

The pusher is actuated by the elbow-lever 40, and the rock-shaft 41, on which said lever is mounted, is actuated from a cam 45, (see Fig. 1,) carried by a suitable shaft 46. (See Fig. 6.) For this purpose the rock-shaft 41 has fast therewith an arm 47, connected by a link 48 with one end of an elbow 49, the other end of which is acted on by the lever 45.

The shaft 46, as well as the shaft 31, is driven from the main driving-shaft 50 by suitable gearing presently to be described, and shown best in Figs. 15 and 6. Said main driving-shaft has thereon a main driving-pulley 51, from which power is received, and a worm, which meshes with a worm-gear 52 on a cross-shaft 53. Said cross-shaft carries a bevel-gear 54, meshing with a bevel-gear 55 on the shaft 31. Fast on the shaft 31 is a pinion 56, meshing with and driving a gear 570 on the shaft 46.

Boring mechanism.—Mounted on suitable ways on the frame is a carriage 57, which carries in suitable bearings two shafts, on which are driving-pulleys 58 and 59, respectively. (See Figs. 2 and 6.) Each shaft carries a chuck 60, in which a drill is supported, said drills being designated 61 and 62, respectively. The drill 61 is of uniform diameter throughout, while the drill 62 is of smaller diameter at its tip than at its base. The carriage 57 has a reciprocating motion toward and from the bobbin-carrier, and to provide for this I have pivoted to said carriage a link 63, which is connected to one arm of an elbow-lever 64, (see Fig. 6,) the other arm of which is slotted, as at 65. Operating in the slot 65 is a crank-pin 66, carried by a gear 67, which is mounted on a stud or pin 580, journaled in the frame. (See Fig. 15.) The gear 67 meshes with and is driven by a pinion 68, fast on the shaft 53.

From the above it will be seen that the rotation of the gear 67 oscillates the elbow-lever 64, and the construction is such that the slotted end of said lever has a slow downward movement, but a quick upward movement, because during the downward movement the pin 56 is working at the outer end of the slot, while during the upward movement it is at the inner end thereof. Consequently the carriage 57 has a slow movement toward the bobbin-carrier and a quick movement in the opposite direction.

The crank-shaft 66 is preferably made adjustable thereby to adjust its throw and the reciprocating movement of the carriage. As herein shown, said crank-pin has screw-threaded engagement with an adjusting-screw 69, which is carried by a suitable block 70, mounted on the face of the gear 67. By turning said adjusting-screw the crank-pin can be moved toward and from the center of the gear, and thus its throw diminished or increased. The relative size of the gears 67 and 68 is such that it takes two revolutions of the gear 68 to rotate the gear 67 once. The gears 54 and 55, however, are of the same size, and therefore the shaft 31 will make two rotations during each complete reciprocating movement of the carriage 57.

In order to properly time the movement of the bobbin-carrier with reference to the carriage 57, it is necessary therefore to provide means whereby the crank-pin 32 shall engage the grooves 29 only during every other rotation of the shaft 31. Accordingly provision is made whereby the shaft 31 may be reciprocated longitudinally, thereby to carry the crank-pin 32 into and out of engagement with the star-wheel 28.

The gears 55 and 56 are mounted on a sleeve 72, which is supported in suitable bearings in the frame, but prevented from longitudinal movement, and through which sleeve the shaft 31 passes, said shaft being splined to the sleeve. (See Fig. 15.) Fast to the shaft 31 is a collar 73, carrying a roll 74, which engages a groove 75 in a cam 76, fast on the shaft 46. The gears 56 and 570 have a ratio of one to two, and therefore the shaft 31 makes two revolutions to each revolution of the shaft 46. With this construction it will be evident that during one-half of each revolution of the shaft 46 the shaft 31 will be carried to the right, Fig. 6, while during the other half of the revolution of said shaft 46 the shaft 31 will be moved to the left. In other words, during one revolution of the shaft 31 it will be in its extreme position to the right, Fig. 6, while during the next revolution it will be in its extreme position to the left. When it is in the right-hand position, the pin 32 is beyond the star-wheel 28, and therefore does not engage in the grooves 29, while when said shaft is in the left-hand position said pin 22 is in the proper vertical plane to engage the groove 29, and thus move the star-wheel forward.

The object in speeding up the shaft 31 so

that it will make two revolutions during every complete reciprocating movement of the carriage 57 and during each step forward of the bobbin-boring device is so as to provide means for advancing the bobbin-carrier from one position to another with the least possible delay. Owing to the speed at which the shaft 31 operates, it will be obvious that the time consumed in advancing the bobbin-carrier each step is much less than it would be if said shaft 31 were rotating slower.

Operation.—When the bobbin-carrier is at rest, a notch 15 and a recess 7 of said carrier stand opposite the gateway leading from the hopper 35, and during the rotation of the shaft 46 the rise of the cam 45 passes out from under the end of the lever 49, thereby permitting the spring 42 to throw the pusher 36 forward and carry a bobbin into said recess and notch, as shown in Fig. 9. By the time a bobbin has thus been fed to the bobbin-carrier the cam 76 has carried the shaft 31 sufficiently far to the left, Figs. 6 and 15, so that during the next rotation of said shaft the pin 32 engages a groove 29, and thereby advances the bobbin-carrier one step. During this advancing movement the tail 22 of one of the gripping-jaws rides up onto the rise of the cam 24, thereby clamping the butt of the bobbin between itself and the corresponding fixed jaw 16, and at the same time the tip end of the bobbin passes under one of the steadying-arms 92. At the end of the advance movement of the bobbin-carrier the bobbin thus fed to the device has its butt-end gripped between the gripping-jaws, as above described, and its tip end engaged by the steadying-arms 92. Said bobbin is also in position to be acted upon by the first drill 61, and while the said carrier remains stationary the carriage 57 is moved forward, thereby advancing said drill 61 into and part way through the bobbin and boring it, as shown in Fig. 7. During the time this is taking place the cam 76 throws the shaft 31 to the right, Fig. 6, so that during the second revolution of said shaft the pin 32 passes by the face of the star-wheel 28, but does not engage it. During the boring operation another bobbin has been fed to the next notch 15 and recess 7, and as the carriage 57 advances to thus bore the bobbin a positioning device 910 on the carriage is brought against the bobbin just fed to the carrier, thereby to properly position said bobbin longitudinally in case such action is needed. When the carriage 57 is retracted to withdraw the drill 61 from the bobbin, the cam 76 again throws the shaft 31 to the left, Fig. 6, so that the crank-pin 32 engages a groove 29 and gives the bobbin-carrier another step forward, thereby to carry the first bobbin into position to be acted upon by the drill 62 and the second bobbin in position to be acted upon by the drill 61. The bobbin-carrier then remains stationary, and the carriage 57 advances, thereby partially drilling a hole of uniform size part way through the second bobbin, as shown in Fig. 7, and completing the boring of the first bobbin, as shown in Fig. 8. This operation is repeated upon bobbin after bobbin as fast as they are fed to the bobbin-carrier. As the tails 22 of the various gripping-jaws pass off from the rise of the cam 24, thereby to release the bobbins, the latter are discharged from the bobbin-carrier by means of a suitable ejector 80, which is in the form of a stationary arm carried by the shaft 801 and adapted to force the bobbins out from the bobbin-carrier as the latter rotates. Said arm is preferably adjustable and is held in its adjusted position by a suitable adjusting-screw 81.

82 designates an oil-reservoir from which delivery-pipes 83 extend, said pipes operating to deliver oil to the drills to keep them cool.

For convenience in assembling the parts of the bobbin-carrier it is constructed as shown in Fig. 17. The shaft 3 is hollow and has screw-threaded to one end thereof a bushing 84, to which the disk or star wheel 28 is rigidly connected. A rod 85 extends through the shaft 3, and a washer 86 at one end of said rod engages the bearing 6 and holds the shaft from longitudinal movement, while the other end of said rod has a nut thereon which engages the outer face of the disk 28.

In order to prevent any parts of the machine from breaking in case a bobbin should become jammed in the machine, the driving-pulley 51 is shown as secured to the shaft 50 by suitable friction devices which will slip in case of any jumping of a bobbin.

As shown in Fig. 15, the shaft 50 has a collar 90, made fast thereto by a screw 91 and provided with a face of frictional material 93, against which the hub of the driving-pulley 51 abuts.

On the outer end of the shaft 51 is a nut 92, and between the nut and hub of the driving-pulley is a washer, also of frictional material 93. By turning up the nut 92 the hub of the driving-pulley is clamped between two frictional surfaces, the friction of which is sufficient to drive the machine under ordinary circumstances. If any undue resistance is encountered, however, the frictional material allows the driving-pulley to slip on the shaft, and thus prevents the parts from becoming broken.

The driving-pulleys 58 and 59 may be rotated in any usual or suitable way. Herein is illustrated an arrangement by which they can both be driven by the same belt. Said belt passes under one of said pulleys, up between the pulleys, and over an idler 99, and thence down under the other pulley, as shown in Fig. 9.

Although the machine which is herein illus-

trated is one which has been found to be eminently practical for the purposes described, yet it will be understood that the invention is not confined to a machine made in every particular like that illustrated in the drawings, for many changes may be made in the arrangement, shape, and construction of the parts without in any way departing from the invention expressed in the appended claims.

Having fully described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a bobbin-boring machine, a bobbin-carrier comprising two connected disks each having a plurality of peripheral recesses to receive a bobbin, a plurality of adjustably-mounted stationary jaws carried by one disk, a pivoted jaw coöperating with each stationary jaw, an adjustable fulcrum for each pivoted jaw, and means to rotate said disks.

2. In a bobbin-boring machine, a bobbin-carrier comprising two connected disks each having a plurality of peripheral recesses to receive a bobbin, a plurality of stationary jaws mounted on one disk, a pivoted jaw cooperating with each stationary jaw, an adjustable fulcrum for each pivoted jaw, and means to rotate said disks.

3. In a machine for boring bobbins, a bobbin-carrier comprising two connected disks, one of which has pairs of radially-arranged ribs on its inner face, a block adjustably mounted between the ribs of each pair, said block forming a seat to sustain one end of a bobbin, and means carried by the other disk to grip the other end of the bobbin.

4. In a machine for boring bobbins, a bobbin-carrier comprising two connected disks, one of which has pairs of radially-arranged ribs on its inner face, a block adjustably mounted between the ribs of each pair, each block being notched at its end to present a seat to receive a bobbin end, said disk having a hole therein adjacent each pair of ribs, bobbin-gripping mechanism carried by the other disk, means to rotate said disks, and a drill for drilling the bobbins axially, said drill being adapted to pass through the hole in the first-named disk during the drilling operation.

5. In a boring-machine, a bobbin-carrier comprising two connected disks, one having peripheral notches each formed with side walls and an adjustable bottom to engage the sides of the bobbin and a perforated end wall to engage the end of the bobbin, pairs of gripping-jaws carried by the other disk, and a drill for drilling the bobbin axially, said drill being adapted to pass through the hole in the end wall.

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

ELLA H. BAILEY,
Administratrix of Charles L. Bailey, deceased.

Witnesses:
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ROBERT A. LOWE.