(No Model.) 2 Sheets—Sheet 1.

E. ALLEN & J. H. MORRISON.

MACHINE FOR TURNING SPOOLS.

No. 256,945. Patented Apr. 25, 1882.

Fig 1.

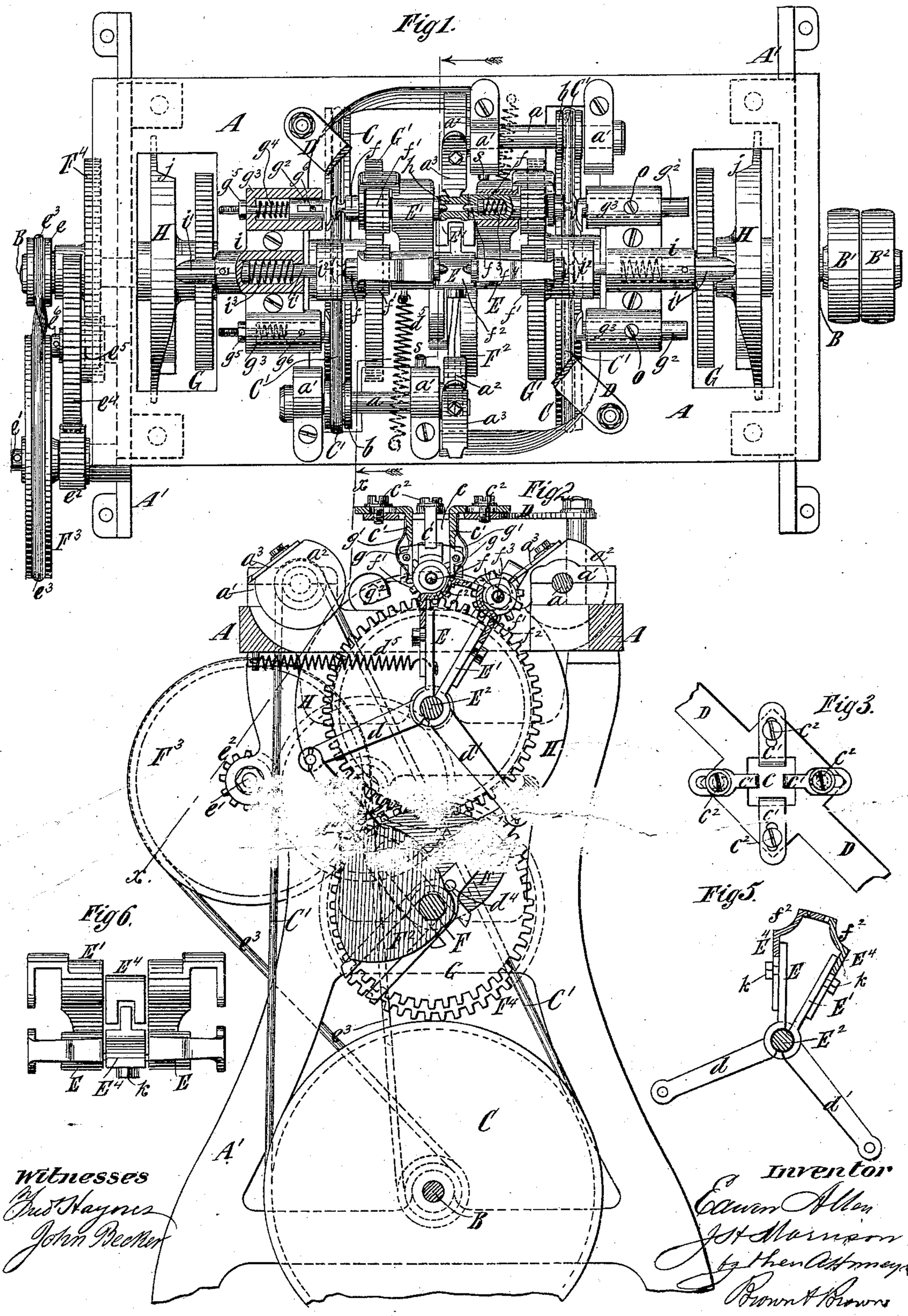

Fig 2.

Fig 3.

Fig 5.

Fig 6.

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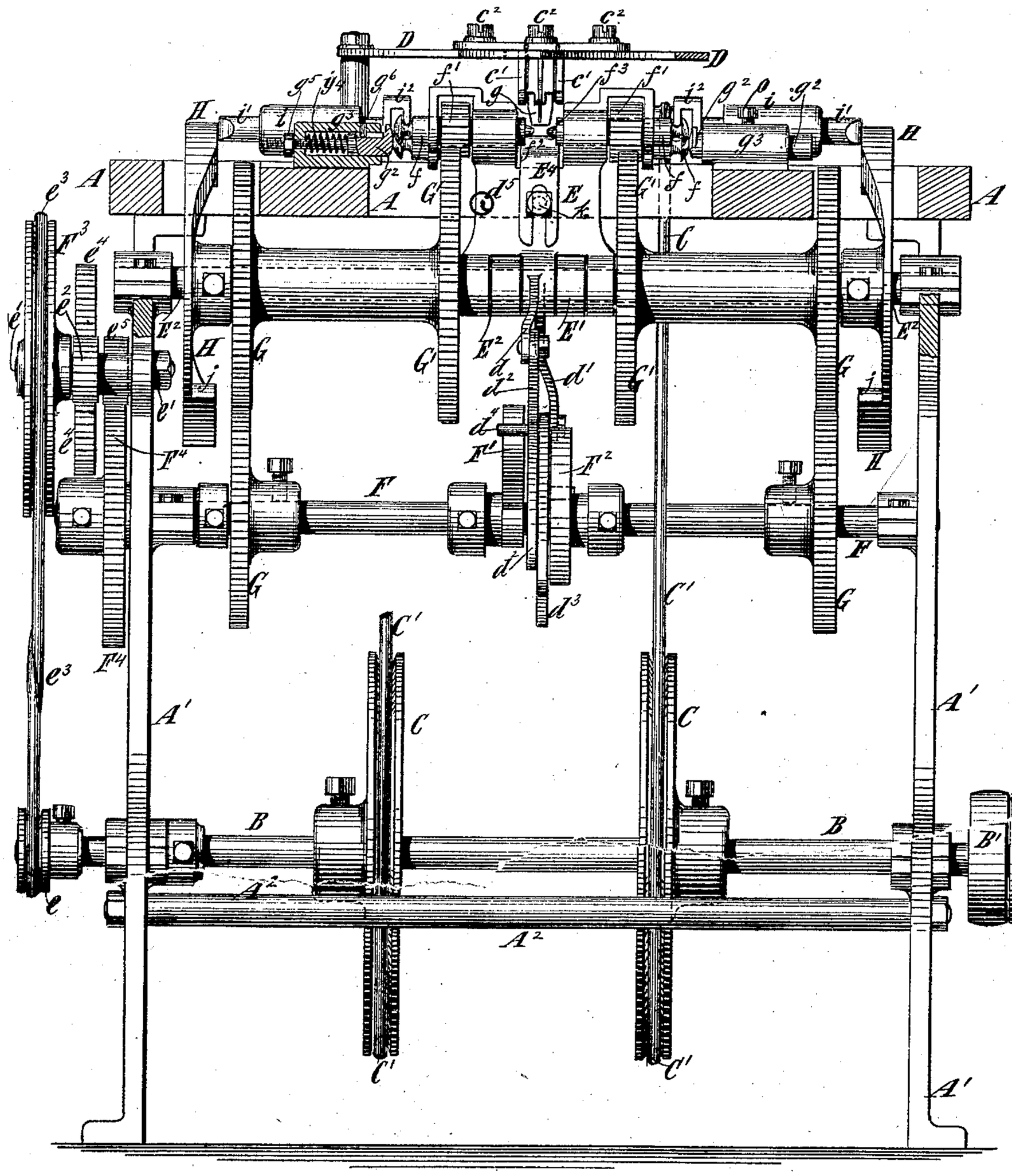
Fig 4.



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UNITED STATES PATENT OFFICE.

EDWIN ALLEN AND JOHN H. MORRISON, OF NORWICH, CONNECTICUT, ASSIGNORS TO THE ALLEN SPOOL AND PRINTING COMPANY, OF SAME PLACE.

MACHINE FOR TURNING SPOOLS.

SPECIFICATION forming part of Letters Patent No. 256,945, dated April 25, 1882.

Application filed June 16, 1881. (No model.)

To all whom it may concern:

Be it known that we, EDWIN ALLEN and JOHN H. MORRISON, both of Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Machines for Turning Spools, of which the following is a specification.

Our invention relates to machines into which spool-blanks may be fed from a hopper, and in which the entire operation of taking the blanks and turning them to form spools and delivering the finished spools is accomplished in a positive, automatic, and accurate manner.

Our invention consists essentially in a machine which comprises a central throat or hopper, in which the blanks lie one upon another, two rotating cutter-heads arranged upon opposite sides of the machine, and two pairs of rotary spindles which are supported in bearings in two pivoted frames or carriers, which are alternately moved toward said throat or hopper to enable one pair of spindles to grasp between them a spool-blank and carry it outward into proximity to the rotary cutter-head, whereby its periphery is turned at the same time that the other frame or carrier and its pair of spindles leave the opposite cutter-head and move toward the hopper or throat to take a new blank. The two pivoted frames or carriers comprise interlocking portions, which move below the throat or hopper and serve as a support upon which the lower spool-blank rests, and by which all the superposed blanks are supported, and said support is depressed or stepped at each end, so that when such depressed portion is brought by the swinging of one of the pivoted frames or carriers opposite the throat or hopper a blank will drop down and rest upon the depressed portion or step, where it will be ready to be gripped at the ends by a pair of spindles and rotated, as previously described.

The features above described might—some or all of them—be embodied in a machine having only one movable frame or carrier and one pair of spool-carrying spindles.

In addition to the principal features of our invention above enumerated, the invention also consists in the necessary mechanism for imparting motion to the several parts of the machine, and in minor details of construction, to be hereinafter more particularly set forth.

In the accompanying drawings, Figure 1 represents a plan view of a machine embodying our invention, except that some portions are sectioned and others broken away to show more clearly the features of construction. Fig. 2 represents a transverse vertical section of the machine. Fig. 3 represents a detail plan of the hopper or throat. Fig. 4 represents a side view of the machine, including a section on the line *x x*, Fig. 1; and Figs. 5 and 6 represent respectively a side view and plan of a pair of pivoted carriers separate from other parts, with their spindles for holding the spools.

Similar letters of reference designate corresponding parts in all the figures.

A designates the table or top of the frame of the machine, which is supported on legs or standards A′, connected by tie-rods A^2, which secure the frame rigidly together.

B designates the main driving-shaft, which is adapted to rotate in bearings near the bottom of the machine, and may be rotated by means of a belt passing onto fast and loose pulleys B′ B^2. From the shaft B all parts of the machine which are movable derive their motion.

Above the top or bed A, and on opposite sides thereof, as best seen in Fig. 1, are two spindles, *a*, which are adapted to be rotated in suitable bearings, *a′*, and upon their ends, and in one plane transversely of the machine, are fixed cutter-heads a^2, carrying knives or cutters a^3, of any desirable kind, the ends of which are shaped to produce a spool of the desired profile.

Upon the driving-shaft B are fixed two large pulleys, C, from which belts C′ pass over smaller pulleys *b* upon the spindles *a*, all as best seen in Figs. 1 and 2.

At the middle of the width of the machine, and at an equal distance from the two rotary spindles *a*, is a throat, *c*, above which is erected a hopper or tube, (not here shown,) and of sufficient size to hold the spool-blanks resting one upon another.

In order to provide for adjusting the size of

the throat to suit the size of spools being turned, we form the sides of the throat *c* of four pieces, *c'*, which are fixed to a cross-bar, D, which extends across the top of the machine, by means of screws c^2 passing through slots or elongated holes in the pieces *c'*. By this means the pieces *c'* may be properly arranged and adjusted toward or from the center to adapt the throat *c* to different sizes of spool-blanks.

E E' designate what we term "spindle frames or carriers," which are fulcrumed upon a central shaft, E^2, and are jointed together like a knuckle-joint, as best seen in Fig. 4. Each frame or carrier E E' is capable of being vibrated or reciprocated back and forth upon the shaft E^2 as a center independently of the other, and from them, below the said shaft, their project arms *d d'*, as clearly shown in Fig. 2, the arm *d* projecting from the frame or carrier E and the arm *d'* from the frame or carrier E'.

To the ends of the arms *d d'* are respectively connected rods d^2 d^3, which are bifurcated or forked at their lower ends, so as to pass over a shaft, F, by which they are guided in their longitudinal movements, as best seen in Fig. 2. Upon the said shaft F are fixed cams F' F^2, the former of which acts upon a pin, d^4, projecting from the rod *d*, and the latter of which acts upon a corresponding pin, d^4, projecting from the side of the rod d^3, and by said cams the rods d^2 d^3 are each moved in one direction to move the frames or carriers E E' from their outermost position as seen by the carrier E' in Fig 2 to their innermost position as seen by the carrier E in said figure. When the two carriers E E' are released by the cams F' F^2, which occurs alternately, they are drawn outward by springs d^5, connected at one end to the carriers and at the other end to the frame of the machine, as best seen in Fig. 2, and also in Fig. 1.

Turning now to the mechanism for rotating the shafts E^2 and F, *e* designates a small pulley on the outer extremity of the driving-shaft B, as seen in Fig. 4. Projecting from the outer side of one of the legs or standards A' is a fixed pin or stud, *e'*, upon which are loosely fitted a pulley, F^3, and a pinion, e^2. A belt, e^3, transmits motion from the pulley *e* on the driving-shaft B to the pulley F^3, and the pinion e^2 gears into and transmits motion to a wheel, e^4, and a pinion, e^5, mounted and adapted to rotate upon a fixed stud, e^6. The pinion e^5 gears into a wheel, F^4, upon the end of the shaft F and from said shaft motion is transmitted through pairs of wheels G G to the shaft E^2. The several wheels and pinions above described are most clearly shown in Fig. 4.

In the upper part of each carrier E E' are bearings for a pair of spindles, *f*, each of which has fixed upon it a pinion, *f'*, and upon the shaft E^2 are two wheels, G', one of which transmits motion through said pinions *f'* to one spindle of each pair, while the other wheel transmits motion in the same way to the other two spindles, one of each pair.

We will here observe that the direction of rotation of the pairs of spindles *f* is opposite to that of the cutter-heads a^2, so that spools held between said pairs of spindles, as hereinafter described, are rotated while they are subjected to the action of the cutters a^3.

The two carriers E E' carry adjustable pieces E^4, which are secured to them by bolts *k*, (seen in Figs. 4, 5, and 6,) and the said pieces project toward each other and interlock, as best shown in Figs. 5 and 6, so that even when said carriers E E' are moving apart, as they do at certain times, the inwardly-extending pieces E^4, which may be properly considered as part of said carriers, will afford a constant support to the blanks in the throat *c*. The two said pieces E^4 are highest between the pairs of spindles *f*, and at each pair of spindles is a step or depression, f^2, which is below said raised portion and is sufficiently depressed to permit of a spool-blank dropping down out of the throat *c* sufficiently low to bring its center, which has been previously bored, in line with the centers of the spindles *f*. The depressions f^2 are seen clearly in Figs. 5 and 6. As seen clearly in Fig. 2, the spindles *f*, mounted in the carrier E', are holding a spool in position to be acted upon by the cutters a^3 of one cutter-head, a^2, and by looking at the cam F^2, which moves said carrier inward, it will be seen that said cam is just about to act. After the carrier E' has moved some little distance inward the other carrier commences its movement away from the center outward, and its pair of spindles *f* carry between them a spool-blank, which they hold by means of projecting pins or centers f^3 on the spindles which enter the ends of the hole in the spool-blank, and thus properly center it.

Referring first to the carrier E, which, as just explained, is moving outward with a spool-blank between its pair of spindles *f*, it will be observed that the spool-blank will come in contact with one of two pivoted guards, *g*, which close the opposite sides of the lower end of the throat *c*, and which are pressed inward into a vertical position by springs *g'*, (see Fig. 1,) which are strong enough to hold them against the outward pressure of the lowermost blank until the latter is grasped by the spindles of one of the carriers. When so grasped the guard *g* on the side toward which the carrier E is moving readily yields and permits the blank to pass, but at once springs back and closes the side of the throat *c*. The carrier E and the spool-blank *h* carried by it continue to move outward away from the center of the machine, the blank meanwhile resting upon the projecting centers f^3 of the spindles *f* until the spindles *f* are brought nearly in line with two plungers or pushers, g^2, which are arranged in line with each other and in sockets g^3, fixed upon the top of the bed or table A, as seen very clearly in Fig. 1. One of the

plungers or pushers g^2 is pressed inward toward the other by a spring, g^4, fitting within its socket, and the extent to which it protrudes from the socket may be regulated by a screw-threaded projection on the plunger and a nut, g^5, on the back of each socket.

In the socket g^3, containing the movable plunger, is an inwardly-projecting pin, g^6, which fits in a groove in the plunger g^2 and serves to prevent the turning of the said plunger, and upon the inner end of each plunger is formed a head, which tapers slightly outward toward the center of the machine, and forms, in effect, a stationary cam. The other plunger or pusher of each pair might be pressed inward by a spring like that just described, but, as here shown, is secured in its socket by means of a set-screw, O, which enables it to be set and secured in any fixed position. As the spool-blank h is brought nearly into line with the plungers g^2, the rounded heads of the spindles f of that pair bear against the inclined or slanted cam-like heads of the plungers g^2, and as the outward movement of one of these plungers is resisted by the spring g^4 and the other is rigidly fixed in its socket, the spindles f are pressed toward each other and tightly against the two ends of the spool-blank, so as to hold the same by friction against rotating, except with the spindles, which, as before described, are rotated at a slow speed, because of the engagement of their pinions with the wheels G′ upon the shaft E².

The advantage of holding the spool between the spindles f by friction is that the ends of the spool (or the hole through it) are not marred, as they would be by spurs, and hence the appearance of the spool is not impaired. While the spool-blank is thus tightly gripped between the spindles f the continued outward movement of the carrier E brings said blank within the range of the cutters a^3 upon the cutter-heads a^2, which turn the exterior of the blank and form it into a spool.

We will here remark that the projecting or protruding pin or center f^3 of each spindle f is pressed outward by a spring, f^4, as will be seen in Fig. 1, which shows one of the spindles partly in section, and the purpose of making said pin or center yielding is to prevent the stoppage of the machine or the breaking of any parts in case a blank having no central hole should get into the machine and be grasped between the pair of spindles f, for if this should occur the plungers g^2, by acting upon the spindles f, could not force them inward to the usual extent, and the pins or centers f^3 might be firmly embedded in the blank, or the automatic action of the machine might be interfered with. As the pins or centers f^3 are made to yield, however, they would be simply forced back into their spindles by the pressure of the cam-like heads of the plungers g^2, and although the spool then produced would not be properly centered and would be worthless, it would not interfere with the continuous and automatic action of the machine, nor would it cause a breakage of any of its parts.

The size to which the spools are turned may be regulated by means of adjustable stops s, which may consist of screws inserted into the bearings of the cutter-head spindles a, and against which the carriers E E′ strike, and are thereby arrested, as seen in Fig. 1. As soon as the spool is completed the cam F′ commences to move the carrier E inward, and as soon as by such inward movements the pair of spindles f are carried away from the cam-like heads of the plungers g^2 the spool is relieved of the pressure of the spindles f upon its ends, and simply rests upon the centers f^3 of such spindles. In order to entirely free the spindles f from the spool h, it is necessary to move them apart sufficiently to withdraw the centers f^3 from the hole in the spool, and this we effect in the following simple manner:

Between the two pairs of sockets g^3 is arranged a third pair of sockets, i, which contain plungers i', having hook-shaped heads i^2 at their inner ends, as most clearly seen in Fig. 4, and which project through the rear ends of their sockets. The two plungers i' are forced outward away from each other by means of springs i^3, contained within their sockets i, and they are forced in the opposite direction—that is, toward each other—against the force of said springs by means of two cams, H, fixed upon the shaft E² and rotating therewith. The spindles f have flanged heads at their outer ends, as seen in all the figures, and particularly in Fig. 4, and before the said spindles are brought into line with the plungers i' by the inward movement of their carrier E the plungers i' have been advanced until their hooked ends or heads i^2 are in line with and in position to receive in them the flanged heads of the spindles f. The continued movement inward of the carrier E takes the flanged heads of the spindles f into the hooked heads i^2 of the plungers i', and at this moment the shoulder or let-off j of each cam H reaches the end of the plunger i', and the plungers are suddenly released and permitted to move outward away from each other under the impulse of their springs i^3. The hooked heads i^2 of the plungers i', having the flanged heads of the spindles f in their grasp, thereby withdraw said spindles from each other sufficiently to release the spool h from the centers f^3 of the spindles and permit the finished spool to drop into a box or other receptacle placed so as to receive it.

We would here remark that although the pivoted guards g are free to swing outward against the force of their springs g', they cannot swing inward past a vertical position, as shown in Fig. 2, and hence they serve as pushers to eject the spool from the hold of the spindles f as the latter move inward past them. The cam F′, which produces the inward movement of the carrier E, acts only during a small part of the rotation of the shaft F, and hence

after the spool is released from the spindles *f* by the outward movement of the latter said carrier and its spindles stand still in position to take a new blank, while the cams H continue their rotation and advance the plungers *i'* inward to cause the centers f^3 of the spindles *f* to enter the hole in the blank, which rests between the said spindles, whereupon the carrier E again commences its outward movement, and the operation is repeated.

The carrier E', which, as before stated, commences its inward movement before the carrier E commences its outward movement, has during the above-described movement of the carrier taken a blank and subjected it to the action of the cutters a^3 on the other cutter-head, a^2, and is again about to move inward to discharge the finished spool and take a new blank; but as the operation of the two carriers and their appurtenances is identical, further description thereof is not necessary. It will suffice to say that the two carriers and pairs of spindles *f* alternate in their operations, one carrier and its spindles moving outward, while the other carrier and its spindles move inward.

By our invention we provide a very useful and desirable machine, which is perfectly automatic in its action, and it is evident that the details of mechanism for operating the main portions of the machine might have substituted for them mechanism which, though different in details, would be capable of producing the necessary successive operations or steps, and would therefore be within the scope of our invention.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a spool-turning machine, the combination of a feeding-throat, a cutter or cutters, a pair of spindles movable toward and from each other, and having separately-yielding centers therein, which are adapted to enter the holes in the spool-blanks, a vibrating or reciprocating carrier in which said spindles are fitted, and which carries said spindles from said feeding-throat to said cutter or cutters for presenting spool-blanks to said cutter or cutters, and cams between which said spindles are carried, and which force the spindles toward each other to clamp a spool-blank between them, the centers of the spindles yielding when a spool-blank which has not been bored is fed between the spindles, substantially as specified.

2. In a spool-turning machine, the combination of a feeding-throat, a cutter or cutters, a pair of spindles movable toward and from each other, a vibrating or reciprocating carrier in which said spindles are fitted, and which carries said spindles from said feeding-throat to said cutter or cutters, and spring-actuated pushers, which serve as cams, between which said spindles are carried, and which force said spindles toward each other to clamp a spool-blank between them, substantially as specified.

3. In a spool-turning machine, the combination of a central throat through which spool-blanks are delivered into the machine, a pair of pivoted carriers having their upper ends extending inward toward each other below said throat to form a support for the spool-blanks therein, and pairs of rotary spindles carried by said carriers, and which are alternately brought below said throat, substantially as specified.

4. In a spool-turning machine, the combination of a central throat, and two pivoted carriers, each having in it a pair of rotary spindles, which are alternately moved below said throat, and having their upper portions extending under said throat and provided with steps or depressions between the spindles of each pair, substantially as specified.

5. In a spool-turning machine, the combination of a central throat for spool-blanks, and two carriers having in them pairs of spindles which are alternately brought under said throat, and having their upper portions extending toward and past each other beneath said throat, so as to form a permanent support for the spool-blanks in said throat, substantially as specified.

6. In a spool-turning machine, the combination of a central feeding-throat, carriers, each provided with a pair of spindles, and which are brought alternately under said throat to receive a spool-blank between said spindles, and hinged guards, which form the opposite sides of said throat at its lower end, and which are adapted to be swung outward by the spool-blanks as the carriers and spindles holding said blanks are moved outward, but which cannot swing inward, and therefore serve to remove the spools from between the spindles as the carriers and spindles are moved inward past said guards, substantially as specified.

7. The combination of the throat *c*, the carriers E E', provided with arms *d d'*, the shaft E^2, the rods d^2 d^3, and the shaft F, provided with cams F' F^2 for operating said rods to move said carriers in one direction and the springs d^5 for moving said carriers in the other direction, substantially as specified.

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