(No Model.) 3 Sheets—Sheet 1.

J. M. PARKER.

SPOOL FINISHING MACHINE.

No. 463,688. Patented Nov. 24, 1891.

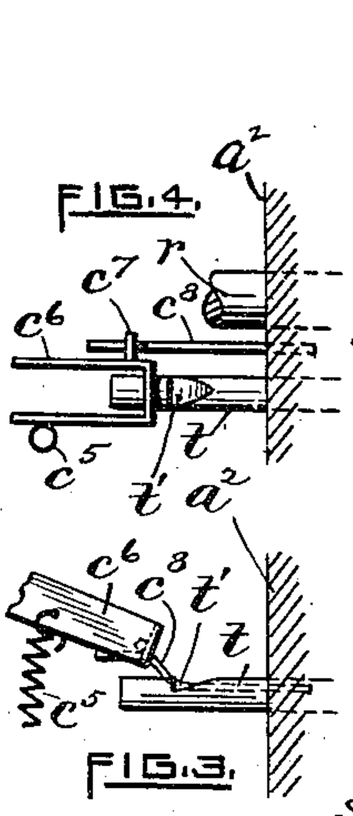

FIG. 4.

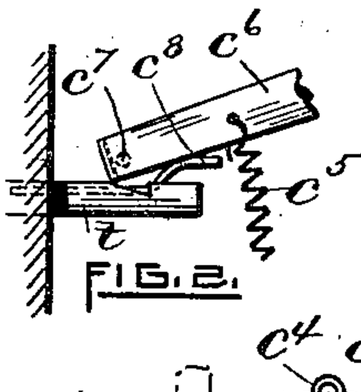

FIG. 3.

FIG. 2.

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

J. M. PARKER.

SPOOL FINISHING MACHINE.

No. 463,688. Patented Nov. 24, 1891.

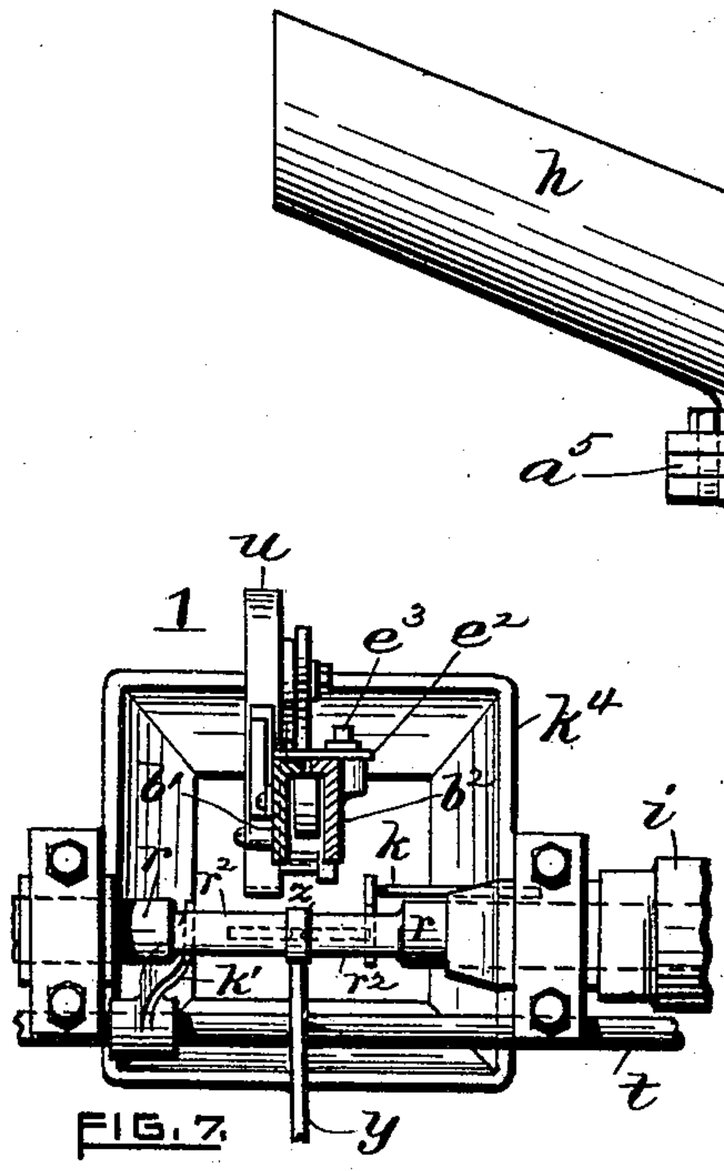

FIG. 7.

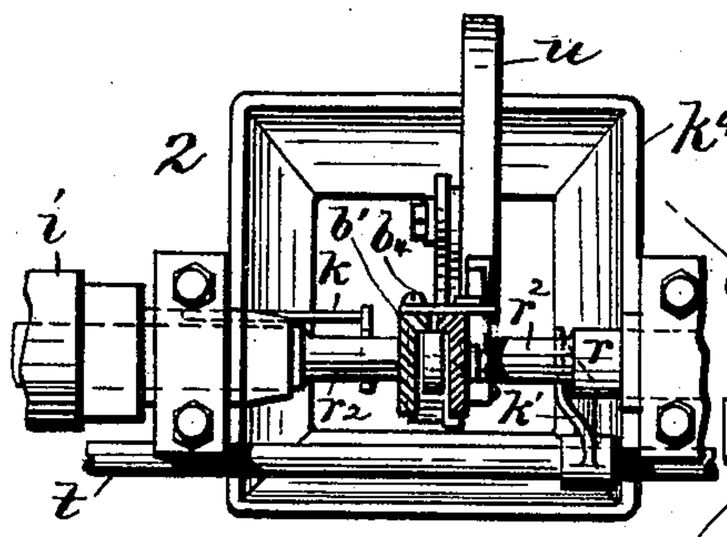

FIG. 6.

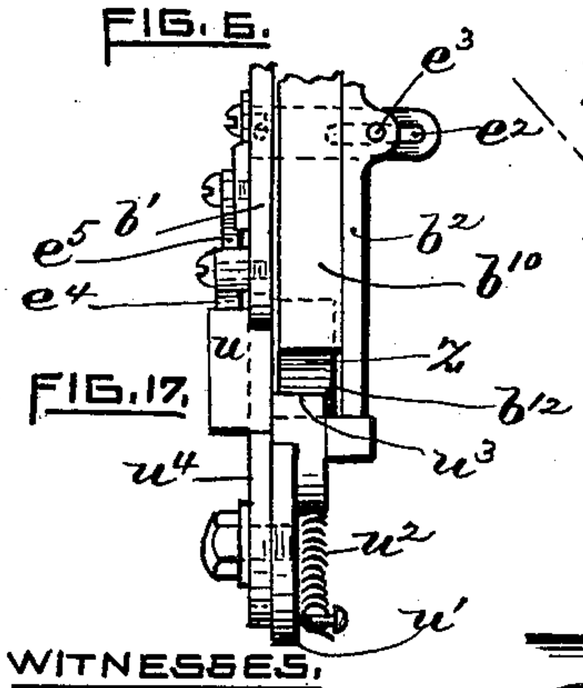

FIG. 17.

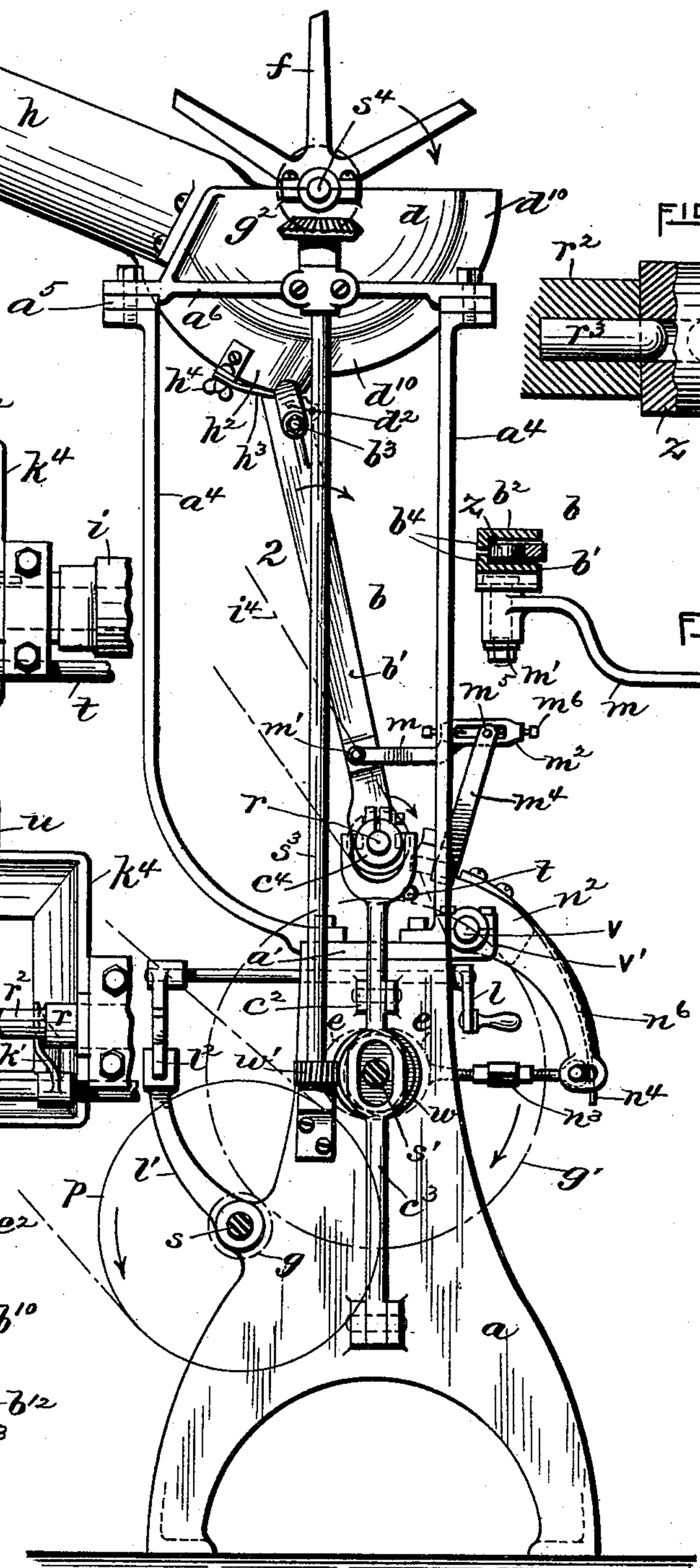

FIG. 5.

FIG. 9.

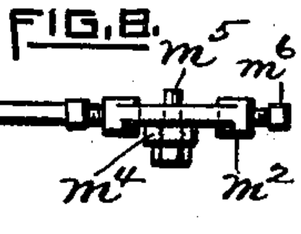

FIG. 8.

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(No Model.) 3 Sheets—Sheet 3.

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SPOOL FINISHING MACHINE.

No. 463,688. Patented Nov. 24, 1891.

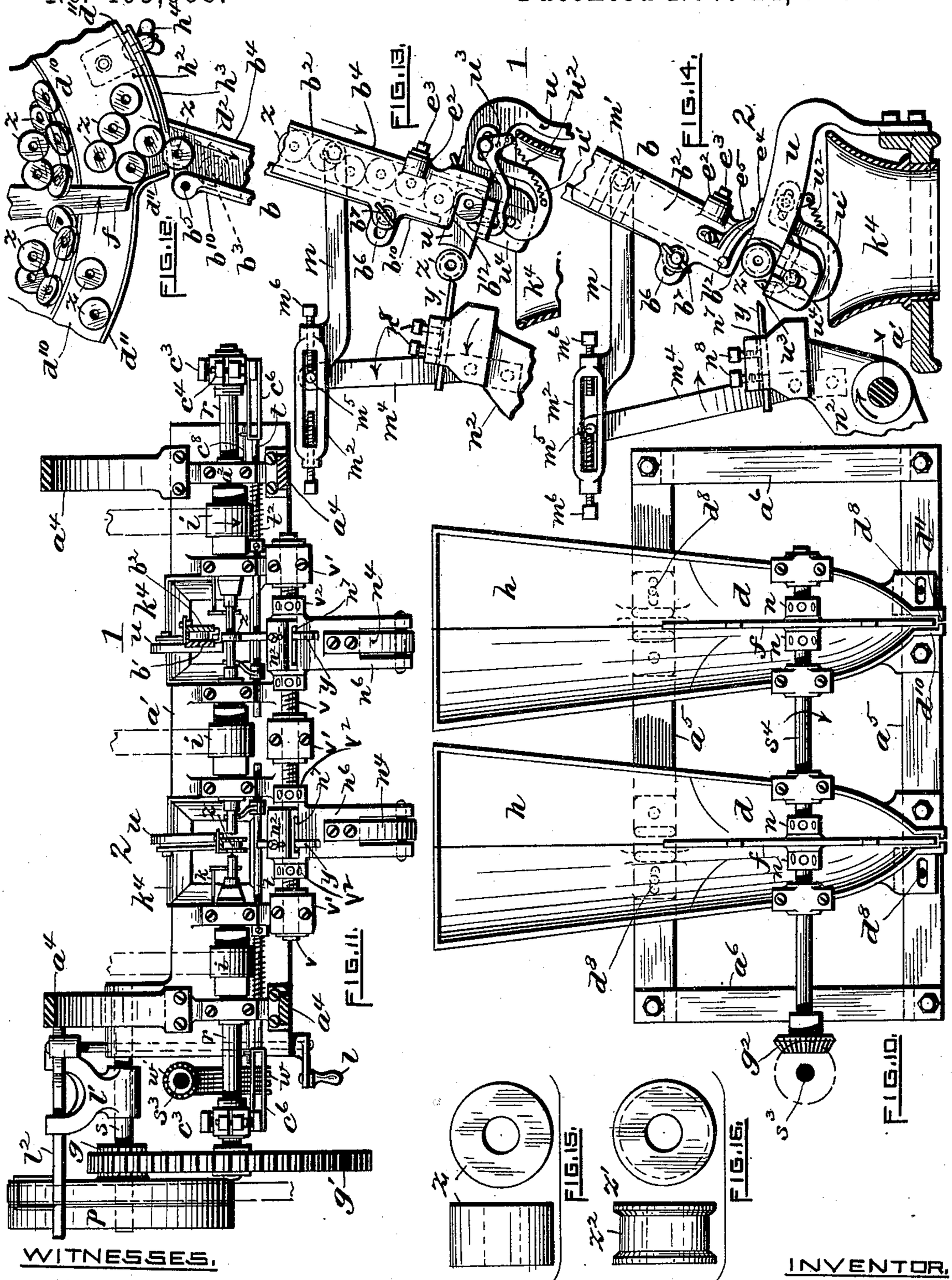

FIG. 11.

FIG. 12.

FIG. 13.

FIG. 14.

FIG. 10.

FIG. 15.

FIG. 16.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN M. PARKER, OF PAWTUCKET, RHODE ISLAND.

SPOOL-FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 463,688, dated November 24, 1891.

Application filed February 10, 1891. Serial No. 380,941. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. PARKER, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Spool-Finishing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

In the manufacture of flanged spools and bobbins made of wood, but more especially small spools, such as are commonly used to wind silk thread or twist upon, it has been heretofore a comparatively slow and expensive process to turn the blanks, because the workman is forced to handle them singly—that is to say, he first selects a blank, next centers it in the lathe or turning-machine, then cuts away the stock intermediate of the two ends of the blank, and finally drops it from the machine complete.

The object I have in view is to greatly facilitate the manufacture of spools of the class just referred to, and to that end I have invented a machine, the same forming the subject of my present application, entirely automatic in its action. The machine is duplex, and is provided with adjustable hoppers and agitators, jointed or hinged vibrating runways laterally adjustable to receive blanks varying in size leading from the hoppers to the center of the machine, cutters secured to pivotally-mounted adjustable heads or holders arranged to move in conjunction with the runways, continuously-revolving longitudinally-movable spindles arranged to receive and hold the blanks endwise between them, and clearers for forcing the spools from the spindles, the turned spools then falling into a suitable receptacle beneath, all as will be more fully hereinafter set forth and claimed.

By means of my invention a workman can tend four hoppers or two machines, his duties being practically to keep the hoppers supplied with the spool-blanks. The latter pass singly therefrom to the bottom of the runway or chute, where suitable fingers or feeding mechanism places it in position to be held frictionally between the adjacent ends of the revolving centering and driving spindles, followed by reducing the blank to form the barrel and forcing it from the spindles. The action of the machine upon the blanks is entirely automatic from the time the blank enters the hopper to its delivery as a finished spool, the rate of production being some fifty spools a minute per feeder.

In the appended three sheets of drawings, illustrating my invention, Figure 1, Sheet 1, is a front side elevation in partial section. Fig. 2 is a side elevation of the knocking-off mechanism at the rear end of the machine. Fig. 3 is a similar view of the knocking-off mechanism at the front end of the machine. Fig. 4 is a plan view of the same corresponding to Fig. 3. Fig. 5, Sheet 2, is an end elevation of the machine in partial section. Fig. 6 is a horizontal sectional view taken through the lower portion of the runway corresponding to Fig. 14, showing a blank in position therein preparatory to moving the runway rearwardly and turning the blank. Fig. 7 is a similar sectional view taken through the other or front runway corresponding to Fig. 13, the cutter being in the act of operating upon the blank. Figs. 6 and 7 show the relation of the several parts to the driving-spindle at the same instant. Fig. 8 is also a horizontal sectional view of the runway, showing mechanism by which it is vibrated. Fig. 9 is an enlarged side elevation in partial section, showing a blank held frictionally between the ends or faces of the driving-spindles. Fig. 10, Sheet 3, is a plan view of the blank-holding hoppers or reservoirs. Fig. 11 is a plan view of the machine, the hoppers and feeding mechanism being omitted. Fig. 12 is a side elevation showing the interior of the lower portion of the hopper and the throat of the runway. Fig. 13 is a side view showing the lower portion of the runway and the feeding mechanism, the relation or position of the parts corresponding to those represented by Fig. 7. Fig. 14 is a view similar to Fig. 13, showing the position of the other runway and corresponding to Fig. 6. Fig. 15 represents enlarged side and end elevations of the wooden blank. Fig. 16 shows similar views of the turned or finished spool, and

Fig. 17 is an enlarged front view of the lower portion of the runway.

In carrying out my invention, represented by the drawings, I have arranged the parts so as to produce a double or duplex machine, the two feeding mechanisms, &c., working alternately. The number of such feeders, &c., may be extended. I find, however, that it is more convenient and otherwise more practical to use only two in the same machine than a greater number. My improved machine as a whole is indicated by A.

In the drawings, *a* indicates the vertical frame or legs to which the bed or table *a'* is secured. The latter is provided with a number of short uprights a^2, surmounted by bearings in which the three driving-spindles *r* freely revolve. Each spindle is driven by a continuously-traveling belt i^4, (shown by dotted lines,) passing over a small pulley *i*, secured to its spindle. The two outer spindles at the right and left are susceptible of endwise movement, so as to readily receive and release the spool-blanks. The means for effecting such movement consists each of a pivoted lever c^3, carrying in its upper end a swivel-bearing c^4, in which the outer end of the spindle revolves, the latter having fixed collars, which engage the ends of the bearing c^4, thus compelling the spindle to move in unison with the lever. The lever is vibrated by a guided link c^2, jointed thereto and carrying at its other end a roll *c'*, arranged to travel in a cam-groove formed in the cam *c*, secured to the continuously-revolving shaft *s'*, as clearly shown in Fig. 1. This shaft is driven by a gear *g'*, intergearing with a smaller gear *g*, secured to the belt-driven pulley *p*, mounted to revolve on a stud-shaft *s*. The adjacent end portions of the spindles *r* contiguous to the runways *b* are reduced in diameter, as at r^2, Figs. 6, 7, 9, &c., and are provided each with a center pin r^3, Fig. 9, having a well-rounded end adapted to readily enter the center hole formed in the spool-blank *z*. The end or face of each spindle is made to frictionally engage the corresponding end of the blank, thereby holding and revolving it in unison with the spindles.

To each lever c^3 is jointed, near its upper end, a latch or hook c^6, (see Figs. 1 to 4,) arranged to engage a notch *t'* formed in the outer end of a horizontally-mounted movable clearer-shaft *t*. A clearer or knock-off lever *k'* is adjustably secured to each shaft *t*, the whole being so arranged that upon the engagement of the moving latch with the notch the shaft is forced endwise toward the runway by the lever c^3, thereby causing the clearer *k'* to engage the blank or spool and force it from and off the center spindle *r*, whence it drops into an open receptacle k^4, Figs. 6, 7, &c. Immediately succeeding the release of the spool, and also while the spindle *r* is still being carried endwise by the said moving lever c^3, a pin c^7, secured to the latch, engages a fixed bent rod c^8, Figs. 2 to 4, and trips or withdraws the latch from the notch, a spring t^2 instantly returning the shaft *t* to its normal position, the pin meanwhile riding upon the rod. The shafts are provided with collars t^3, against which the springs bear. Springs c^5 serve to insure the engagement of the latches with the respective shafts when the latches are freed from the tripping-rods c^8. Sometimes the spools frictionally adhere to the adjacent ends of the other or longitudinally-movable spindles *r*, in lieu of the center spindle. Therefore in such case in order to detach the spool at the proper time I provide a suitably-located stationary clearer *k*, which is secured to an upright a^2. The function of this clearer is to force the spool from the rearwardly-moving revolving spindle upon the engagement of the spool therewith.

To the front side of the bed are secured three bearings *v'*, in which two shafts *v* are mounted to vibrate. A cutter-holder n^2 is secured to each shaft, each holder being provided with a downwardly-extending arm n^6, to which at its lower end is jointed a connection n^3, the latter in turn being attached to an eccentric *e*, secured to the cam-shaft *s'*. The arm n^6 is furnished with a comparatively stiff spring n^4, the same bearing against the end of the connection n^3, thereby rendering the arm somewhat yielding, the latter being slotted transversely to permit a movement of the joint-pin, as shown in Fig. 5. The holders n^2 are adjustable in a lateral direction upon the shafts by means of screw-threaded collars or nuts v^2. The cutters *y*, Figs. 11 to 14, &c., are held in position by screws n^8, an elongated opening n^7 being formed in the upper portion of the holder to receive the cutters. From the foregoing it is obvious that the holder and its cutters vibrate to and fro substantially in unison with the eccentric's movement.

I will next describe the construction of the hoppers and runways leading therefrom. To the top of the standards a^4, secured to the bed *a'*, are fastened longitudinal ties a^5 and end ties a^6, the whole forming a rectangular open frame, Fig. 10, upon which the two hoppers *d* are mounted. These as drawn consist of two pieces or halves, being divided longitudinally through the center. An inclined reservoir *h* extends from the back of and communicates with each hopper, into which the spool-blanks *z* are first deposited and from which the hoppers proper are supplied. The sides of the hoppers are inclined and also curved. The two adjacent sides are normally separated along the lower edge a distance slightly exceeding the thickness of a spool-blank and terminate in wide parallel flanges d^{10}, which in turn are inwardly bent along the outer edge to form narrow retaining-flanges d^{11}, the latter being provided to prevent the blanks from falling through. (See Fig. 12.) In the drawings the two adjacent or inner sides of the hoppers are permanently secured to the frames a^5; but

the other or outer sides are laterally adjustable by means of bolts d^8, passing through slotted openings formed in the hopper's ears and tapped into the frame. (See Figs. 1 and 10.) A mounted stirrer-shaft s^4 extends transversely through the center of the hoppers. Motion is imparted to the shaft by a pair of bevel-gears g^2, a vertically-guided shaft s^3, carrying one of the gears, a worm-wheel w', secured to the lower end of the shaft s^3, and a worm w, secured to the cam-shaft s'. (See Figs. 1, 5, &c.) Each hopper is provided with a stirrer or agitator f, adjustably secured to the shaft, the same having a series of arms adapted in revolving to keep the blanks moving rearwardly toward the reservoirs. The arms travel freely in the opening or space formed by the lateral separation of the flanges d^{10}. (See Figs. 10 and 12.) The stirrers are adjusted and held in position by collars n. The bottom of each hopper near its center is provided with downwardly-extending bent ears, the two forming a yoke d^2, to which the upper end of the runway b, about to be described, is jointed. A pocket h^2 is formed at the rear portion of the under side of the hopper contiguous to the reservoir h by further extending the flanges d^{10}. (See Figs. 5 and 12.) This depression also forms a mouth or throat from which the spool-blanks pass singly to the runway. The size of the throat-opening may be varied, as desired, by means of the thin movable slotted plate h^3 and adjusting-screw h^4, Fig. 12. Each chute or runway b is jointed at its upper end to the hopper by means of pins b^3, the sides of the runway having bent ears adapted to receive the pins. (See Figs. 1 and 5.) Each runway practically consists of three pieces—the left and right lateral sides b' b^2 and the front b^{10}. The two former are provided with inwardly-turned flanges b^4, Figs. 8, 13, &c., thereby forming the back side of the runway and preventing the blanks from falling out during their passage to its mouth b^{12}. The runway is rendered adjustable to receive blanks varying in size, as follows: the front side b^{10} is jointed at its upper end at b^5 to the adjacent sides, the lower end having a slotted extension b^6, through which passes a retaining-screw b^7, attached to an ear formed on the side b^2. By means of the arrangement just described, the front b^{10} is vibrated upon the pivot, thereby adjusting the depth of the runway's opening at its mouth b^{12} to blanks varying in diameter, the throat-opening at the same time being correspondingly adjusted by means of the plate h^3, Figs. 12 and 13.

In order to change the width of the runway to receive blanks varying in length, one of its sides b' is provided at the back near the lower end (see Fig. 17, &c.) with a slotted plate e^2, through which a holding-screw e^3 passes and is tapped into an ear formed on the opposite piece b^2 of the runway, the movable half of the hopper at the same time being correspondingly changed, thereby producing a uniform width for the blanks, the same extending from the pocket h^2 to the mouth b^{12}. The lower end of the chute is cut away at one side to fit a curved stationary guide u, secured to the bed a'. (See Figs. 14 and 17.) This guide serves to support the runway in its intermittent vibratory movement. By means of a plate e^4, backed by a spring e^5, the chute is frictionally held in position upon the guide u during the time it is normally stationary.

u^3 indicates a yielding bent finger or stop adjustably pivoted to an arm u', adjustably secured to an extension u^4 of the lower portion of the chute. The front or free end of the stop is beveled and projects upwardly in front of and in close proximity to the bottom blank resting in the chute. (See Figs. 13, 14, and 17.) The chute is vibrated back and forth by means of a bent link m, jointed thereto at m'. The opposite portion of the link is provided with a slotted head m^2, in each end of which is tapped an adjusting-screw m^6. The ends of these screws are adapted to engage a pin m^5, mounted in the upper end of an arm m^4, secured to the cutter-holder n^2. (See Figs. 5, 8, 13, and 14.) From the foregoing it will be seen that although the eccentric e causes the cutter-holder to vibrate regularly the runway itself does not travel in unison therewith in either direction, except when the pin m^5 engages the corresponding screw m^6. Consequently the runway remains stationary twice a short time during a revolution of the cam-shaft s'.

I would state that the position of the right runway is indicated by 1, Figs. 1, 7, 11, and 13, the relative position of the other runway at the same time being indicated by 2, Figs. 1, 5, 6, 11, and 14.

A shipper located at the left of the machine, consisting, say, of a lever l, adapted to operate a belt-guide l^2, mounted in a holder l', secured to the stud s, Figs. 5 and 11, affords means whereby the machine can be operated at will.

The following describes the operation of the machine, it being first assumed that the several spindles r and cam-shaft s' are all normally working. I would add that the description to follow refers to one set 2 of cutters, &c.; but obviously it applies equally to the other set 1, the parts being so adjusted that they work alternately, as hereinbefore stated. The spool-blanks z are deposited in the reservoir, from whence, by means of the revolving stirrer f, they are carried along the space formed between the flanges d^{10} to the throat of the pivoted runway b, the blanks falling singly therein, the stirrer acting to keep the runway filled. The blank drops to the mouth of the chute, the latter then being, say, in its forward and, for the time being, stationary position, Fig. 14, and is arrested and held by the stop u^3, the spring e^5 preventing the chute from accidental movement. At the same time the adjacent revolving spindle r is carried

ahead toward the right by the corresponding cam *c* to engage the blank and center it thereon and upon the adjacent end of the revolving middle spindle. While the blank is being thus centered and frictionally held and revolved the pivoted cutter-holder is moving ahead through the medium of its eccentric, thereby causing the pin m^5, mounted in the end of the arm m^4, Fig. 14, to traverse the space formed in the link-head m^2 and engage the other screw m^6. The continued movement will force the chute rearwardly, opposed by the spring e^5, to its limit upon the guide *u*, thereby causing the blank to pass out of the mouth b^{12} and over the end of the yielding stop u^3, the latter, by means of a spring u^2, immediately returning to its normal position, a blank at the same time taking the place of the one withdrawn. While the chute is thus moving rearwardly the cutters *y* engage the revolving blank and turn the barrel portion z^2 therein, the spool *z'*, Fig. 14, being practically finished at or before the commencement of the movement of the chute in its return or forward stroke, the position of the parts then being substantially as represented by Fig. 13. The revolving eccentric now upon passing its center causes the cutter-head to vibrate in the opposite or arrow direction, Fig. 13, thereby removing the cutters from contact with the spool. At the same time, too, the corresponding position of the cam *c* causes the lever c^3 at the left to move endwise, thereby separating the two spindles and releasing the spool from them, whence it falls into the receptacle k^4. Usually, however, the spool adheres to one of the spindles, owing to the pressure required to hold it while being turned. In such case the clearer *k'*, secured to the shaft *t*, moving endwise in unison with the spindle by means of the engagement of the spring-latch c^6 with the shaft, acts to force it from the middle spindle, or in case it adheres to the other spindle the latter in its rearward movement (to the left) causes the spool to engage the stationary clearer *k* or knock-off, which forces it from the spindle. Meanwhile the runway has been vibrated to the front, thereby bringing another blank into position to be centered upon the spindles, Fig. 14, as before described, thus completing the operation.

While the spool just referred to is being completed by its mechanism the other runway and corresponding mechanism 1 is working alternately therewith to complete another spool. By this it is apparent, as before stated, that two spools are finished during one revolution of the cam-shaft *s'*.

I claim as my invention—

1. A spool-finishing machine having a stirrer-carrying reservoir or hopper adjustable to receive and discharge blanks varying in size, a mechanically-vibrating runway communicating with the hopper arranged to intermittingly discharge the blanks singly therefrom, and mechanisms for holding, finishing, and releasing the blanks.

2. In a spool-finishing machine, the combination of a stirrer-carrying reservoir or hopper adjustable to receive and discharge blanks varying in size, an adjustable outlet or discharge-opening, a mechanically-vibrating runway communicating with said opening jointed to the hopper, also adjustable to receive and intermittingly discharge such varying blanks singly, and mechanisms for holding, finishing, and releasing the blanks after being completed, substantially as hereinbefore set forth.

3. In a spool-finishing machine, the combination, with a stirrer-carrying reservoir or hopper adjustable to receive and discharge blanks varying in size, and mechanisms for automatically receiving, holding, finishing, and releasing the blanks after being completed, of an adjustably-guided runway or chute jointed to and communicating with the hopper, and mechanism for intermittingly vibrating the runway back and forth, substantially as hereinbefore described, and for the purpose set forth.

4. In a spool-turning machine, the combination of a hopper, mechanisms for feeding, holding, turning, and releasing the spools singly, and a vibrating guided runway jointed to and communicating with the hopper, said runway being adjustable both in width and depth to accommodate spool-blanks varying in size, and provided with a stop for controlling the position of the blank resting in the bottom end of the runway, substantially as hereinbefore set forth.

5. In a spool-turning machine, an intermittingly-vibrating runway adjustable to receive blanks varying in size and having its lower portion provided with an adjustable yielding stop, substantially as hereinbefore set forth.

6. In a spool-turning machine, an intermittingly-vibrating hinged runway adjustable to receive blanks varying in size and having its lower portion provided with an adjustable yielding stop and a friction-plate, and a stationary guide, as *u*, adapted to receive the moving runway and also in engagement with the said friction-plate, substantially as hereinbefore described, and for the purpose set forth.

7. In a spool-turning machine, the combination, with a stirrer and hopper, and a guided runway jointed to and communicating with the hopper, of a vibrating cutter-carrying holder provided with an arm or extension, as m^4, and a slotted link jointed to the runway and arranged to be intermittingly reciprocated back and forth by the movement of said arm, substantially as hereinbefore described, and for the purpose specified.

8. In a spool-turning machine, the combination, with a hopper and stirrer, a guided intermittingly-vibrating runway jointed to and communicating with the hopper, and a vibrating cutter-carrying head, of continuously-revolving spindles *r*, adapted to receive and frictionally hold the spool-blank between

them, mechanism for moving one of the said spindles endwise, and clearers or knock-offs for detaching the spool from the spindles, substantially as hereinbefore described.

9. In a spool-turning machine, the combination, with an intermittingly-vibrating runway arranged to release the spool-blanks singly from its mouth, and cutters moving to and fro to engage said blanks, of two continuously-revolving spindles *r*, arranged to receive and hold the blank endwise between them, a cam-actuated vibrating lever arranged to reciprocate one of the said spindles back and forth, a spring-resisted movable clearer *k'*, actuated by a moving latch in engagement with the clearer-shaft, means for tripping or releasing the latch, and an adjustable stationary clearer *k*, mounted adjacent to the inner end of the reciprocating spindle, all combined and operating substantially as hereinbefore described, and for the purpose set forth.

10. In a spool-turning machine, the combination, with two revolving spindles, one of which is intermittingly-movable endwise, arranged to frictionally hold a spool-blank between them, of a fixed clearer having its free end arranged to release a spool from the end of the said endwise-moving spindle, and a longitudinally-movable clearer secured to an adjustable spring-resisted notched shaft *t*, a spring pawl or latch traveling in unison with the said spindle arranged to engage the notched shaft, and a stationary tripping device for releasing the latch from the notch, the free end of the movable clearer being arranged to release a spool from the end of the other revolving spindle, substantially as hereinbefore described.

11. In a spool-turning machine, the combination of two stirrer-carrying reservoirs or hoppers adjustable to receive and discharge blanks varying in size, an adjustable guided runway arranged to release the spool-blanks from its mouth jointed to each hopper, continuously-revolving spindles arranged to receive, hold, and release the blanks after being turned, mechanically-moving adjustably-mounted cutters adapted to turn the blanks, mechanisms for intermittingly vibrating the runways alternately to introduce the blanks singly to the spindles and withdraw them from the runways, and mechanically-actuated clearers arranged to detach the spools from the spindles, all combined, arranged, and operating substantially as hereinbefore described.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN M. PARKER.

Witnesses:
CHARLES HANNIGAN,
GEO. H. REMINGTON.