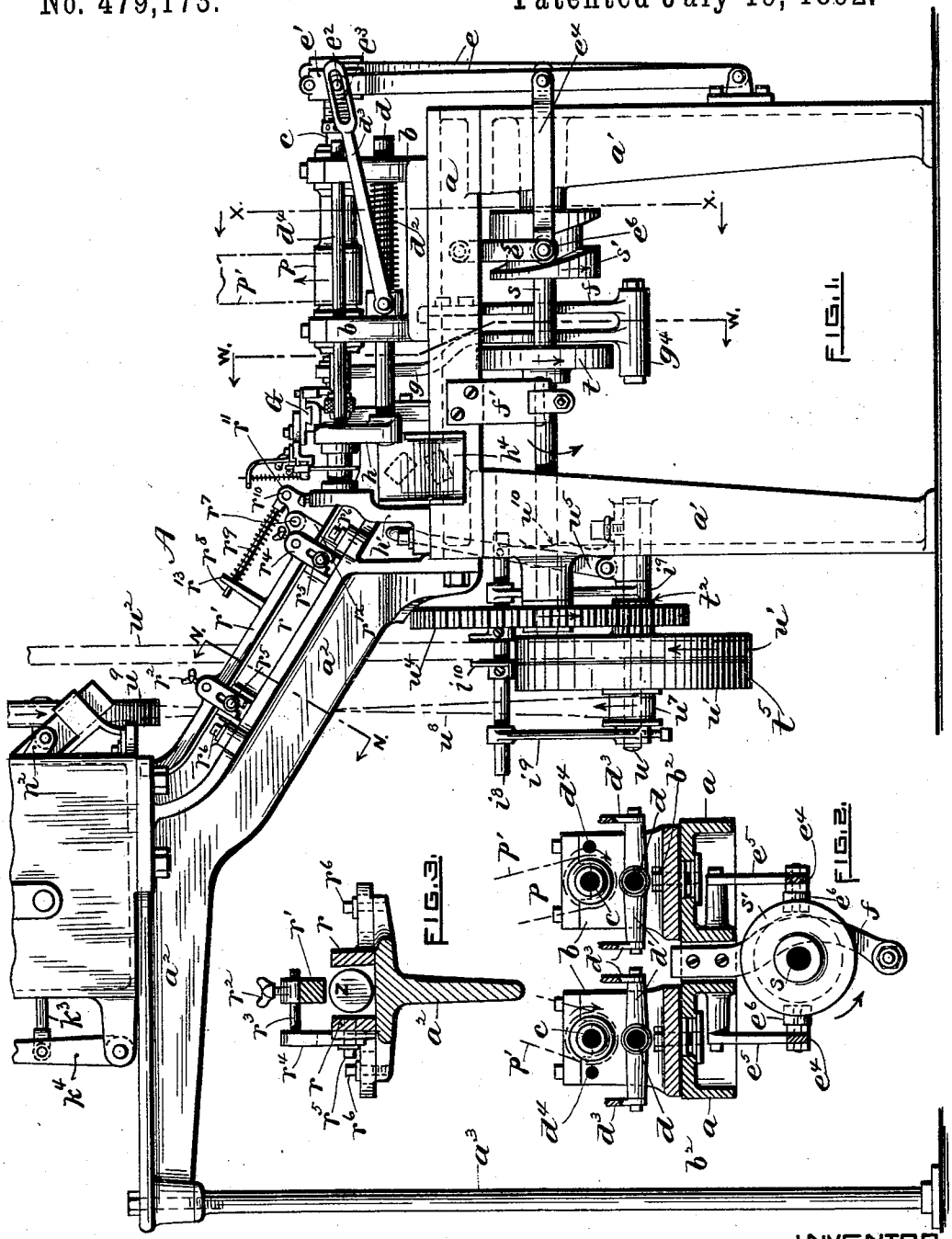
(No Model.) 5 Sheets—Sheet 1.

J. M. PARKER.

SPOOL BORING MECHANISM.

No. 479,173. Patented July 19, 1892.



WITNESSES:

Charles F. Hannigan.

H. E. Carpenter.

INVENTOR.

John M. Parker.

by Pennington & Henborn

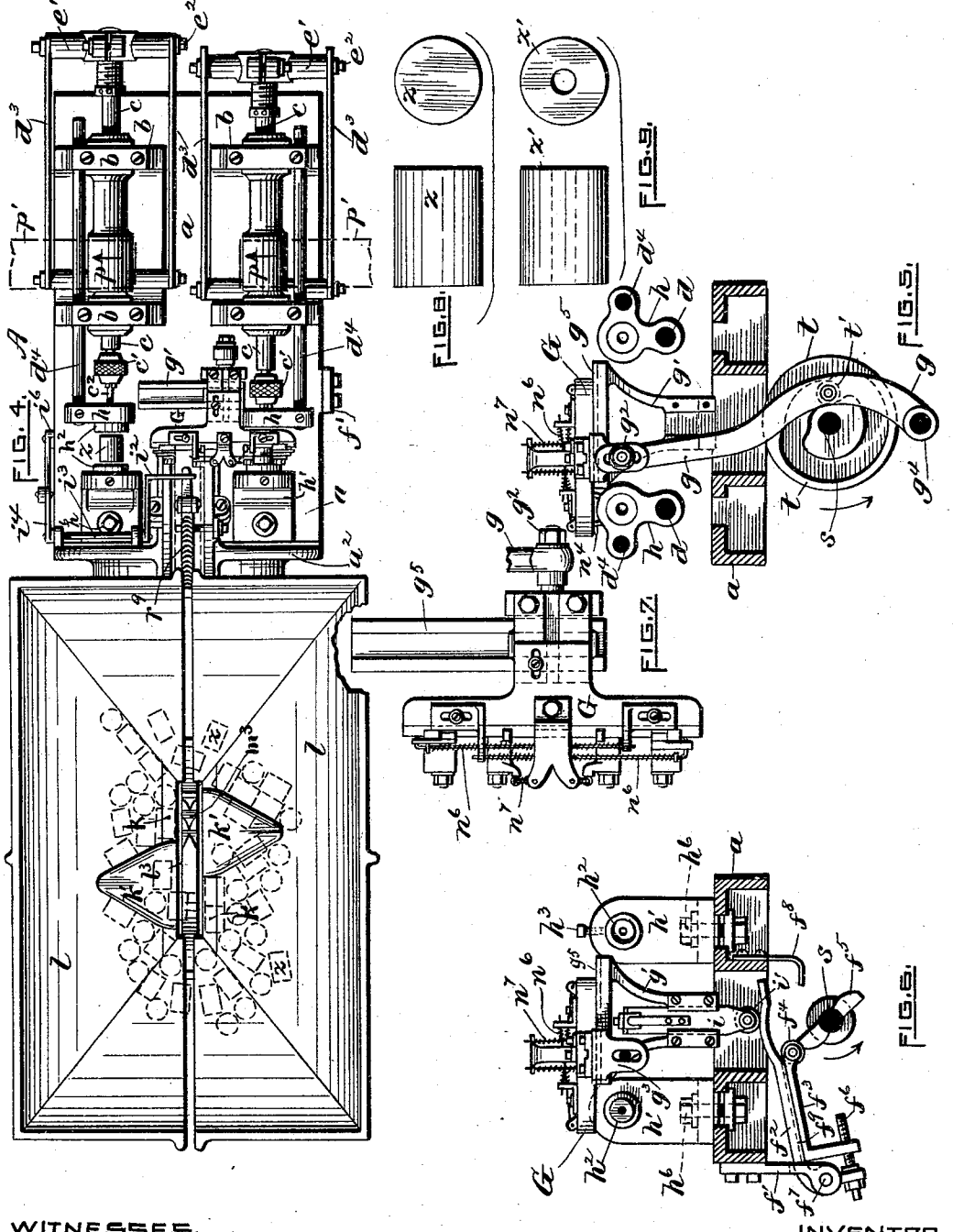
Attys.

(No Model.) 5 Sheets—Sheet 2.

J. M. PARKER.

SPOOL BORING MECHANISM.

No. 479,173. Patented July 19, 1892.



WITNESSES:

Charles Hannigan.

H. E. Carpenter.

INVENTOR:

John M. Parker.

by Remington & Henthorn

Attys.

(No Model.) 5 Sheets—Sheet 3.

J. M. PARKER.

SPOOL BORING MECHANISM.

No. 479,173. Patented July 19, 1892.

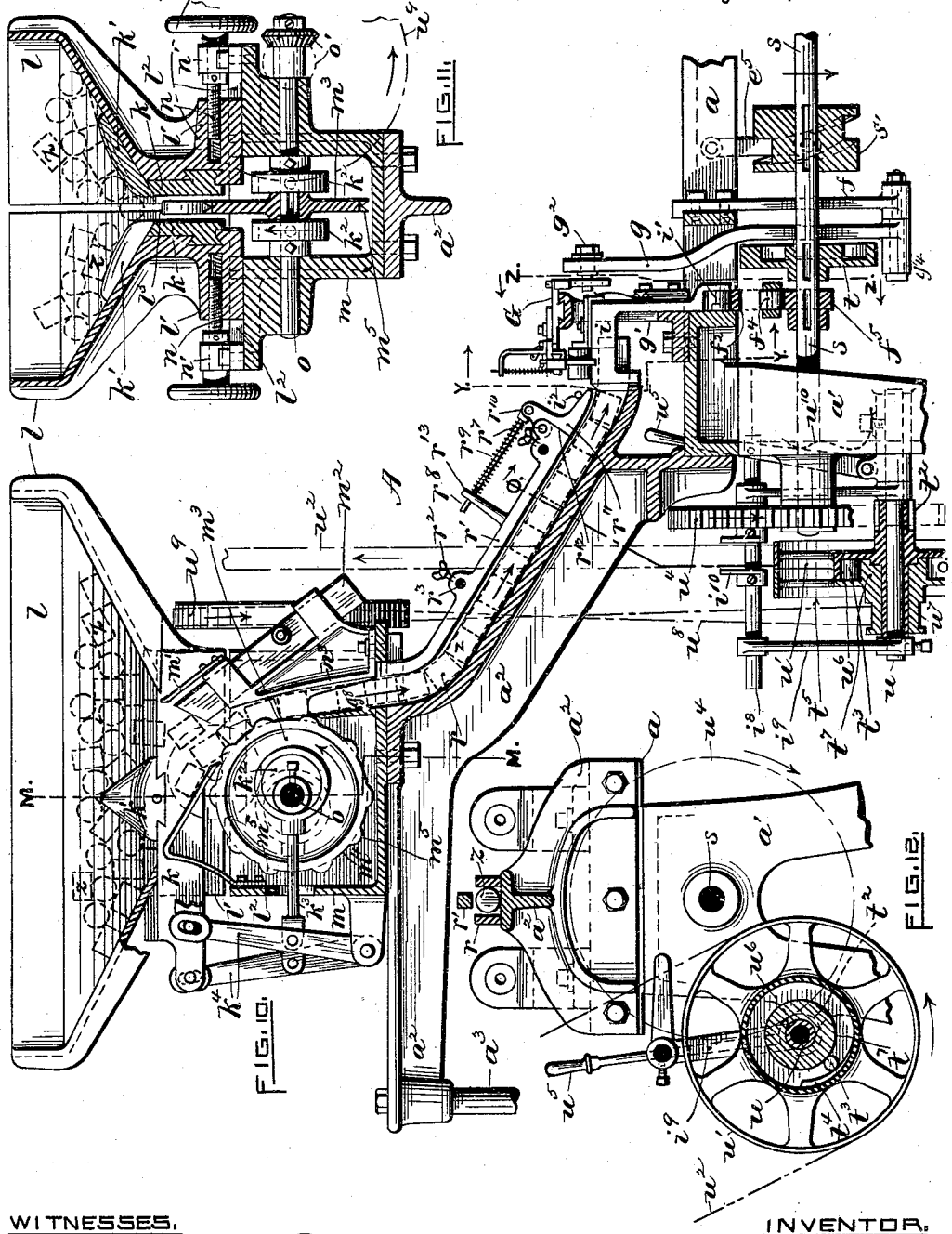


FIG. 11.

FIG. 10.

FIG. 12.

WITNESSES.

Charles F. Hannigan.

H. E. Carpenter.

INVENTOR.

John M. Parker.

by Remington & Hawthorn

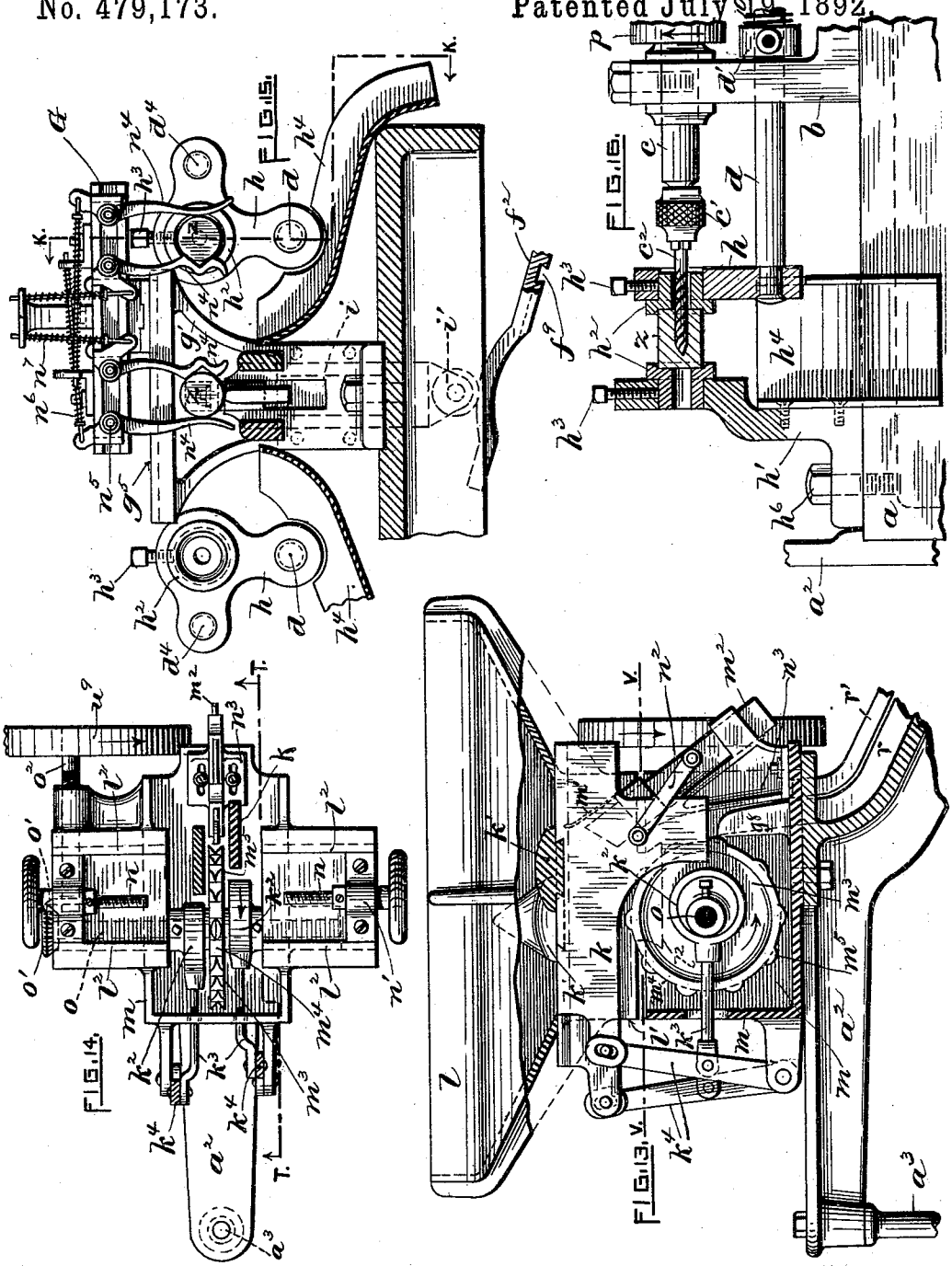
Attys.

(No Model.) 5 Sheets—Sheet 4.

J. M. PARKER.

SPOOL BORING MECHANISM.

No. 479,173. Patented July 19, 1892.



WITNESSES.

Charles Hannigan.

H. E. Carpenter.

INVENTOR.

John M. Parker.

by Remington Stenthorn

Attys.

(No Model.) 5 Sheets—Sheet 5.

J. M. PARKER.

SPOOL BORING MECHANISM.

No. 479,173. Patented July 19, 1892.

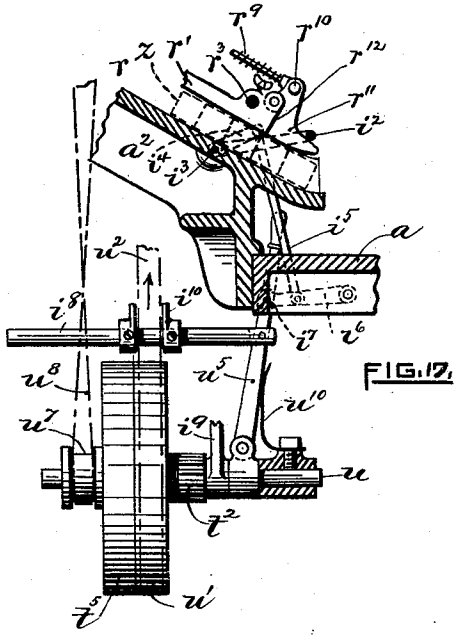


FIG. 17.

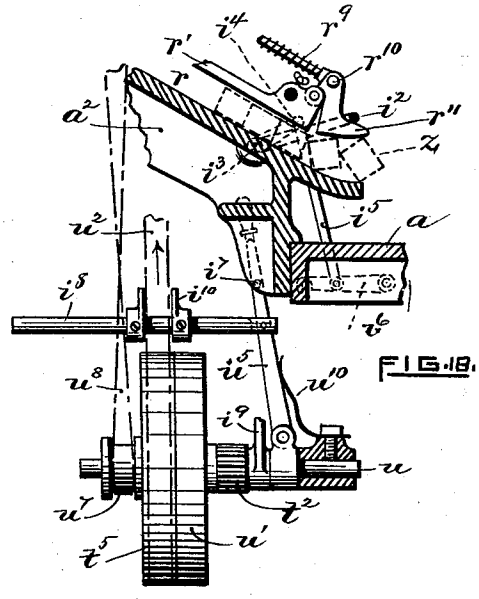


FIG. 18.

WITNESSES,

Charles F. Cunningan

Ida M. Warren

INVENTOR,

John M. Parker.

By Remington & Henthorn

Attys.

UNITED STATES PATENT OFFICE.

JOHN M. PARKER, OF PAWTUCKET, RHODE ISLAND.

SPOOL-BORING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 479,173, dated July 19, 1892.

Application filed June 9, 1891. Serial No. 395,645. (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-Boring Mechanism; 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 of reference marked thereon, which form a part of this specification.

In an application for United States Letters Patent filed by me February 10, 1891, Serial No. 380,941, I have shown and claimed a novel machine for turning wooden spool-blanks.

My present invention also has relation to spool-making machinery, but more especially to machines for boring the spool-blanks. Spools of this class are used for winding thread upon, such as made of cotton, linen, silk, yarn, &c.

The object I have had in view in the invention hereinafter described is to produce a machine automatic in its action, which will bore or drill spool-blanks in a more accurate and rapid manner, the cost of the work or product thus produced being at the same time greatly reduced as compared with machines of this class heretofore made.

My invention consists, essentially, of a machine combining an adjustable feeding device which receives the blanks singly from the mouth of a runway communicating with a suitable hopper or reservoir, a pair of revolving drills or augers, a carriage traveling intermittingly across the machine and provided with automatically-operating fingers which receive the blanks from the feeder, a pair of yielding chucks or holders arranged to receive the blanks from the fingers alternately and maintain them in position axially, mechanism for feeding the revolving drills longitudinally to bore the spools or blanks and to withdraw the drills therefrom, and a device for releasing the blanks from the holders, all as will be more fully hereinafter set forth and claimed.

In the accompanying five sheets of drawings, Figure 1, Sheet 1, is a side elevation of my improved spool-boring machine, a portion of the hopper being omitted. Fig. 2 is a transverse sectional view taken on line $x\,x$ of Fig. 1. Fig. 3 is a similar sectional view taken on line N N of said Fig. 1, showing the construction of the inclined runway. Fig. 4, Sheet 2, is a plan view of the machine. Fig. 5 is a transverse sectional view taken on line $w\,w$ of Fig. 1. Fig. 6 is a cross-sectional view taken on line Z Z of Fig. 10. Fig. 7 is a plan view of the carriage arranged to reciprocate back and forth transversely past the end or mouth of the runway. Fig. 8 shows, enlarged, side and end elevations of the spool-blanks before being bored. Fig. 9 shows the same bored. Fig. 10, Sheet 3, is a vertical sectional view taken substantially through the center of the machine longitudinally. Fig. 11 is a transverse sectional view taken through the hopper, &c., on line M M of Fig. 10. Fig. 12 is a transverse sectional view taken on line O O of Fig. 10. Fig. 13, Sheet 4, is a vertical sectional view taken on line T T of Fig. 14, showing mechanism for keeping the spool-blanks in motion. Fig. 14 is a horizontal sectional view taken on line V V of Fig. 13. Fig. 15 is an enlarged cross-sectional view taken on the irregular line Y Y of Fig. 10. Fig. 16 is a longitudinal sectional view taken on line K K of Fig. 15, showing a drill in the act of boring a spool-blank. Fig. 17, Sheet 5, is a side elevation showing the automatic stop-motion when the machine is normally running; and Fig. 18 is a similar view showing the belt automatically shipped, owing to the clogged runway.

In the drawings, A indicates my improved spool-boring machine as a whole.

I will first describe the hopper and its contiguous parts and the manner of its operation.

l designates the hopper or reservoir, having suitable inclined sides and ends. The hopper is divided longitudinally through its center into two independent parts, each terminating at the bottom in a foot or base l', which is fitted to slide transversely in ways or guides l^2, formed in the top of the stirrer-box m, which in turn is secured to an extension of the stationary runway-base a^2. The hopper-feet are tapped to receive each an adjusting-screw n, mounted to revolve in bearings n', secured to the stirrer-box. By means of these

screws the central lateral space or opening l^3 between the vertical sides of the hopper may be readily adjusted to accommodate spool-blanks z varying in diameter.

The interior of the box or frame m is provided with a transversely-mounted shaft o, driven by a pair of bevel-gears o', one of the latter being secured to a shaft o^2, carrying at its opposite end a pulley u^9, driven by a crossed belt u^8, leading from a small pulley u^7, mounted upon a stud-shaft u. (See Figs. 1, 10, 11, 14, &c.) The vertical faces of the hopper adjacent to the said space l^3 are provided each with an agitator plate or bar k. These bars are fitted to slide endwise therein, the upper edges being beveled to form a continuation of the inclined sides of the hopper. (See Figs. 10 and 11.) The bars are provided each with a well-rounded block or lug k', which in operation serves to loosen or agitate the mass of blanks, thereby preventing the latter from "bridging." The bars are reciprocated by eccentrics k^2, secured to the shaft o, links k^3 and pivoted levers k^4 being employed to connect the eccentrics with the bars. The eccentrics are mounted so as to reciprocate the bars k alternately, thus causing the blanks lying in the lower portion of the hopper to be agitated and rolled about until they finally drop into the space l^3. I would state that it is usual to make the length of a spool-blank somewhat greater than its diameter. Therefore the blanks cannot enter the said space and runway crosswise after the parts have been properly adjusted.

At the front end of the slot l^3 is located a stationary yielding guard m', Fig. 10, to prevent blanks from clogging, and also serving to close the opening l^3 between the bars k. This at the same time shields the upper portion of the centrally-mounted inclined pusher m^2, which by means of a link n^2, Fig. 13, receives an inclined reciprocating motion by its connection to one of the agitator plates or bars k, thus serving to place the blanks in position as they fall from the hopper and also to dislodge any blank that may have become stalled. As the blanks fall from the hopper l they come in contact with the slowly-revolving partially V-surfaced guide-wheel m^3, and as the rotation of the shaft o, upon which the guide-wheel m^3 is mounted, is contrary to that of the gravitating path of the blanks in the runway r the effect is to place mechanically the blanks axially with that of the runway by contact with the alternate smooth portion m^4 of the wheel m^3 and the V-shaped projection m^5. Motion is imparted, as I have before stated, to the shaft o, upon which this guide-wheel m^3 is mounted, by means of the pair of gears o', which in turn are operated by the shaft o^2 by means of the pulley u^9 and its connection by a cross-belt u^8 to the small pulley u^7, as shown in Figs. 10 13 14, &c.

At the face of the machine and located centrally within the stirrir-box m is provided a groove g^8, Figs. 10 and 13, corresponding in location and cross-section to the runway r and through which the blanks pass from the stirrer-box to the runway leading to the boring mechanism. In construction the base of this runway is part of the frame a^2, having adjustable sides r which, form the runway, and a guide or adjustable top-guard r' to retain the blanks in position during their passage from one point to another, the angular or front side n^3 of the guide for the inclined pusher m^2 also serving the same purpose to retain the blanks in their proper relation.

To accommodate blanks of different diameter, simple adjusting devices are provided that the sides of the runway-tube r may be made wider and the guide or top-guard r' higher from the frame a^2, and thus accommodate varying requirements. These devices are shown in detail in Fig. 3, where the sides of the runway r are retained in position by the binder-screws r^6, which pass through slotted holes and are tapped into the frame a^2. To adjust the guide or top-guard r' to the desired height, vertical pieces r^4 with slotted holes in their lower portions are secured to the sides of the runway r by the binder-screws r^5 and by means of the horizontally-projecting studs r^3, riveted into the upper portion of the vertical piece r^4, which pass through corresponding projections on the back of the guide r', retains the said upper guide r' in the desired position and is secured in place by the thumb-screw r^2 at the proper elevation. At the lower end of the runway-tube r is a yielding or jointed tongue r^{11}, forming the continuity of the top guard r' and serves as a part of the stop-motion to the machine in case of derangement of the feeding device and the down-feeding blanks. During the normal working of the machine this tongue r^{11}, which is hinged at r^7, is held securely against the abutment r^{12} by the pusher-spring r^9, supported upon the rod r^8, and thus always under compression and retained in position by its connecting-pin r^{10} and supporting-post r^{13}, cast upon the back of the top guide r'. (See, also, Figs. 17 and 18.) Nearing the extreme point of the tongue r^{11} is located transversely a bell-crank lever i^2, with one of its ends resting thereon, while the other is connected to the horizontal shaft i^3. (See Figs. 4, 17, and 18.) It will therefore be seen that if from any cause this tongue r^{11} is raised from its normal position—say by derangement of the blanks in the runway and feeding device—a corresponding upward motion will be imparted to the bell-crank lever i^2, as in Fig. 18, and thus partially rotate the shaft i^3, and by means of this motion through the lever i^4 and the vertical link i^5 the fulcrumed lever i^6, to which the said link is connected, is unhooked at i^7 from the shipper-lever u^5, and the moment it is thus released the tension of the flat shipper-lever spring u^{10} throws over the lever u^5 and thus stops the drilling and the upward feed motion of the blanks at the lower end of

the runway r, while at the same time the motion for agitating the blanks in the hopper is undisturbed by the continuous operation of the belt u^8. This interruption in the operation of a portion of the mechanism while the other parts are performing their duty is effected by the employment of the pulley u', loosely mounted upon a stationary stud u, and forming a part of this pulley-casting is the driving-gear t^2, which is connected with the corresponding pulley u^7, freely revolving upon the hub of the pulley u', and which completes the driving mechanism, and by shifting the belt u^2 by the above-described means from the pulley u' onto the pulley t^5 the feeding and boring mechanism becomes inoperative. Fig. 18 shows the belt thus shifted.

To start the machine in operation as a whole, there is an annular ring u^6 of the pulley u', having a portion of its inner circumference t^4 eccentrically finished, and a corresponding pulley t^5, having a concentric inner hub t^7, which in fact is a prolongation of the pulley u^7, the said two parts t^5 and u^7 being integral. Thus it follows that by the intervention of the cylindrical block t^3 motion imparted by the belt u^2 to the pulley u' would carry along the cylindrical block t^3 until it engaged the eccentrically-turned surface t^4 of the pulley u', and when sufficient contact or pressure against the surface of the annular hub t^7 and the eccentrically-turned surface t^4, Figs. 10 and 12, has been produced a corresponding motion will be imparted to the pulley and thus the whole mechanism is in operation. If now any disarrangement of the boring or feeding mechanism takes place at the lower end of the runway r, the stop-motion operated by the finger i^2 previously described, Figs. 17 and 18, acts to shift the belt from one pulley to the other, and the cylindrical block t^3 is thus relieved of contact between the eccentrically-turned portion t^4 of the annular ring u^6 and results in a discontinuance in the motion of the pulley u' and its dependent parts. To impart motion to the lower part of the machine which embraces the boring and feeding mechanism by engagement with the above-described pulley u' and its connected gear t^2, connection is made to the large gear u^4, Fig. 10, mounted upon the horizontal shaft s, having its bearings in the stands a' of the machine. Upon this shaft s are mounted the cam f^5 for raising the blanks z from the mouth of the runway r up to a point level with the center of the revolving drills c^2, a cam t for moving the blanks z transversely and alternately as they are placed in position by the feeding mechanism, and a cam s' for operating horizontally the boring tools or drills c^2. Upon the side of the base-plate a is secured the bracket f', Figs. 1 and 6, to which at its lower end f^7 is secured the pivoted lever f^2, having in its lower surface a dovetailed groove f^9 for receiving and guiding the cam-actuated arm f^3, with its roller f^4, said arm being adjusted and secured in position by the binder-screw f^6, thereby allowing the said arm to be moved transversely of the machine and thus change the length of the upward stroke to correspond with the diameter of the blank used. As the roller f^4 approaches the center of the shaft s, a greater upward stroke is imparted to the curved extremities of the pivoted lever f^2, thus actuating the vertical plunger i and the friction-roll i' pivoted thereto. When this plunger is at its lowest position, its upper surface is in line with the mouth of the runway r, so that the blanks are fed thereto by gravity. One blank will slide upon the top of the plunger. The latter by its upward motion imparted by the revolving of the cam f^5 on shaft s, through the agency of the respective lever and arm f^2 and f^3, the blank z is conveyed up and deposited between the spring-actuated yielding fingers n^4, which are pivoted at n^5, and thus by compression of the springs n^6 and n^7 the blank is retained at that elevation and the plunger i allowed to descend by the further revolving of the cam f^5, and thus take its position to receive a second blank from the runway to again repeat the motion. (See Figs. 6 and 15.) After the blank z has been left between the fingers n^4 it is then in a central position to be moved transversely to the right or left, as desired, such movement bringing the center of the blank to coincide with that of the corresponding drill c^2. This shifting of the blanks from the center line of the machine to place them alternately and central with the axis of the drilling mechanism is accomplished through the agency of the cam t, which is located upon the shaft s, and actuating the lever g by means of the roller t', which follows the path of the cam. As the said lever is fulcrumed at g^4, with its upper end slotted to receive the stud g^2, a corresponding transverse motion is imparted to the finger-carriage G, sliding in the top of the stand g' between dovetailed guides g^5. When the roll t', Fig. 5, is in contact with the small diameter of the cam t, a blank previously inserted between the flexible fingers n^4 is being operated upon by one of the drills c^2, and by the time that the shaft s has revolved sufficiently to bring the roll t' upon the greater diameter the operation of clamping the blank endwise and drilling it has been completed, the drill removed, and the spool dropped under the influence of this larger diameter of the cam, the carriage meanwhile being moved transversely one-half of the distance that the drills are apart. The other set of fingers which had been supplied with a blank by the vertical plunger i during this intervening time are then brought opposite the neighboring drill, where the operation of clamping and drilling the blank, withdrawing the drill, and finally dropping the spool is accomplished, to be again repeated at the next change in the position of the vertical lever g, actuated by the roller t' in the path of the cam.

To effect the drilling of the blanks, a pe-

ripherally-grooved cam s', located on the shaft s, is employed to impart motion longitudinally in alternate directions to the two vertically-supported levers e by means of the connecting-links e^4, which carry a roller e^6, corresponding in diameter to the width of the groove in the cam. This roller and link are retained in position by the suspending-link e^5, pivotally connected to base a of the machine. When the cam s' arrives at its extreme outward throw corresponding to the outward position of the drill, the contact of the pin e^2, Fig. 1, located in the box or upper portion e' of the vertical lever e with the outer end of slot e^3 of the pair of slotted levers or links d^3, withdraws the movable centering head-block h by its connection with the rod d, and at the same time a blank is carried across from the center of the machine over to that of the drill by its suspension between the flexible fingers n^4, Fig. 15, previously described. As the shaft s revolves this contact of the pin e^2 with the outer end of the slot, Fig. 1, is relieved by the inward motion of the vertical lever e, being operated upon by the roller e^6 in the path of the cam, and thus the spiral spring d^2, which is at all times under compression upon the guide-rod d, reacting upon the fixed collar or arm d', closes the centering head-block h, and thus holds by frictional contact the blank z between the two self-centering bushings h^2, held in position by the set-screws h^3 in the head-block h and stationary stand h' while the blank z is being drilled. As the shaft s and the cam s' revolve the vertical lever e is still further carried inward, and by reason of its connection directly to the end of the drill-spindle c a corresponding forced advance is made to the drill c^2, and thus the blank z is drilled. Upon a further motion of the cam the drill arrives at its extreme outward position, the blank having been drilled and the travel of the drill reversed by a continuation in the revolution or travel of the cam by bringing its reverse path to act on the roll e^6 and its connection to the levers e. A revolving motion is imparted to the drill-spindle c by the continuously-running belt p', actuating the splined pulley p, mounted upon the spindle, the latter moving endwise through the pulley.

This device as a whole is mounted in boxes in the spindle-head b, and therein provision is made for guiding the rods d^4, which thus retain the centering head-blocks in their normal position, while at the same time the said spindle-heads serve as guides for the spring-mounted sliding bars d.

This mechanism is in duplicate, one set being located either side of the center of the machine, and by contact of the rolls e^6 on opposite sides of the cam s' one drill is boring while its mate is being withdrawn after it has completed the operation.

To stop the boring and upward-feeding mechanism, an ordinary shipper-lever u^5, Figs. 10, 17, and 18, adapted to operate a belt-guide i^{10}, sliding in the stands i^9, affords means whereby that portion of the machine may be controlled at will. To discontinue all operation, the usual shipping mechanism upon an overhead-shaft is employed.

To describe the operation of the machine more connectedly, it is assumed that the several boring and feeding mechanisms are in their normal working condition, and the outline of operation following will apply equally as well to the duplicate boring and feeding mechanisms, although reference may be made to but one set, as obviously the parts are so adjusted that they work alternately and in unison with each other, as hereinbefore stated. Upon the blanks z being deposited in the hopper l they are at once agitated or acted upon by the well-rounded blocks k', secured to the agitator plate or bar k, which receives its motion from the eccentric k^2, mounted upon the shaft o, through the intervention of the eccentric-rod k^3 and the vertical lever k^4. As the blanks are agitated by this mechanism they fall singly through the aperture in the bottom of the hopper l, which is slightly wider than the diameter of the blank upon the slowly-revolving wheel m^3, having an alternate smooth and V-shaped projecting face. The blanks are thereby delivered endwise into the mouth of the runway-tube r. The direction of the rotation of this feeding-wheel m^3 is opposite to the downward path of the blanks, which has the effect to properly guide them and prevent any clogging of the mass. As the blanks are delivered into the runway-tube r they descend by gravity therein until one blank is pushed by the weight of those above it out at its lower end and upon the top of the vertically-moving plunger i, which arrives at the proper time in the regulation of the machine's movements—that is, the cam f^5, located upon the horizontal shaft s, directly beneath the said plunger and central with the machine by the continuous revolving of the shaft, engages with the pivoted arm f^3, actuating the lever f^2, in which it is guided and adjustably secured, and the said plunger i is thereby raised, so that the center of the blank z carried on the top thereof is central with that of a drill. To facilitate the ease in its action, an anti-friction roll is introduced at the lower extremity of the plunger i and the arm f^3, as indicated at i' and f^4 of Fig. 6. During the upward motion of this above-described plunger with its blank thereon the blank is forced into engagement with the spring-actuated flexible fingers n^4, which are mounted upon a carriage arranged to move transversely. At the moment the cam f^5 is freed from the roll f^4 a downward motion is imparted to the plunger i by gravity, thereby leaving the blank suspended frictionally between the two fingers, where it is then in position to be moved transversely opposite a drill to be acted upon by the clamping device and boring mechanism. The operation of shifting the blank between

the fingers transversely is commenced immediately by the action of the slowly-revolving cam t, operating the friction-roll in the path or groove of said cam and by which motion is imparted to the vertical lever g, fulcrumed at g^4 and connected at its upper end by means of the stud g^2, passing through the slotted opening of the lever and secured to the traveling slide G, traversing between dovetailed guides g^5, planed in the top of the standard g'. While this transverse change in the position of the blanks z is being made there is in operation at the same moment another portion of the machine which prepares for the reception of the blank the moment it arrives at its new location and in position central with the drill with which it is to be drilled. This anticipation in the preparation for the reception of the blank is the withdrawing horizontally of the movable head-block h and with it the self-centering bushing h^2 mounted therein, from the stationary stand h' and its self-centering bushing h^2. This withdrawal or separation of the self-centering bushings, so that the blank may pass between their faces as it is carried transversely from the center of the machine to that of the drill, is effected through the agency of the cam s', as when on its extreme outward travel, the lever e at the same time being correspondingly carried over by the suspended link e^4 and thus through the pin e^2, located in the upper end e' of the arm e, contact is made with the extreme outer end of the slot e^3 in the arms d^3, as in Figs. 1 and 2, and by their connection to the collar or arm d', rigidly secured to the rod d, the spring d^2 is still further compressed and the whole (spring d^2, rod d, head-block h, and self-centering bushing h^2) moved outwardly. As the cam s' still further revolves, this contact of the pin e^2 in the upper end e' of the lever e ceases and the rod d is brought under the influence of the spiral spring mounted thereon, with a result that the self-centering bushings h^2 are closed upon the ends of the blank z which had been placed in position, as before described, and securely held frictionally until the drill advances through the agency of the revolving cam s', and actuating the lever e, above referred to, and which is connected directly to the end of the drill-spindle c. As the cam s' revolves the drill advances forward, and when it has arrived at its maximum inward stroke the reverse path of the cam withdraws the drill from the finished stationary blank. Previous to the cam's arrival at its maximum outward throw contact is again made by the pin e^2 in the end of the lever e with the slotted lever or link d^3, thereby compressing the spiral spring d^2, withdrawing the head-block h and its self-centering bushing h^2, which relieves the blank from pressure and it falls into the receptacle h^4 completed.

While the spool just referred to is being completed by its mechanism the corresponding mechanism is working alternately therewith to bore another spool, and it is thus apparent that two spools may be finished at one revolution of the cam s'.

In the action of the carriage as it reciprocates transversely from one position to another it is evident that there must be a disengagement of the fingers n^4 from the blank z, Fig. 15, in order that the said blank may drop in the receptacle h^4 when it is released from pressure between the self-centering bushings h^2. This disengagement takes place in the passage of the carriage from one position to another, as during such motion the blank is frictionally and singly held between the self-centering bushings h^2 while it is being operated upon by the drill c^3, and the carriage in its passage withdraws the pivotally-connected and spring-actuated fingers n^4 from the blank, and the moment they are thus released they return automatically to their vertical and normal condition.

As hereinbefore stated, my present specification forms one of a series relating to the manufacture of wooden spools.

In my prior application, Serial No. 380,941, I have described and claimed mechanism for turning the barrel or thread-holding portion of spools. In a companion application, Serial No. 395,644, to this my present one I have described and claimed mechanism for boring the spool-blanks before they are introduced to the said spool-turning machine, and my present specification also has relation to spool-boring machines, although its construction and arrangement is more particularly adapted to receive spool-blanks having lengths exceeding their diameters, whereas the machines described in the other applications are adapted to spool-blanks having diameters exceeding their length or thickness.

I would further state that some of the parts or features of my present specification are set forth in my other cases before referred to.

This improved spool-boring machine in some of its details is obviously capable of changes or modifications in construction, as well as in the manner of combining the parts other than as described, without departing from the spirit of my invention.

I claim as my invention—

1. In a spool-boring machine, the combination, with a blank-holding hopper, a runway or chute leading therefrom, and a vertically-moving plunger, as i, communicating with the mouth of the runway, of a pair of horizontally-mounted drills adapted to continuous rotation, a pair of blank-holders arranged in line with and in advance of each drill, a guided carriage provided with yielding fingers adapted to receive and release a spool-blank, mechanism for reciprocating the carriage transversely of the machine to carry blanks alternately from the plunger to the said holders, and mechanism for intermittingly and alternately moving the drills and holders in a longitudinal direction, substantially as hereinbefore described.

2. In a spool-boring machine, the combination, with blank feeding, conveying, and boring mechanisms, of a vertically-movable plunger adapted to receive a spool-blank from the mouth of the runway, and a yielding tongue forming a continuation of the top portion of the runway, substantially as described.

3. In a spool-boring machine, the combination of a blank-guiding runway provided at its mouth with a yielding tongue, as r^{11}, a plunger arranged to travel up and down past the mouth of the runway, a spring-resisted shipper-lever connected with suitable main driving mechanism, and a stop-motion device connected both with the said tongue and shipper-lever, substantially as described.

4. In a spool-boring machine, the combination, with a runway, a pair of revolving laterally-separated longitudinally-movable drills, and a guided blank-carrier traveling back and forth across the machine in advance of the drills, of a vertically-guided plunger arranged to receive a spool-blank from the runway and elevate it into engagement with the carrier, and means for intermittingly reciprocating the plunger in a vertical direction, substantially as described.

5. In a spool-boring machine, the combination, with a guided blank-carrier provided with yielding blank-receiving fingers, all arranged to travel transversely of the machine, of a vertically-guided and automatically-falling plunger, a jointed lever arranged to engage the plunger, provided with an adjustably-secured arm for controlling the plunger's movement, and a revolving cam arranged to engage said arm to effect the vertical travel of the plunger, substantially as described.

6. In a spool-boring machine, the combination of two hollow stationary self-centering blank-holders arranged at the front and the rear sides of the machine, two hollow yielding longitudinally-movable self-centering blank-holders, mechanisms for intermittingly placing spool-blanks in position singly between the adjacent faces of said stationary and movable holders, a pair of continuously-revolving drills mounted in line with the axes of said holders and blanks, springs for forcing the movable holders into frictional engagement with the blanks, and mechanism for feeding the revolving drills endwise through the holders and the retained blanks and returning the parts to their normal positions, substantially as described.

7. In a spool-boring machine, the combination of a blank-holding hopper laterally adjustable to accommodate blanks varying in size, a runway leading therefrom communicating with mechanism for conveying the blanks singly to revolving drills, a guide-wheel revolving in a contrary direction to the path of the column of blanks leading to the runway, an intermittingly-moving pusher, as m^2, located in the front portion of the hopper, and oppositely-arranged reciprocating agitator-plates mounted above the guide-wheel, all arranged and operating substantially as hereinbefore described.

8. In an automatic spool-boring machine, the combination, with an intermittingly-moving plunger and a runway arranged to deliver spool-blanks singly thereon, of two suitably-mounted revolving drills, mechanism for alternately and intermittingly moving the drills in a longitudinal direction, yielding self-centering separable holders arranged in line with said drills, and a carriage reciprocating transversely of the machine arranged to remove the blanks from the plunger and place them in position to be acted upon by the said holders and drills, substantially as described.

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

JOHN M. PARKER.

Witnesses:

CHARLES HANNIGAN,

GEO. H. REMINGTON.