(No Model.) 3 Sheets—Sheet 1.

J. M. PARKER.

SPOOL BORING MACHINE.

No. 483,576. Patented Oct. 4, 1892.

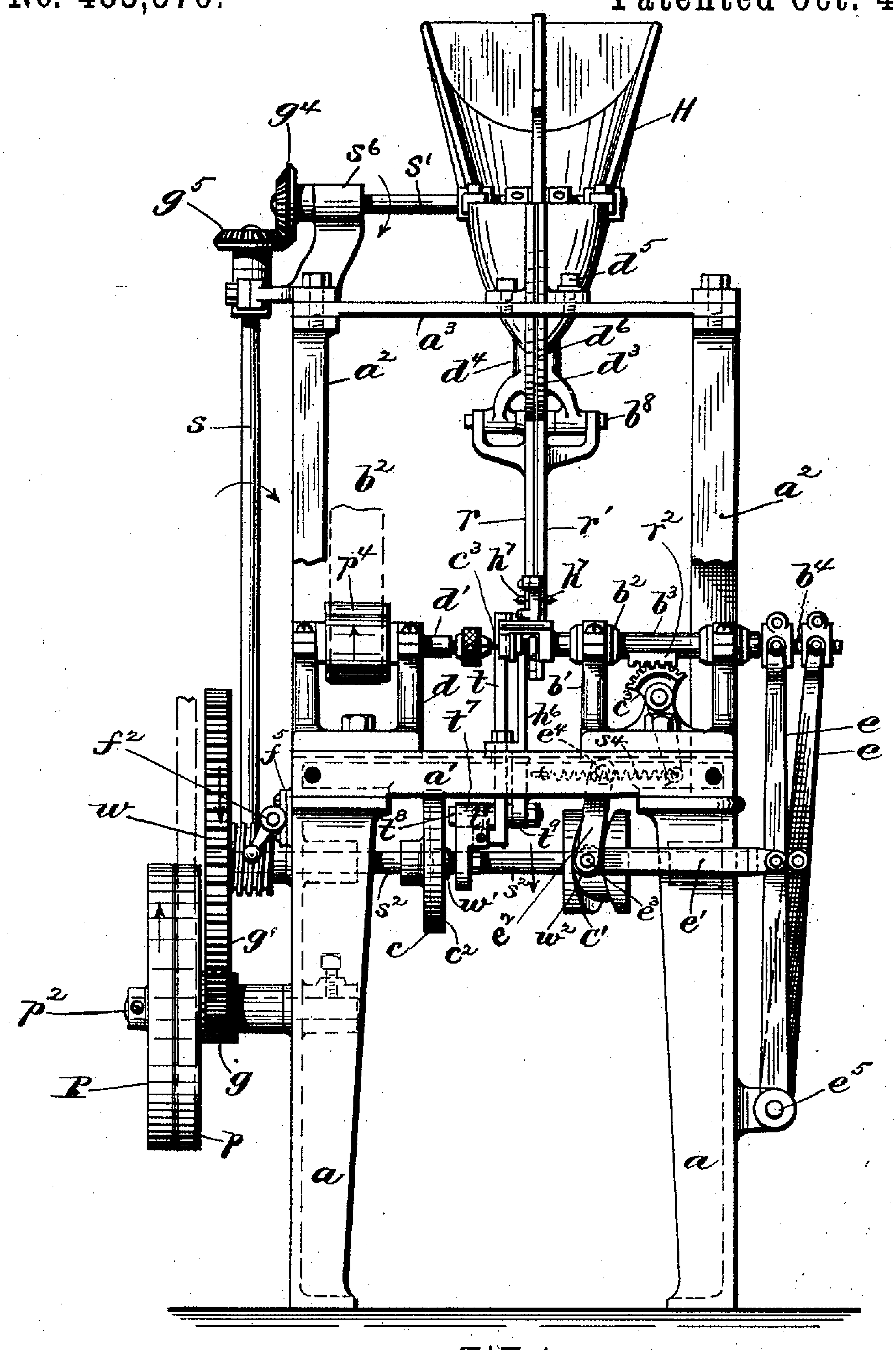

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

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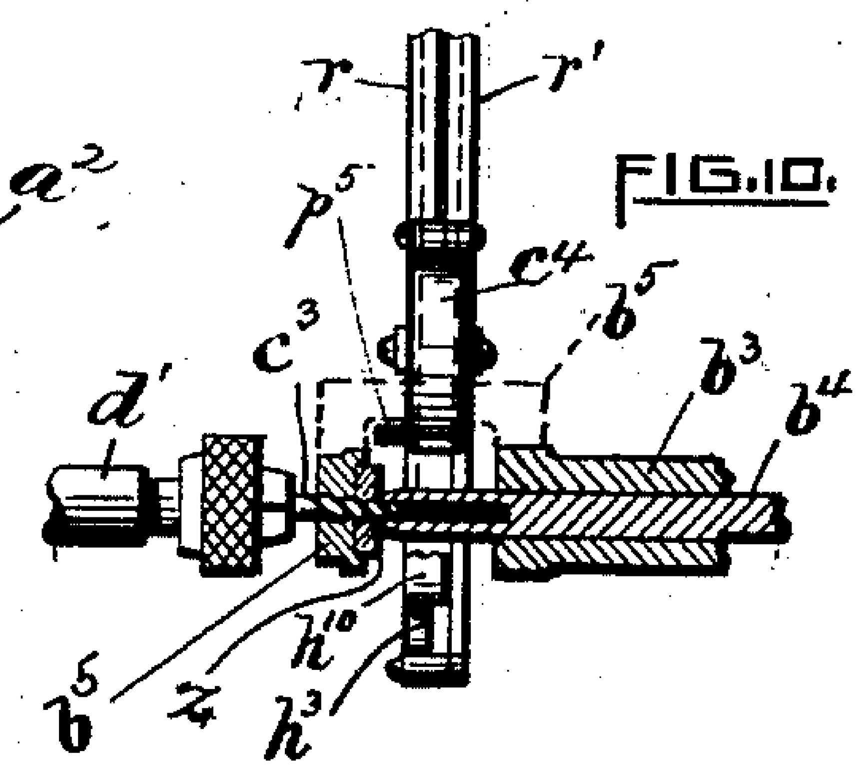

FIG. 10.

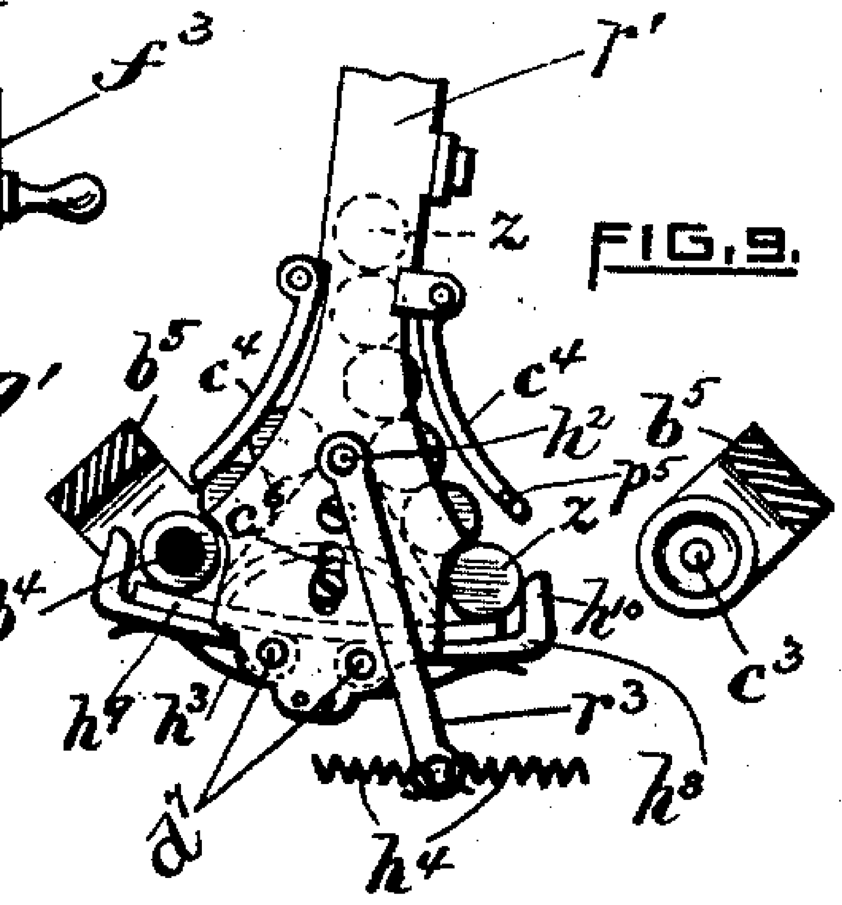

FIG. 9.

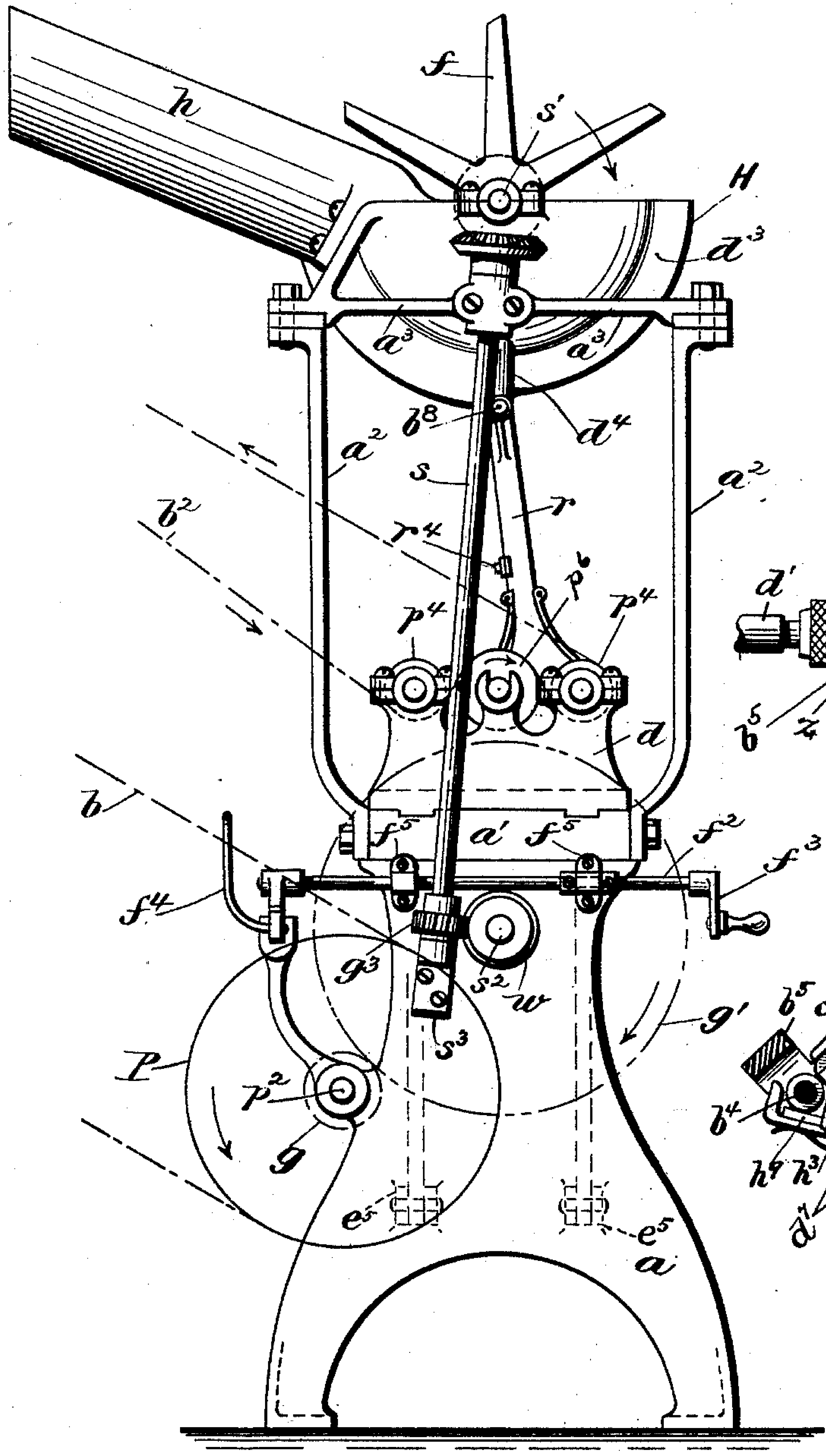

FIG. 2.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

J. M. PARKER.

SPOOL BORING MACHINE.

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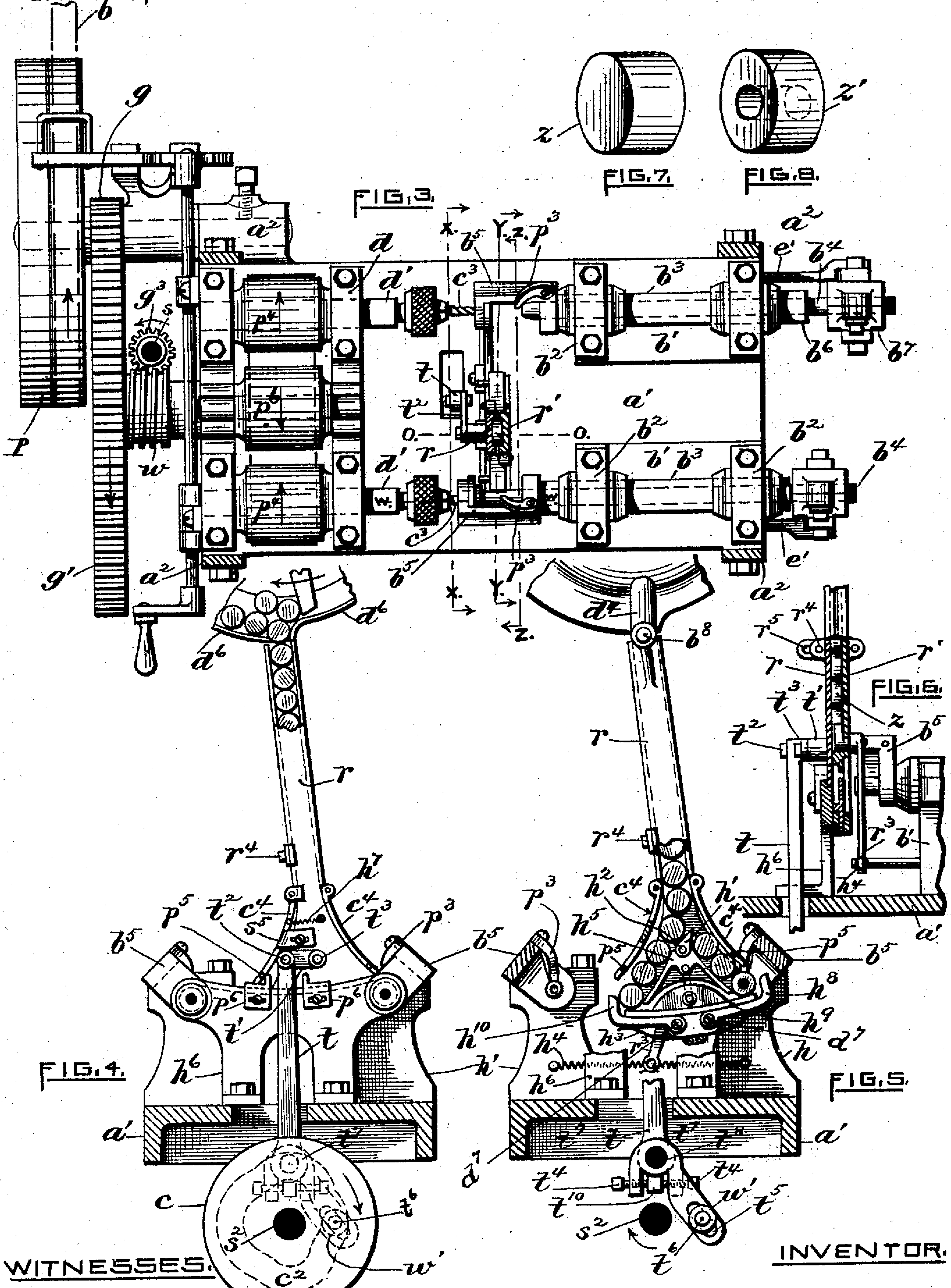

WITNESSES.

Charles Hannigan.

H. E. Carpenter.

INVENTOR.

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by Remington & Henthorn Attys.

UNITED STATES PATENT OFFICE.

JOHN M. PARKER, OF PAWTUCKET, RHODE ISLAND.

SPOOL-BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 483,576, dated October 4, 1892.

Application filed June 9, 1891. Serial No. 395,644. (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 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 of reference marked thereon, which form a part of this specification.

In the manufacture of flanged spools or bobbins made of wood, but more especially small spools, as in use for winding silk, cotton, linen, &c., thereon, I have in United States Patent No. 463,688, granted to me November 24, 1891, described, shown, and claimed a novel machine for turning such wooden spools or blanks after they have been bored or drilled.

My present invention, to be hereinafter described, is for the purpose of boring or drilling the spools or blanks after they have previously been roughly shaped or turned and previous to entering the turning-machine just referred to, with a result that the cost as compared with other machines or methods is greatly reduced and the quality of the work much more uniform and satisfactory.

My invention consists, essentially, of a machine combining an adjustable hopper provided with a revolving stirrer or agitator, a laterally-adjustable jointed or hinged vibratory runway communicating with the hopper, having two mouths or outlets, mechanism for intermittingly discharging the blocks alternately from the runway, two intermittingly-operating longitudinally-moving adjustable spindles and holders arranged to receive and hold the blanks while the latter are being bored or drilled, two continuously-revolving drills, and clearers for discharging the spools from the holders, all as will be more fully set forth and claimed.

By the use of my machine it is evident from its automatic action that a large quantity of spool-blanks may be finished with a minimum amount of labor, as it is the duty of the operative principally to keep the hopper supplied with the spool-blanks, the latter passing therefrom into the runway, from whence they pass out laterally to the right and left intermittingly into frictional engagement with longitudinally-moving fingers, which hold and at the same time press the blanks endwise against revolving drills, the spool thus drilled being next automatically withdrawn from the drills and released from the holders.

To properly illustrate and describe my invention, I have prepared the three appended sheets of drawings, wherein—

Figure 1, Sheet 1, is a front side elevation of the machine, showing the hopper, conveying runway-tube, and the drilling and feeding mechanism. Fig. 2, Sheet 2, is a front end elevation of the drill-head's driving mechanism, the hopper and vibratory runway-tube being distinctly shown. Fig. 3, Sheet 3, is a partial sectional plan of the lower portion of the machine, where are located the drills and blank-feeding devices and the driving mechanism for the whole. Fig. 4 is a partial transverse sectional elevation of a portion of the vibratory runway-tube, taken on line $x\,x$ of Fig. 3 and showing the actuating mechanism whereby through the agency of a cam and a pivotally-connected lever a vibrating motion is imparted to the conveying runway-tube. Fig. 5 is a partial transverse sectional elevation of the lower portion of the said conveying or runway tube, taken on line $y\,y$ of Fig. 3, showing the manner that the blanks are diverted in their path alternately from one side of the runway-tube to the other as the latter vibrates from one position to another. Fig. 6 is a vertical longitudinal sectional view of the vibratory runway-tube, showing its connection to the operating mechanism, taken on line $o\,o$ of Fig. 3. Figs. 7 and 8 are respectively enlarged views of the unfinished and finished blanks. Fig. 9 is a transverse elevation of the lower portion of the conveying or runway tube, taken on line $z\,z$ of Fig. 3, which clearly indicates its spring-actuated operating-lever, and the relative position of the blanks with the arbors, which are shown in cross-section; and Fig. 10 is a longituinal sectional view of the arbor and drill mechanism, taken on line W W of Fig. 3, where the blank is represented as being operated upon by the drill between the faces of the two arbors, while at the rear the lower end of the conveying or runway tube is shown in elevation.

In the drawings, a indicates the vertical frame or legs, upon which the bed or table a'

is secured, and thus forming the base of the machine, upon which at one end is rigidly secured the drilling-head d, and therein mounted in suitable bearings are the revolving drill-spindles d' with their pulleys p^4. Secured in the end thereof are the removable drills c^3, operated by the belt b^2. To attain sufficient frictional belt contact with the drill-pulleys, the idler-pulley p^6 is introduced, and thus allows the two drill-spindles to be operated in the same direction by the one belt.

Underneath the table a' of the machine there is mounted in suitable bearings formed in the stands or legs a the horizontal main driving-shaft s^2, and mounted thereon are the cams c and c' for operating the conveying or runway tube and the blank-feeding mechanism. This shaft s^2 revolves by its connection with the gear g', in turn operated upon by the small gear g and pulley p, supported upon the stationary stud p^2, rigidly secured to the frame a. Between the stand or vertical frame a of the machine and the large spur-driven gear g' there is mounted upon the shaft s^2 a worm w, connected with the worm-gear g^3, (see Fig. 2,) located upon the lower portion of the nearly-vertical shaft s, this gear being retained in position by the bracket s^3, secured to the stand a, the bracket also serving as a support and bearing for the said shaft s.

P is the idler or loose pulley, onto which the driving-belt b is shipped when the machine is not in use.

Upon the sides of the bed or table and at each of the four corners are placed uprights a^2 of rectangular cross-section, which are employed to support the hopper and the mechanism connected thereto. Upon the top of these uprights there are placed tie-bars a^3 of like cross-section, thus forming a framework for supporting the hopper H and the nearly-vertical and the horizontal driving-shafts s and s', respectively, for operating the stirrer.

Located longitudinally of the machine and jointly supported by the stationary portion of the hopper and the rectangular framework a^3 in a suitable bearing s^6 is the stirrer-shaft s', having mounted upon its outer end the gear g^4, engaging the gear g^5 upon the top of the shaft s, which in turn receives its motion by the worm-gear w and the wheel or gear g^3, previously described. (See Figs. 1, 2, and 3.)

I will next describe the construction of the hopper and its contiguous runway. To the top of the rectangular standards a^2 are fastened longitudinal and end ties a^3, as before stated, thus forming a rectangular open framework, Fig. 1, upon which the hopper H is mounted. This, as drawn, consists of two pieces or halves, being divided transversely through the center, one half thereof being stationary and rigidly secured to the horizontal framework, while the remaining half is adjustably secured to the frame by bolts d^5, passing through slotted holes in ears cast upon the hopper. The sides of the hopper are of a curved semicircular form terminating in broad flanges d^3, which in turn are inwardly bent along their outer edges to form narrow retaining-flanges d^6, the latter being provided to prevent the blanks from falling from the hopper. (See Figs. 1 and 4.) The lateral space between the broad flanges d^3 is slightly in excess of the length or thickness of a spool-blank, and therein revolves the stirrer or agitator arms f, adjustably secured to the shaft s', the same having a series of arms adapted to revolve freely within the flanges d^3 of the hopper, and thus keep the blanks moving rearwardly toward the reservoir. (See Figs. 1 and 2.) By the addition of an inclined reservoir h, extending from the back of the hopper, the spool-blanks z are first deposited therein, the hopper being continually supplied therefrom. As the blanks are agitated in the hopper by the stirrer f they finally find their axial position in the mouth or lower portion d^4 of the hopper, at the lower extremity of which is pivotally jointed at b^8 the downwardly-extending rectangular-shaped conveying-tube or runway r, which is formed of two parts, thus admitting of a vibratory motion being imparted to the same.

Directly underneath the table a' is located the main shaft s^2, as before stated, the same having mounted thereon to impart a vibratory motion to the runway-tube r the disk-cam c, having in the face thereof an irregular path or groove c^2, in which revolves a guided friction-wheel w', supported upon a stud t^6, adjustably secured in the slotted or lower portion t^7 of the runway-operating lever t, which in turn is fulcrumed upon the stationary pin t^8, secured in a bracket t^9, bolted to the under side of the table, and thus connection is made, so that by revolving the shaft, the friction-wheel w' working in the cam c, a vibratory motion is imparted to the pivoted lever t, the latter passing through an opening in the table, its upper end terminating in a jointed connection at t^2 with the short horizontal link t', similarly pivoted at t^3 to the side of the runway, and through this intervening link t' a corresponding vibratory motion is given to the pivotally-jointed runway-tube. Upon the fulcrum or pin t^8 of the lever t is also loosely mounted the said lower portion t^7, the latter carrying lateral adjusting-screws t^4, adapted to engage a central lower tongue t^{10}, forming a part of the main lever t, as indicated in Fig. 5. Upon the shaft s^2 is also mounted a barrel-cam c', having in its peripheral surface an irregular path, whereby an endwise horizontal motion is imparted alternately to the blank-feeding mechanism. From this cam connection is made with either side thereof by horizontally-suspended links e' to the vertical feed-levers e, which are supported and pivoted at e^5 by a projection upon the frame or leg a. Working in the peripheral path of the cam c' are two oppositely-located friction-wheels w^2, revolving upon studs e^8, which studs also join the ends of the links e' and that of the suspending-links e^2. The upper ends e^4 of the latter links are pivoted to the flanges of the base-plate or table, the outer ends of the links e' being pivotally connected to the feed-levers e, as before stated.

Upon the table a' there are rigidly secured two rear stands or heads b', each having at either end suitably-arranged bearings b^2 for supporting a hollow spindle b^3, which carries at its inner end and adjacent to the runway-tube an adjustable finger b^5 or prolongation of the hollow shell, which serves as a holder for the blanks while they are being operated upon by the drill. Through this hollow spindle passes the arbor b^4, pivotally connected at its outer end with the corresponding feed-lever e, and as the different motions of the machine are so adjusted and related that a blank in the lower part or mouth of the runway is opposite the center of the arbor when it is traveling inward contact is made endwise therewith, and as the travel of the arbor is uninterrupted the latter engages the blank and forces it horizontally from the runway up to the rear face of the holder b^5 of the spring-resisted hollow spindle, and by a further travel of the lever e through the action of the cam c' contact is made between the advancing end of the arbor b^4 and the holder b^5 through the intervening blank and results in a simultaneous advance of the said two horizontal shafts b^3 and b^4. The blank thus carried along or conveyed is soon brought within the action of the revolving drills to bore the hole. Upon its completion a reverse action of the revolving cam c' withdraws the arbor b^4 by its positive connection to the lever e, while at the same time the hollow spindle is withdrawn, together with the frictionally-attached blank, by the tension of the spiral spring s^4, operating upon the pivotally-mounted segmental gear c^3 and its corresponding rack r^2, secured to the under side of the hollow spindle. (See Fig. 1.) During such rearward motion of the shafts the runway-tube is opposite the like neighboring mechanism, and thus permits the blank to be released from between the front end of the arbor and the adjacent face of the holder of the hollow shaft, the blanks dropping therefrom into any desired receptacle or runway. Sometimes the end of the arbor is slightly embedded into the blank, so that upon withdrawing the arbor after the completion of the drilling it is held thereon. In order to detach the blank, I introduce the pivotally-mounted pawl p^3, the free end of which, operating by gravity, detaches the blank should it stick to the arbor when on its outward or rearward movement. When the arbors are on their inward stroke, the tapering ends thereof move the pawls outwardly, the latter being always in contact with the surface of the arbor.

The construction of the runway-tube r is such as to accommodate blanks of any desired length, as is also the hopper H. This is attained by having the rear half of the tube r' adjustably secured to the permanent or non-adjustable side r of the tube by means of adjusting-screws r^4, passing through slotted holes r^5, Fig. 6. As the blanks are agitated in the hopper they finally find their axial position in the mouth d^4 of the hopper, where they descend in the runway-tube r by gravity. Internally located in the lower portion of the runway-tube is a V-shaped tongue or lever h', pivoted at h^2 and forming a part of the spring-actuated lever r^3, located upon the outside of the runway, (see Figs. 5, 6, and 9, the lower end of said lever being practically stationary and under the tension of the spiral spring h^4, which serves, also, to relieve the mechanism from undue pressure should the blanks become caught by the V-shaped tongue or lever h'. As the runway-tube vibrates from one side to another, and coincidently the fulcrum h^2 of the lever r^3, the blanks are diverted singly to alternate sides of the runway by means of contact with the diverting tongue or lever h' through its connection to the normally-stationary end of the lever r^3, and thus fed down to the corresponding side of the vertically-adjustable end h^9 of the runway, the triangular guide h^5 serving, also, as a bearing for and a continuation of the V-shaped lever h'.

Directly underneath the angular guide are mounted the spring-resisted guards h^8, whose upwardly-turned projections h^{10} prevent the blanks from rolling out as the tube vibrates. The said guards are pivoted at d^7, Figs. 5 and 9, near the center and underneath the runway, their outer ends being supported by the double spring h^3, secured, also, to the end of the runway. When the runway is in readiness to return to again place a blank in position for drilling, the projection h^{10} on its return motion comes in contact with the arbor b^4 and slips downwardly therefrom to be again elevated to its normal position by the spring h^3.

At the sides of the double-mouthed runway-tube there are pivotally mounted the spring-resisted curved covers c^4, adapted to bear upon the blanks, so as to prevent them from dropping when the lower blank is removed. As the runway approaches its extreme position alternately it causes a contact of the pin p^5, located in the lower extremity of the corresponding cover c^4, with the adjustably-mounted stationary stop p^6, and thus relieves the blanks from the pressure of the cover produced by the spiral spring h^7, and when so relieved the column of blanks falls to the bottom alternately. The covers are constantly under the influence of the tension of the springs h^7, (there being one attached on the rear and front sides of the runway,) excepting a short period of the time, when the runway is nearing its maximum travel in either direction. (See Figs. 3, 4, 5, 9, and 10.)

To start and stop the machine, a customary shipping mechanism is shown at Figs. 2 and 3, where f^2 is the shipper-shaft, and f^4 its shipping-arms, all being operated by the lever f^3 and the whole supported in suitable bearings f^5.

In carrying out my invention represented by the drawings I have arranged the parts so as to produce a double machine, the two feeding and boring mechanisms working alternately. It is apparent that the number of such feeding and boring appliances, together with the mechanically-agitated hopper, may be extended at pleasure; but I find, practically, it is better to confine myself in this class of machine to one hopper and its one vibrating double-mouthed runway-tube.

To accommodate various diameters of blanks, an adjustment must be made in the throw or vibration of the runway, and also in the vertical height of the adjustable end h^9. This I do for the vertical adjustment when the blanks are of larger diameter by lowering the end h^9, Fig. 5, by means of the slotted holes c^6, Fig. 9, in the side of the runway sufficiently so that the center of the blanks will traverse a segment of a circle of a constant or fixed distance from the face of the table or coincide with the predetermined path of the center of a blank whatever its diameter. The transverse adjustment I accomplish by the position of the friction-wheel w' in the angular slotted end of the lever, thus causing an increase or decrease in the motion of its upper portion. To attain a nicety of adjustment so that the center of the blank, whatever its diameter, shall come axially on the two extremes of the vibratory motion or directly opposite the centers of the drills, I employ two oppositely-located adjusting-screws t^4 and between which is the tongue t^{10}, forming a part of the lever t. Thus it will be seen that the lower portion of the lever t^7 during such time of adjustment may remain stationary, while the main or operating lever t and its connected runway are moved slightly transversely to thus have the runway traverse an equal amount either side of the center of the machine. After the proper stroke has been fixed, which is entirely governed by the position of the friction-wheel in the slot t^5 of the lower portion of the lever, the set-screws are rigidly set up, as before stated, thereby adapting the parts t and t^7 to move in unison.

I will now briefly describe the operation of the machine. It is first assumed that all of its parts are in their normal position and adjustment. Blanks introduced into the hopper H are by means of the stirrer or agitator axially delivered into the mouth of the runway-tube, and by gravity they descend to its lower part, where they are diverted either to the right or left or in a direction contrary to the position of the swinging runway. This is accomplished by the tongued or V-shaped lever h', actuated by the pivoted lever r^3, under the control of the spring h^4. When a blank has arrived by gravity at the bottom h^9 of the tube and is in contact with the projection h^{10} of the spring-guard h^8, the vibratory motion imparted to the runway by means of the pivoted links t and t' through the agency or revolution of the disk-cam c carries the blank transversely to the center of the drill. Previous to its arrival at that point the pressure upon the blanks on the opposite side of the runway has been relieved from frictional contact with the yielding cover by the pin p^5 coming in contact with the adjustable stop p^6, and thus the blanks fall by gravity to the bottom and are arrested by the end h^9, the diverting-tongue h', forming a part of the lever r^3, pivotally connected to the runway, with its lower end nominally stationary, serving to deflect the blanks in this direction—*i. e.*, to a contrary side of that necessary for drilling. It is now assumed that the blank is at its extreme position or opposite the axis of a drill, the runway being stationary. The mechanism for operating horizontally the arbor b^4 being in motion, the arbor advances toward the drill, carrying with it the blank which lies directly in its path upon the bottom of the runway, a further advancement of the arbor and propelled blank soon causing the latter to engage the holder or end portion b^5 of the hollow shaft b^3, and thus the two parts advance under the influence of the cam-actuated feed-lever e, and as the hollow spindle is always under the influence of the spring-resisted segmental wheel c^3 and rack r^2 frictional contact is sufficient to hold the blank stationary while being operated upon by the drill as the whole advances upon it. While this inward motion of the arbor, blank, and hollow shaft is taking place the runway-tube has started transversely to again assume a position that a blank may be in readiness to be acted upon by the neighboring drill, the projection h^{10} of the spring-actuated guard h^8 meanwhile slipping in its transverse motion from underneath the arbor. As the cams still further revolve they arrive at their maximum travel and the outward motion or withdrawal of the blanks and its connected mechanism takes place, and finally as the hollow spindle arrives at its normal position a further rearward motion of the arbor b^4 under the influence of the feed-levers relieves the blank from frictional contact, when it at once falls into any receptacle beneath, thus completing the operation.

My present invention is more particularly adapted to bore spool-blanks having diameters exceeding their length or thickness, substantially as indicated in my patent hereinbefore referred to. I have, however, in a companion application to this my present one described and claimed a machine constructed and arranged to drill or bore spool-blanks whose lengths exceed their diameters. In these three applications some of the parts or features are common to all.

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 new and desire to secure by United States Letters Patent—

1. A spool-boring machine having a hopper or reservoir for the spool-blanks, a jointed runway communicating with and extending downwardly from the hopper, two laterally-separated revolving drills, two blank-receiving holders arranged in line with the drills, mechanism for intermittingly vibrating the runway to deliver blanks singly to the holders, and mechanism for reciprocating the holders alternately in a longitudinal direction, substantially as described.

2. In a spool-boring machine, substantially as described, the combination, with a pair of laterally-separated revolving drills, a pivotally-mounted double-mouthed runway arranged to receive a column of spool-blanks, and mechanism for vibrating the runway transversely of the machine and in front of the drills, of two suitably-mounted holders arranged to receive the blanks singly and intermittingly from the runway, an arbor for each holder, arranged to hold a blank in position therein, and mechanism for alternately moving the holders and arbors in a longitudinal direction.

3. In a spool-boring machine, the combination, with a suitably-mounted hopper, a pair of revolving drills, and intermittingly-operating blank-holding devices arranged to reciprocate back and forth longitudinally of the machine, of an adjustable double-mouthed runway pivoted to and communicating with the hopper, a movable tongue mounted in the runway for diverting the blanks to the two mouths alternately, and mechanism for vibrating the runway transversely of the machine, substantially as hereinbefore described, and for the purpose set forth.

4. In a spool-boring machine, a pivotally-suspended blank-carrying runway adapted to be vibrated back and forth, having its lower portion provided with two oppositely-arranged mouths or outlets, a yielding front or cover for each, an adjustable base attached to and moving in unison with the runway, yielding stops or guards, as h^8, and a movable tongue, as h', for diverting the blanks to the right and left, substantially as described.

5. In a spool-boring machine, the combination, with the mounted revolving drills and pivotally-mounted double-mouthed adjustable runway working transversely of the machine, of the mounted spring-resisted hollow shafts b^3, provided each with a holder b^5, adapted to receive a blank, an arbor b^4, passing through each shaft, arranged to frictionally retain a spool-blank between the adjacent ends or faces of the holder and arbor, and mechanism for forcing the thus-retained blank into engagement with the corresponding drill and withdrawing and releasing the blank after it is drilled, substantially as described.

6. In an automatic spool-boring machine, the combination of a continuously-revolving drill, an intermittingly-reciprocating central arbor having an end arranged to engage the spool-blank, a longitudinally-movable spring-resisted non-rotating shaft having said arbor passing through and actuated by the arbor-operating mechanism, a blank-holder secured to the forward end of the shaft, arranged to have the drill pass through it, mechanism for delivering the spool-blanks singly to the holder in advance of the arbor, there to be frictionally held between the adjacent faces of the holder and arbor during the drilling operation, and a clearer arranged to detach drilled blanks adhering to the arbor, substantially as described.

7. In an automatic spool-boring machine, the combination of a revolving drill, a swinging runway communicating with a reservoir containing spool-blanks, a spring-resisted holder arranged to receive the blanks singly from the runway, a central arbor passing through the rear portion of the holder, arranged to engage the spool-blank, mechanism for intermittingly reciprocating said holder and arbor to and from the drill, and a clearer arranged to detach the bored blank from the arbor and holder, substantially as hereinbefore described.

8. An automatic spool-boring machine having a suitable hopper or reservoir for the spool-blanks, a runway or chute leading downwardly therefrom, two laterally-separated revolving drills, a yielding holder and center spindle mounted in line with each drill, mechanism for alternately delivering the blanks singly from the mouth of the runway to the holders, and devices for feeding the said holder, blank, and spindle ahead to drill the blank and for releasing the latter after it has been acted upon by the drill, substantially as described.

9. In an automatic spool-boring machine, the combination, with a hopper provided with a stirrer, a movable runway communicating with the hopper, a pair of revolving drills, and mechanism for conveying the blanks singly from the runway and placing them in position in line with the drills, of a spring-resisted longitudinally-movable non-revolving hollow arbor and holder arranged opposite to and in line with each drill, a center spindle passing longitudinally through the arbor, and mechanism for intermittingly and alternately forcing or feeding the said arbors, holders, and spindles in a longitudinal direction, substantially as hereinbefore described, and for the purpose set forth.

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

JOHN M. PARKER.

Witnesses:

CHARLES HANNIGAN,

GEO. H. REMINGTON.