3 Sheets--Sheet 1.

G. E. LYMAN.
Spool-Machines.

No. 158,644. Patented Jan. 12, 1875.

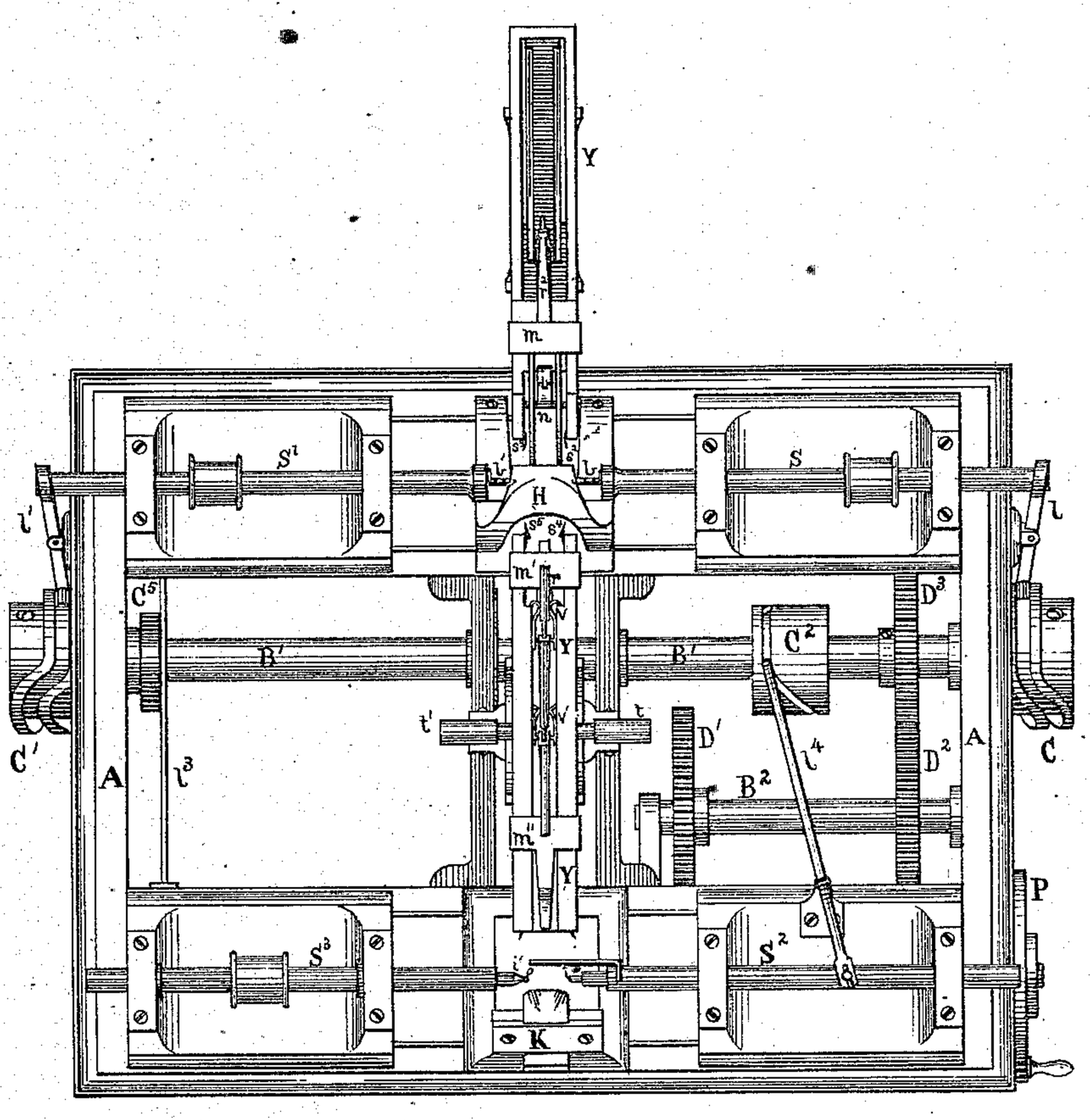

FIG. 1.

WITNESSES.

F. P. Read.

D. T. Lyman

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3 Sheets--Sheet 2.

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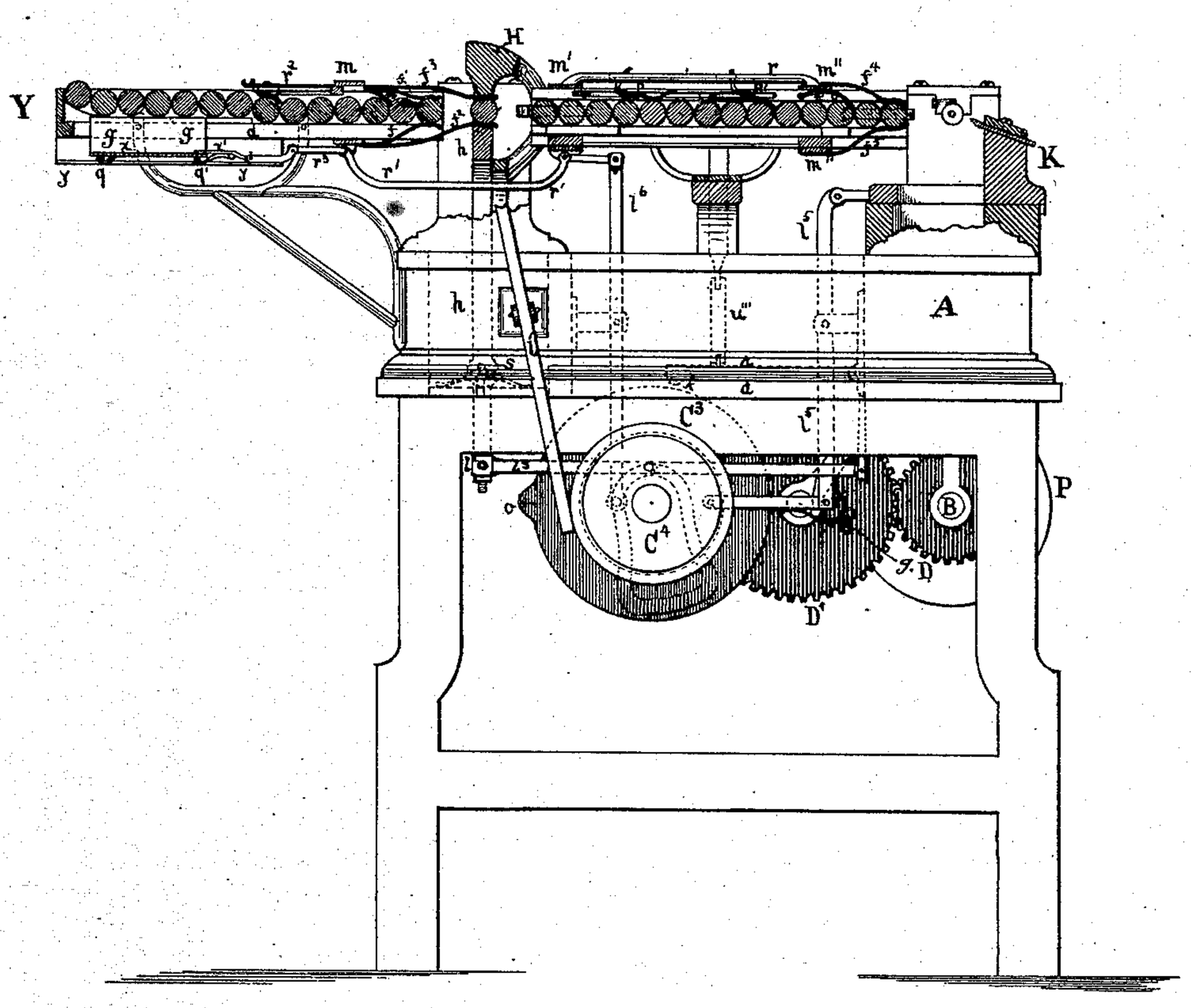

FIG. 2.

WITNESSES,

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3 Sheets--Sheet 3.

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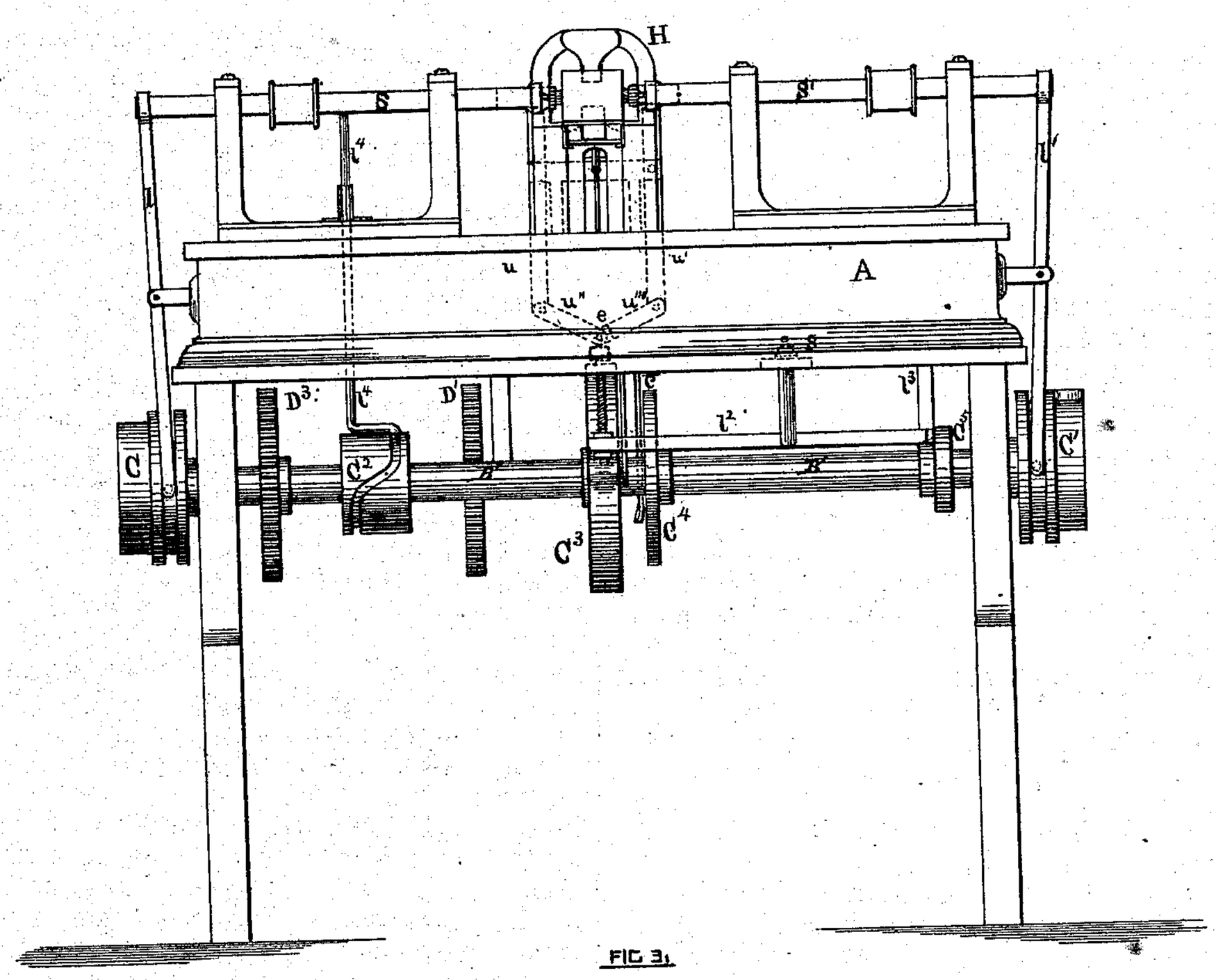

FIG 3.

WITNESSES:

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INVENTOR.

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UNITED STATES PATENT OFFICE.

GURDON E. LYMAN, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO DANIEL T. LYMAN, OF SAME PLACE.

IMPROVEMENT IN SPOOL-MACHINES.

Specification forming part of Letters Patent No. **158,644**, dated January 12, 1875; application filed August 30, 1872.

To all whom it may concern:

Be it known that I, GURDON E. LYMAN, of the city and county of Providence and State of Rhode Island, have invented certain Improvements in Spool-Machines, of which the following is a specification:

This invention has for its object the manufacture of thread-spools from cylindrical wooden blocks or blanks, including the stamping or embossing, on one or both heads of the spool, of a trade-mark, name, or other device; and consists in such a combination of the various parts that all the operations in such manufacture are performed in one machine.

The blanks are submitted to three principal operations, namely, first, planing or smoothing the ends and boring the hole, called heading and boring; second, stamping the ends; and third, turning the barrel of the spool by means of a lathe. The blanks are transmitted in succession by automatic machinery from the place where they are first introduced into the machine to different points where these several operations are performed. These blanks are first prepared for the machine by being turned to the requisite diameter, and sawed to the proper length for the spools intended to be made, and are then placed in the end of a conductor, adapted in this part of it to hold a considerable quantity. They are then drawn in succession, by mechanism adapted to the purpose, through the conductor into that part of the machine where the heading and boring are performed. As fast as this work is completed on each blank it is transmitted through a conductor, which is a mere continuation of the one already mentioned, to the stamp, and thence along the same conductor to the lathe, which finishes the spool by turning the barrel, and drops it from the machine.

In the accompanying drawing, Figure 1 represents a top view of my machine. Fig. 2 is a side elevation with a section through the length of the conductor, showing it filled with blanks and with portions of the end of the machine removed. Fig. 3 is a view of the back side of the machine.

A is the frame of the machine, which frame should be of substantial construction to resist the vibrations of the operating parts. P is the driving-pulley, which is hung on shaft B, from which latter motion is communicated to cam-shaft B′ by means of shaft B″ and gears D D^1 D^2 D^3. On cam-shaft B′ are hung the cam-wheels C C^1 C^2 C^3 C^4 C^5, the three latter having cam-grooves cut in the sides or faces, and C^3 also having a small cam, *c*, on its periphery. S S^1 are revolving spindles, on the inner ends of which are bits *b b′* for boring the hole, and at right angles to the bits are set knives in the ends of the spindles for planing and smoothing the ends of the blank.

These spindles are made to reciprocate or slide horizontally forward and backward by levers *l* l^1, operated by cams C C^1, for the purpose of boring the hole, and are so moved that one bit pierces a little past the center of the blank, and begins to retire before the other bit can meet it. This latter bit passes a little beyond the limit of the first, thus securing a clear hole through the blank. H is the block-holder or spool-clamp, of which the top is stationary, while the bottom is provided with a vertical clutch, *h*, working up and down in grooves. In the arrangement for working the clutch *h* it is desirable to provide against any danger of breakage in case a blank or other hard substance should chance to get into the jaws of the block-holder in such a way as to prevent the clutch from rising as far as intended. For this reason, the following has seemed to me to be the best. Lever l^2 is hung on an elliptic spring, *s*, (shown in dotted lines in Figs. 2 and 3,) and has one end attached to clutch *h*, and the other end connected with one end of lever l^3. This latter lever extends across the machine, as shown in Fig. 1, and is attached to the frame on the opposite side. By the action of cam C^5 this lever causes lever l^2 to oscillate and work clutch *h*, in the manner described. The spring *s* is sufficiently stiff to enable the clutch to do its proper work, but in case of any unusual resistance the spring yields, and the extra strain on the machinery is thus avoided. In place of the two levers l^2 l^3, a single lever may be used.

My invention embraces other means for relieving against unusual resistance in the jaws

of the block-holder, such as substituting rubber or a coiled spring for spring *s*, or a jointed lever, or a lever with sufficient elasticity in itself.

The stamping or embossing is performed after the blank has left the block-holder and is on its way to the lathe. Two upright, or nearly upright, levers, *u u'*, with proper supports, are placed one on each side of the conductor, along which the blank passes, the blank being in a horizontal position, and lying across the conductor. To the lower ends of *u* and *u'* are attached two other levers, *u'' u'''*, which come together so as to form an elbow or toggle-joint, *e*, Fig. 3. This joint rests on and is fastened to an arm, *a*, projecting from the side of the frame at some convenient point, and is attached to the frame by a hinge. The other end of the arm projects over the cam *c* on cam-wheel C^3. On the top of levers *u* and *u'* are placed cross-pieces *t t'*, as shown in Fig. 1. The inner ends of these pieces are fitted with dies for stamping, and also with centers of about the diameter of the hole in the blank, and tapered slightly at the ends. The centers are thus tapered to render them more certain to take up the blank in case the hole should chance not to come in a direct line with the centers at the proper time. By the revolution of cam-wheel C^3 cam *c* lifts the end of arm *a*, and with it the elbow *e*, thus throwing outward the lower ends of *u* and *u'*, and bringing the dies in contact with the ends of the blank through an opening provided in the sides of the conductor. To bring the dies back, and set the blank free from the dies and centers after the stamping, the end of arm *a* is made to fall after the cam *c* has passed under it by connecting the end of the arm with a groove in the side of cam-wheel C^3, cut to operate like a cam. The time occupied in stamping and freeing the blank is diminished by a knob or protuberance placed on the under side of the cam *a*, as shown by dotted lines at *k*, Fig. 2. S^2, Fig. 1, is a spindle, made to slide horizontally by a lever, l^4, actuated by cam C^2. This lever may be attached to the frame, and then bent toward the cam on the one hand, and toward the spindle S^2 on the other, so as to act like a crank. Spindle S^2 is provided with a center, *i*, to fit loosely in the hole of a blank, which, after stamping, is placed, by appropriate mechanism, in a line with this spindle. The spindle is then brought forward by lever l^4, and taking the blank upon the center *i* presses it upon the center *i'* of revolving spindle S^3. This center *i* has flanges in the usual way, but as spindle S^3 is revolving rapidly, if the flanges should strike the wood before the blank begins to revolve, they would cause more or less reaming. To obviate this difficulty a ball or knob, *o*, Fig. 1, fitting snugly in the hole, is placed on the end of center *i'*, between the flanges and the blank, and enters the hole in advance of the flanges, and causes the blank to begin its revolutions before it reaches the flanges. The three revolving spindles take their revolutions from shafting outside of the machine by means of belts and pulleys. The knife-carriage K (shown in Fig. 1 and in section in Fig. 2) may be of the ordinary construction, and is moved by lever l^5, shown in part in Fig. 3 and by dotted lines in Fig. 2, in connection with cam C^4, Fig. 3. The drawings show a lever, l^5, projecting nearly vertically downward from the point where it is attached to the knife-carriage, and then bent toward cam C^4, forming about a right angle, as shown in Fig. 2. At this angle a joint is made in the lever, which allows the opening of the angle contained between the two parts of the lever, but prevents its closing to less than the angle fixed upon in the contraction of the lever. The cam C^4 works against the end of the lower arm of this lever in drawing up the knife-carriage toward the blank and depresses it, and tends to open the joint. A spring, *s'*, Fig. 2, keeps this joint closed unless the knives or carriage in advancing meet with some undue resistance. This might happen if, from some defect in the wood, a blank should fail to revolve. In such case the spring *s'* allows the joint to open until the cam has ceased to act in that direction. The carriage stops or comes up more slowly according to the amount of resistance, and the danger of breaking any part of the machinery is entirely obviated or greatly reduced. Various other means may be employed to accomplish the same end, as suggested in the case of clutch *h* and the lever operating it. The conductor Y (shown in Fig. 1 and in longitudinal section in Fig. 2) extends from behind the blockholder nearly to the lathe in the front part of the machine. It should be of sufficient width and depth to allow the blanks to pass freely through its whole length in the manner shown in Fig. 2, and sufficiently closed on all sides to prevent the blanks from escaping as they are pushed along. It consists of two parts—the portion behind the block-holder and that portion between the block-holder and lathe. These two parts will be treated as forming one conductor. *m m' m''* are sleeves or sliding bands upon the conductor, the two latter being connected by rods, which run in grooves in the bottom of the conductor, and also by a rod, *r*, Fig. 1. A connecting rod, *r'*, extends from *m'* to *m* through the block-holder, so that the three sleeves *m m' m''* are all thus connected, and move simultaneously by the operation of lever l^6, Fig. 2, in connection with the cam-groove in cam-wheel C^3. *v v'*, Fig. 1, are carriages running in grooves made in the inner surfaces of the sides of the conductor, near the top. To these carriages are attached movable pawls, *p p'*, Fig. 2, with slotted necks extending upward, through which the rod *r* passes to give them motion. These pawls are intended at each forward movement to engage a single blank and carry it forward a distance equal to its diameter, but as the travel of any

fixed point on the rod r would in most, if not all, cases exceed the length of such diameter, the rod r is allowed to pass freely through the slots in the first part of its travel in either direction, and shoulders or projections on the rod then carry the pawls the remaining distance. The space over which the pawls are thus made to travel is easily regulated by placing the shoulders nearer together or farther apart. Adjustable bands or sleeves around the rod with a set-screw are a convenient means for adapting the movements of the pawls to different-sized blanks. The pawl p attached to carriage v is intended to place a blank directly between the dies, and is so shaped as to embrace a portion of the top of the blank and prevent its going beyond its destination until it is caught by the centers which hold it during the act of stamping. A carriage similar to those described, with a pawl like that attached to carriage v', is placed in that part of the conductor which is behind the block-holder, and is moved by a rod, r^2, extending back from sleeve m with shoulders like rod r. The pawls are attached to the carriages by hinges or such other means that, with a slight friction of the carriages in the grooves, the lower ends of the pawls will be lifted up in their backward travel and pass clear of the blanks, and will be dropped down on starting to go forward, so as to engage a blank. These several movable pawls now described are intended to assist in moving a column of blanks filling the whole length of the conductor, and they so operate, in connection with other mechanism, that at the same instant at which a blank is taken out of the mouth of the conductor to go into the lathe another blank is taken into the line out of the reservoir of blanks in the back end of the conductor, and the whole series is moved forward a distance equal to the diameter of one blank, the blanks being supposed to be of uniform size. If the conductor were placed at an angle, so as to incline toward the lathe, or if it were placed in a perpendicular position the blanks might find their way through it without the aid of the pawls; but it is believed that, owing to some slight irregularities in the size of the blanks, which is unavoidable, and to their lightness and other reasons, the assistance of a greater or less number of pawls, such as described, or other similar means, is necessary for delivering the blanks constantly and with certainty at the required points. n is a stationary pawl in the conductor so hung as to allow the blanks to pass under it toward the block-holder, but prevents their return. s^2 s^3 are springs, which hold the blanks from falling out of the mouth of the conductor after passing in front of the stationary pawl n. ff^1, Fig. 2, are fingers or springs attached to and moving with sleeve m, and which, in drawing back, take hold of the blank lying directly in front of pawl n, as shown in Fig. 2. These fingers carry the blank forward and place it in the jaws of the block-holder, which are hollowed or concaved so as to fit the form of the blank and to insure its position in a line with the spindles, as well as to hold it more firmly. The clutch h, rising at the same instant, grasps and holds the blank firmly in the proper position for heading and boring, while, by a reverse motion, the fingers are drawn back to take up another blank, which, in the mean time, has been pushed forward under the stationary pawl n. f^2 f^3 are also fingers attached to sleeve m, and similar to those already described, but of greater length, and which, moving simultaneously with ff^1, grasp the blank in the block-holder before the clutch h has set it free, and, after it is so released, carry it into the conductor in front of the block-holder. Springs s^4 s^5, Fig. 1, in the sides of the conductor, with a shoulder in their inner surfaces, catch hold of the blank and retain it in the conductor. This blank is, in turn, pushed forward by the succeeding blank or blanks until it comes within reach of a pawl. f^4 f^5 are fingers attached to sleeve m'', and take the blanks in succession from the mouth of the conductor and place them in the lathe in such a manner that they are taken upon the centers of the spindles S^2 S^3, as already explained. These fingers operate precisely like ff^1 in taking hold of the blank in the conductor, and are assisted by a stationary pawl, n', Fig. 2, performing the same office as pawl n. In the end of the conductor, where the blanks are first introduced, the bottom may be made to incline slightly toward the block-holder, so that the blanks will roll forward as fast as those in front are taken away. A shoulder or ledge, d, Fig. 2, in the bottom, over which the blanks are allowed to fall, prevents them from being pushed back by the pawl, in case it should chance to drag over them in moving back. In place of the inclined plane, or in conjunction with it, a sliding carriage, g, shown in part in Fig. 2, is found useful in drawing the blanks toward the first pawl and keeping it constantly supplied. This carriage is shaped like a carpenter's miter-box or a cigar-box with the top and both ends removed, and across the bottom of such carriage are fastened two rods, q q', projecting beyond the sides like trunnions or journals, which rest on a railway, y, placed under and parallel with the conductor. A connecting-rod, r^3, with joints, connects the carriage with sleeve m, so that they move together. Longitudinal slots or channels, seen in Fig. 1, are cut in the bottom of the conductor, in which the sides of the carriage run. When the carriage rests on the railway these sides should not be high enough to touch the blanks in the conductor; but when it is drawn forward, with the motion of sleeve m, the journals pass over little inclined planes, X X', resembling pawls fixed over the rails which raise the sides of the carriage up through the channels, so that they will lift the blanks and draw them forward.

The journals, after passing over the elevations, fall down upon the rails again and pass under the pawls in returning.

The edges of the carriage brought in contact with the blanks may be roughened or serrated to render them more effective in removing the blanks.

When it is desired to make plain spools the stamping apparatus can be removed or disconnected.

By means of the invention now described, not only spools, but pail-handles and a variety of other articles in daily use can be made with great rapidity and of a quality equal or superior to those made by the ordinary means.

I do not claim as new a single revolving spindle, with cutters and bits for boring the hole, nor the cutters as applied to a revolving spindle for planing the head, nor any of the ordinary and well-known parts of a lathe which are here employed.

What I do claim, and desire to secure by Letters Patent, is—

1. The block-holder H, with clutch *h*, constructed and operated substantially as described.

2. In combination with lever l^2 and clutch *h*, the spring *s*, substantially as and for the purposes herein shown and set forth.

3. In combination with the reciprocating stamping cross-pieces *t*, provided with centers and dies, and arranged one on each side of the conductor, as specified, the levers *u u' u'' u'''*, toggle-joint *e*, arm *a*, and cam C, substantially as shown and set forth.

4. In combination with the bent lever l^5 for for actuating the knife-carriage, jointed at its bend or elbow as described, the spring *s'* applied to said lever at said jointed bend or elbow, substantially as and for the purposes set forth.

5. The combination of a spindle, S^2, having center *i*, lever l^4, cam C^2, spindle S^3, provided with center *i'* and ball *o*, with carriage K, cam e^4, lever l^5, and spring S^1, substantially as and for the purposes described.

6. The conductor Y, substantially as described, for the purposes set forth.

7. The combination of sleeves *m*, fingers *f*, rod *r* provided with shoulders, carriage *v*, sliding pawls *p*, stationary pawls *n*, and springs *s*, substantially as described, and for the purposes specified.

8. In combination with the conductor, the carriage *g*, railway *y*, and inclined planes *x*, substantially as described, and for the purposes specified.

9. A conductor or trough, Y, extending in a right line or continuously from end to end of the machine, in combination with the mechanism for boring and heading and for turning the blanks contained in and passing through said conductor, substantially as herein shown and set forth.

GURDON E. LYMAN.

Witnesses:
D. T. LYMAN,
F. P. READ.