(No Model.) 3 Sheets—Sheet 1.

A. W. ALLEN.

SHUTTLE BOBBIN WINDER.

No. 488,176. Patented Dec. 20, 1892.

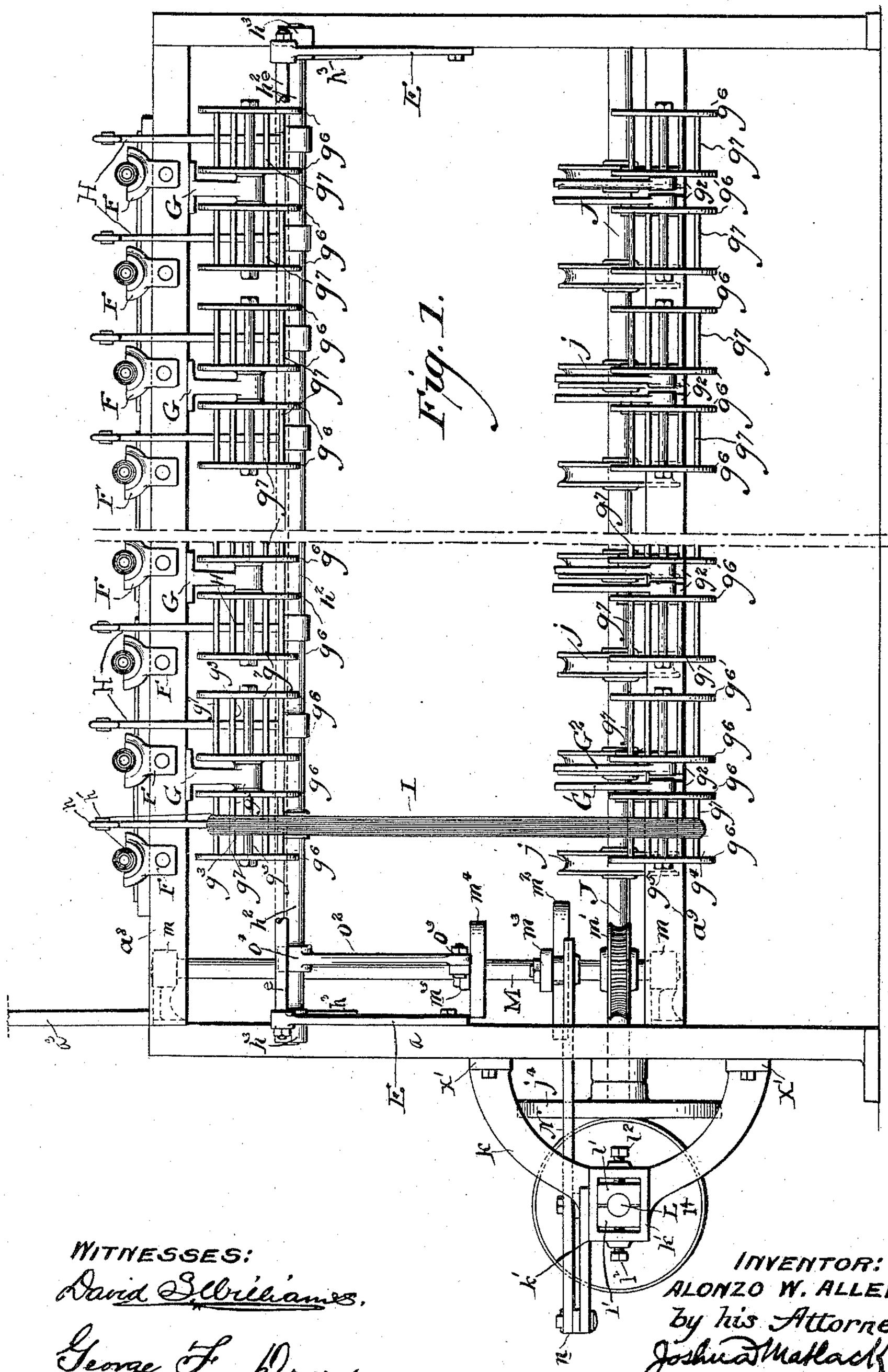

Fig. 1.

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Fig. 5.

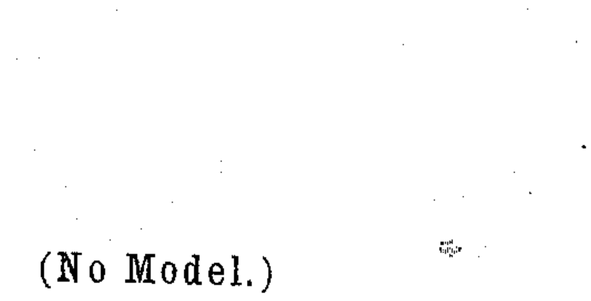
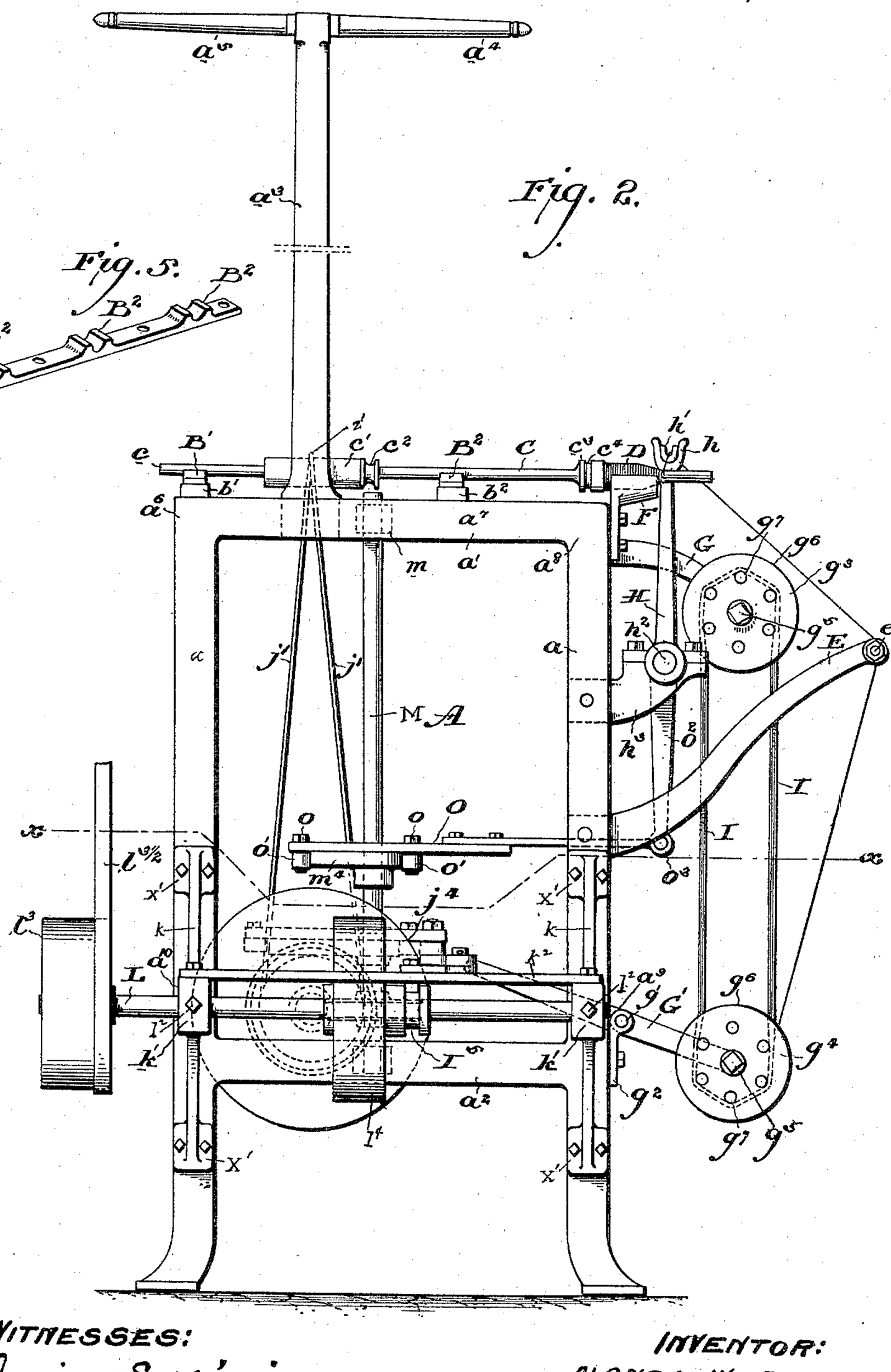


Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 3.

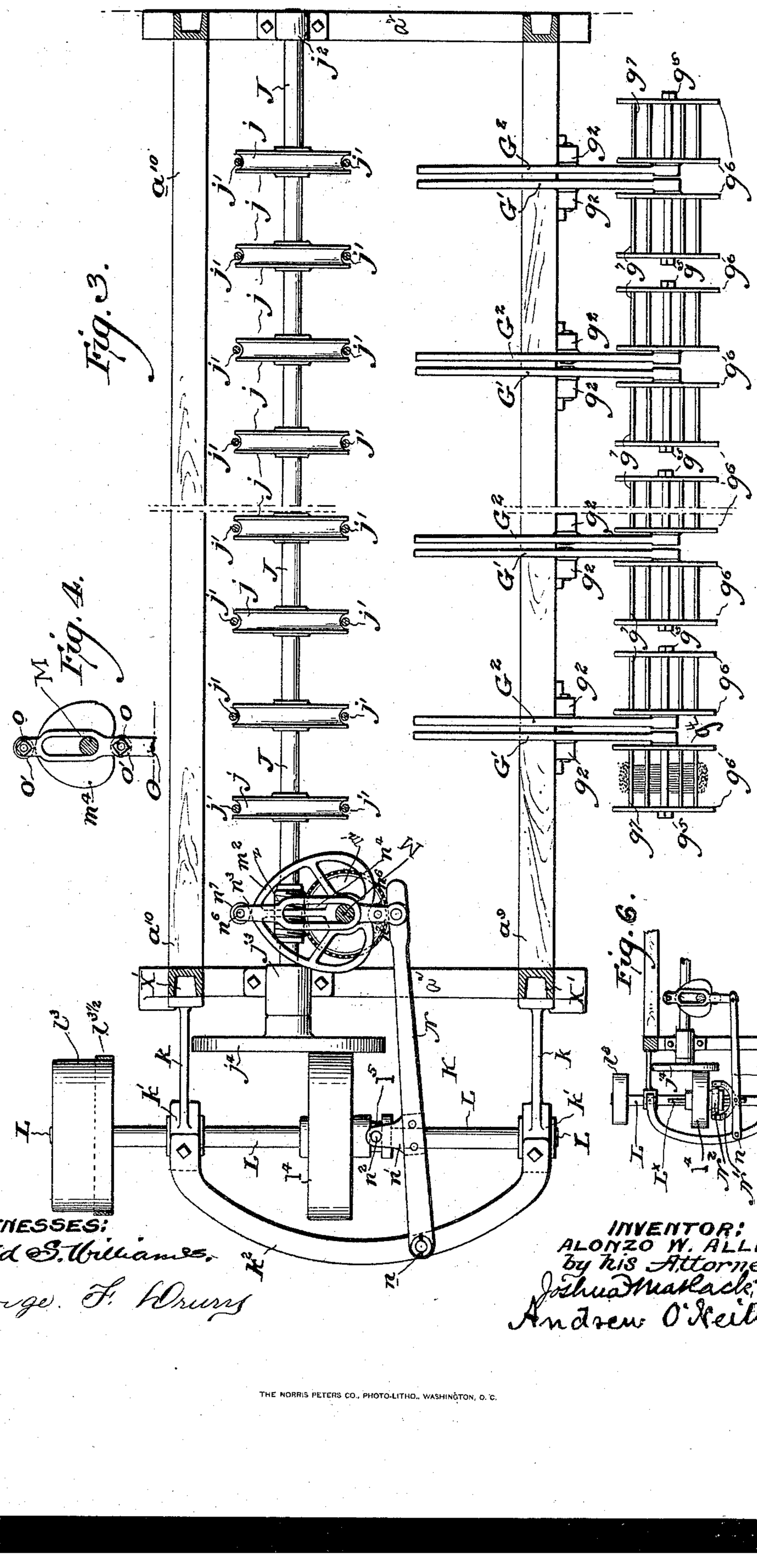

Fig. 4.

Fig. 6.

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SHUTTLE-BOBBIN WINDER.

SPECIFICATION forming part of Letters Patent No. 488,176, dated December 20, 1892.

Application filed December 21, 1891. Serial No. 415,692. (No model.)

To all whom it may concern:

Be it known that I, ALONZO W. ALLEN, of the city and county of Philadephia, State of Pennsylvania, have invented a certain new and useful Improved Shuttle-Bobbin Winder, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of machinery known as textile, and particularly to that class of textile machinery known as winders.

It has for its object to wind the thread or yarn on the nose of the bobbin as tightly as it is wound at its base to prevent said thread unwinding from the bobbin before its use which avoids waste of the thread and enables the weaving to be better accomplished, the waste heretofore caused by the thread being wound more loosely on the nose of the bobbin than on its base being at least a third of the thread used. I overcome this difficulty by devising the mechanism hereinafter described and claimed which has a variable motion and increases the speed of the spindle as the thread approaches the nose of the bobbin and decreases the speed of said spindle as the thread is wound toward the base of the bobbin.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated and in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 an end elevation. Fig. 3, a sectional plan view on the line x—x of Fig. 2; and Fig. 4 a plan view of the small cam which imparts motion to the rock-shaft to which the thread guides are secured. Fig. 5 is a detached perspective view of the spindle bearings; and Fig. 6 is a plan view of the modified differential speed mechanism.

A (Fig. 2) is the frame of the machine which consists of two castings each of which is formed of legs a a, upper and lower strengthening pieces a' and a^2—extension a^3 having laterally-extending arms a^4 a^5; square beams a^6 a^7 a^8 a^9 and a^{10}, made either of wood or iron, running from one casting to the other as shown in Fig. 2. The purpose of the arms a^4 and a^5 on extension a^3 is for the operator to hang the skein of thread upon as he, with his arms thrust through the other end of said skein, works out any entanglement that may have gotten into it preparatory to placing the skein on the runners—it being very essential that all the threads should be free from each other.

B′ and B² designate spindle-bearings; these bearings consist of a straight rod of iron or other suitable material with square blocks, as it were, cast with and at intervals along it; these blocks have their upper face grooved out in a concave or U-shape as shown in Fig. 5; the surface of this concave is covered with Babbitt metal which lengthens the life of the bearings considerably. Their number corresponds to the number of spindles on the machine. They are screwed to square rods of iron b' b^2, which, in turn, are secured to beams a^6 and a^7.

C (Fig. 2) is the spindle. This spindle consists of a shaft c tapering to a point at one end; its length being a little more than the width of the machine so as to allow its pointed end to extend into the shaper F. Near the left-hand end of this shaft is a fast pulley c' and a loose grooved pulley c^2; near the pointed or right-hand end is a socket c^3 with pin c^4.

D is the bobbin consisting of a cone-shaped body of wood with a hole running from end to end through its center, and having a groove across its bottom.

E is an arm; there is one of these fixed on the right-hand side and at each end of the machine and a cylindrical rod e passes from one to the other—the arms and rod constituting what might be called the thread-rod.

F is a cone-shaper open at its top and having a porcelain lining. There is one of these to every spindle and they are movably fixed to beam a^8, that is, fixed so that they can be raised or lowered.

G, G′ and G² are hangers—G being the upper, and G′ and G² the lower. The upper one, G, is an arm curving downwardly; it is rigidly fixed to beam a^8; it has extending laterally from each side on its lower end small cylindrical rods upon which the reels or runners revolve. The lower ones, G′ and G², are straight rods of iron swung or journaled at their center in bearings g^2; on their inner

end is movably fixed a small weight; on their outer end is rigidly fixed a small cylindrical rod extending at right angles with it upon which the reels or runners revolve as in the case of the upper ones; there is a pair of such hangers in each bearing. The holders or bearings g^2 are movably secured to the beam a^9 so as to allow their being moved upward or downward.

g^3 and g^4 are runners or reels; they consist of a hub with a flat circular piece of wood g^6 on each end, and pins g^7 passing from one to the other and placed in a circle around the hub. These runners are slid onto the laterally-extending rods on the hangers and revolve thereon. There are two such runners on each upper hanger, and one on each lower hanger. Each runner revolves independently of every other one; the upper and lower runners are in direct line with each other—that is, over and under each other. The purpose of these runners is to receive the skein to enable its being unwound—said skein is passed around the upper and lower runner, the lower one being raised by swinging the arm up so as to allow the skein to be slipped thereon and the weight on the inner end of the lever is placed at a point on said rod as to relieve the weight of the hanger with attached runner from the skein which allows very fine and delicate thread to be wound.

H is a thread guide consisting of a rod of iron having a large hole in its lower end to allow its being slipped on rock-shaft h^2, and having at its upper end a fork h; in this fork is set a piece of porcelain h' which corresponds to the shape of said fork and over the surface of which the thread passes to the bobbin. There is one of such guides at the side of every spindle and they are rigidly secured to the rock-shaft h^2.

I (Figs. 1 and 2) is the skein of thread or yarn passing around the runners—one thread being taken from the lower runner out to and passed on the outside of the thread-rod e, up to and through guide fork h, and then to the bobbin.

J (Figs. 1 and 3) is a counter-shaft running from one end of the machine to the other on its left-hand lower side and being journaled in bearings j^2 and j^3 (Fig. 3) on the lower strengthening pieces a^2 of each casting A.

j indicates grooved pulleys rigidly secured at intervals along this shaft and being equal in number to and corresponding with the spindles over them on the top of the machine.

j' (Figs. 2 and 3) is a cord belt passing around and from each of these pulleys up to and over each pulley c' on spindle C as shown at z' in Fig. 2.

At the upper end of the counter-shaft J and on the inside of the machine is a worm z which meshes with worm-wheel m' on vertical-shaft M. This counter-shaft passes through its bearing j^3 and has secured to its end an operating-disk j^4; this disk has cemented to its face, entirely covering it, a piece of pasteboard which has undergone a process which imparts to it an adhesive quality; the disk is thirteen inches in diameter.

On the upper left-hand side of the machine, running from end to end thereof, and placed in front of beam a^6 on the inside of the machine, is a roller (not shown); the purpose of this roller is to force the cord-belt j' along the fast pulley c' on the spindle as said spindle moves from right to left of the machine as the thread is being wound upon the bobbin, the roller at all times keeping the cord in a perpendicular position and until it drops into the grooved pulley c^2.

All of the above parts, with the exception of the worm and disk on the counter-shaft, are old and well-known and form no part of my invention except in combination with the variable-speed and rock-shaft mechanisms which I will now describe and which constitute the new portion of my machine.

K (Fig. 3) is a bracket. This bracket consists of two castings k and k of the semi-circular shape shown in Fig. 1; there is a casting secured to each leg of the head of the machine as shown at x' in Figs. 1 and 3; at the center of each casting is a journal-box k'; these castings are secured together by a yoke k^2 running from one to the other with its concave turned away from the machine as shown in Fig. 3.

L is the main-shaft; this shaft is journaled in bearings k' k'; these bearings have in them two pieces of rubber l' l' (Fig. 1) placed on each side of the shaft and act as cushions for the same and serve to increase the frictional contact of the pulley and disk; through each side of the boxes are screwed set-screws l^2 l^2 (Fig. 1) which press against and hold firmly to said shaft the pieces of rubber.

l^3 is the fast pulley on the left-hand end of the shaft L from which the machine receives motion through a belt passing from another pulley and shaft connected with the source of power; this pulley is preferably much wider than the belt which passes around it, the object of which will hereinafter be stated.

l^4 is a differential-speed pulley rigidly secured to shaft L; on the right-hand end of the hub of this pulley is a groove l^5 (Figs. 2 and 3) which receives the pin n^2 on extension n' from lever N. The face of this pulley is covered with the same material that I before stated the face of the disk was covered with, and said pulley comes in frictional contact with said disk; the pulley is nine inches in diameter and three inches face.

M is a vertical shaft journaled in bearings m m secured to the strengthening pieces a' and a^2, (Figs. 1 and 2.) Near the bottom of this shaft is a worm-wheel m' (Fig. 1) which meshes with worm z on the counter-shaft.

m^2 (Figs. 1 and 3) is a heart-cam rigidly secured to the shaft a little above the wheel m'.

m^3 is a collar rigidly secured to the shaft a

little above the cam; this cam is the one which imparts motion to the differential-speed pulley and its attached levers.

m^4 (Figs. 1 and 2) is another heart-cam, smaller than the one below it, rigidly secured to the shaft.

m^5 (Fig. 1) is a collar rigidly secured to the shaft a little above the cam m^4; this cam imparts motion to the rock-shaft.

N (Figs. 1 and 3) is a lever; the outer end of this lever is fulcrumed to yoke k^2 at n; opposite differential-speed pulley l^4 it has an extension n', (Fig. 3) which extension has a pin n^2 which sets in or engages with groove l^5 on the hub of the differential-speed pulley; the inner end of this lever is movably connected with the lever n^3, which lever n^3 has a parallel guide n^4 cut in it through which the shaft M runs, (Fig. 3;) on each end of said lever n^3, are downwardly-extending pins n^6 carrying wheels n^7; this lever is placed upon the shaft immediately above the cam m^2 with the wheels n^7 in contact with the periphery of said cam—the collar m^8 being immediately above the lever.

O (Fig. 2) is a lever; it has a parallel guide cut out of its center like lever n^3 through which the shaft runs, and at each end of the guide are pins o, carrying wheels o', which wheels bear against the periphery of cam m^4 as in the case of the cam below it; the outer end of this lever is movably fixed to extension o^2 as shown at o^3 (Figs. 1 and 2); the upper end of said extension being rigidly secured to rock-shaft h^2 at o^4 as shown in Fig. 1.

The operation of my machine is as follows: A bobbin D is slipped on the pointed end of the spindle C—the groove in its bottom receiving the pin c^4 on socket c^3 which holds said bobbin securely to the spindle and prevents it turning upon said spindle. The cord j' is then slipped over the grooved pulley j on the counter-shaft and the fast pulley c' on the spindle; the spindle is then placed in the bearings B′ with the bobbin resting in the shaper but free to revolve therein as shown in Fig. 2. A skein of thread or yarn is now passed around the runners g^3, g^4, one thread of said skein taken from the lower runner to and around the outside of the thread-rod e up to and through the guide-fork h, and fastened to the base of the bobbin. A belt $l^{3½}$ is passed from a pulley on a shaft secured to the ceiling or other convenient place (which shaft is in connection with the source of motion) to and around the fast pulley l^3 on shaft L. Power is now applied, belt $l^{3½}$ turns pulley l^3, which turns shaft L, which shaft revolves differential-speed pulley l^4, which, being in frictional contact with the disk j^4, revolves said disk and in turn the counter-shaft J to which it is secured, which shaft in turn, carrying grooved pulleys j, revolves them which in turn, carrying the cords j', said cords being passed over pulley c' on the spindle C, revolves said spindle and of course the bobbin which said spindle carries. The small worm on counter-shaft J meshing with worm-wheel m' on vertical-shaft M turns said shaft M, which, in turn, turns cams m^2 and m^4, which, having the wheels on levers n^3 and O in contact with its periphery pushes said levers outward and inward—the levers being guided by the opening in their center through which the vertical-shaft passes. The lever n^3 being connected with lever N imparts motion to it; the lever N being connected, as before described, with the differential speed-pulley l^4 which is rigidly secured to the shaft L—moves said shaft in a parallel direction—that is, from right to left of the machine—toward and away from the center of the disk j^4—which movement of the pulley l^4 toward and away from the center of said disk with which it is in frictional contact, varies the speed of the spindles—as the pulley l^4 moves toward the center of the disk the speed of said disk increases and in turn the spindles to which it gives motion, as said pulley moves away from the center of the disk the speed of the said disk decreases and consequently that of the spindles. When the pulley l^4 is nearest the center of the disk and the speed of said disk at its highest point the thread is being wound on the nose of the bobbin; when the pulley is farthest away from the center of the disk and the speed of said disk is at its lowest point the thread is being wound on the base of the bobbin, hence accomplishing the result aimed at, namely, winding the nose of the bobbin as tightly and closely as the base. This is the essence of my present invention. As the shaft L moves backward and forward the fast pulley l^3 which drives it of course does likewise and in so doing the belt $l^{3½}$ runs from one side of said pulley to the other; to allow this is the reason the pulley is made wider than the belt as I have stated before. When the vertical shaft is revolved it of course revolves the upper cam m^4, which, having the wheels o' of lever O pressing against its periphery, pushes said lever backward and forward, which in turn rocks the extension o^2 and which again rocks the rock-shaft h^2 to which it is secured; the rocking of this shaft rocks the guides H, the rocking of which guides distributes the thread up and down the travis of the bobbin; the distance of said rocking is regulated by the size of the heart-cam m^4. As the base of the bobbin becomes full of thread said thread comes in contact with the surface of the inside of the shaper which pushes the spindle slowly toward the left side of the machine—that is, pushes it out of said shaper; the cord passing over fast pulley c' is of course carried back with it but said cord coming in contact with the roller heretofore spoken of it is pushed forward and finally, when the bobbin is full of thread, the cord drops into the loose pulley c^2 and the revolution of the spindle ceases.

As above described the differential-speed

pulley is rigidly secured to the main shaft L and the shaft with its two pulleys moves backward and forward; this is preferred by me but there is another way of accomplishing the same purpose, namely, loosely fixing the pulley to the shaft and moving the said pulley independently of the shaft. I do this (as shown in Fig. 6) by sinking a feather or keyway $L^{\times}$ on the shaft, running a groove $l^{5\frac{1}{2}}$ from end to end on the inside of the hub of the pulley which fits over and engages with the feather on the shaft; placing a collar N^2 around the groove l^5 on the right-hand end of the hub so that the pulley can revolve independently of it; securing a yoke N′ to said collar, and movably fixing the lever N to this yoke. Therefore, as the lever N moves backward and forward it pushes and pulls the pulley l^4 at the same time that the said pulley revolves.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is—

1. In combination the bracket K, the shaft L journaled thereon, the pulleys l^3 and l^4 carried by said shaft, the counter-shaft J, the disk j^4 secured to said counter-shaft, and being in frictional contact with the pulley l^4, the worm z on said counter-shaft, the vertical shaft M, the worm-wheel m' on said shaft, said worm-wheel meshing with said worm, the cams m^2 and m^4 on said shaft M; the cam-levers n^3 and O, lever n^3 being in engagement with cam m^2; the rock-lever N connected to lever n^3 at its inner end and at its outer end fulcrumed on bracket K and also connected with pulley l^4 in such a way that said pulley l^4 can revolve freely with shaft L; cam-lever O engaging with cam m^4 on shaft M; rock shaft h^2 connected to lever O in such a manner that said rock-shaft will rock through the motion imparted to it by the action of cam m^4; the whole being so arranged and operating in such a manner that the pulley l^4 can move toward and away from the center of the disk j^4 as the shaft L revolves.

2. In a thread-winding machine, the combination of the bracket K, the shaft L journaled thereon in such a manner that said shaft can have a parallel or sidewise movement in its bearings; the cushions l' on each side of shaft L in its bearings; the pulleys l^3 and l^4 carried by shaft L, pulley l^4 having its periphery covered with anti-friction material; the counter-shaft J, the disk j^4 secured to said counter-shaft, having its face covered with anti-friction material and being in frictional contact with the pulley l^4; the worm z on said counter-shaft; the vertical shaft M, the worm-wheel m' on said shaft, said worm-wheel meshing with said worm, the cams m^2 and m^4 on said shaft M; the cam-levers n^3 and O, lever n^3 being in engagement with cam m^2, the rock-lever N connected to lever n^3 at its inner end and at its outer end fulcrumed on bracket K, and also connected with pulley l^4 in such a way that the shaft L and pulley l^4 can revolve freely at the same time that said fulcrumed lever pushes said shaft L in a parallel direction through the action of the cam m^2 on shaft M, moving the pulley l^4 toward and away from the center of the disk j^4; the cam-lever O engaging with cam m^4 on shaft M; the rock-shaft h^2 connected to lever O in such a manner that said rock-shaft will rock through the motion imparted to it by the action of cam m^4; all substantially as and for the purpose specified.

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