No. 653,786. Patented July 17, 1900.

M. G. BLUE.

LATHE FOR TURNING IRREGULAR FORMS.

(Application filed May 25, 1899.)

(No Model.) 4 Sheets—Sheet 1.

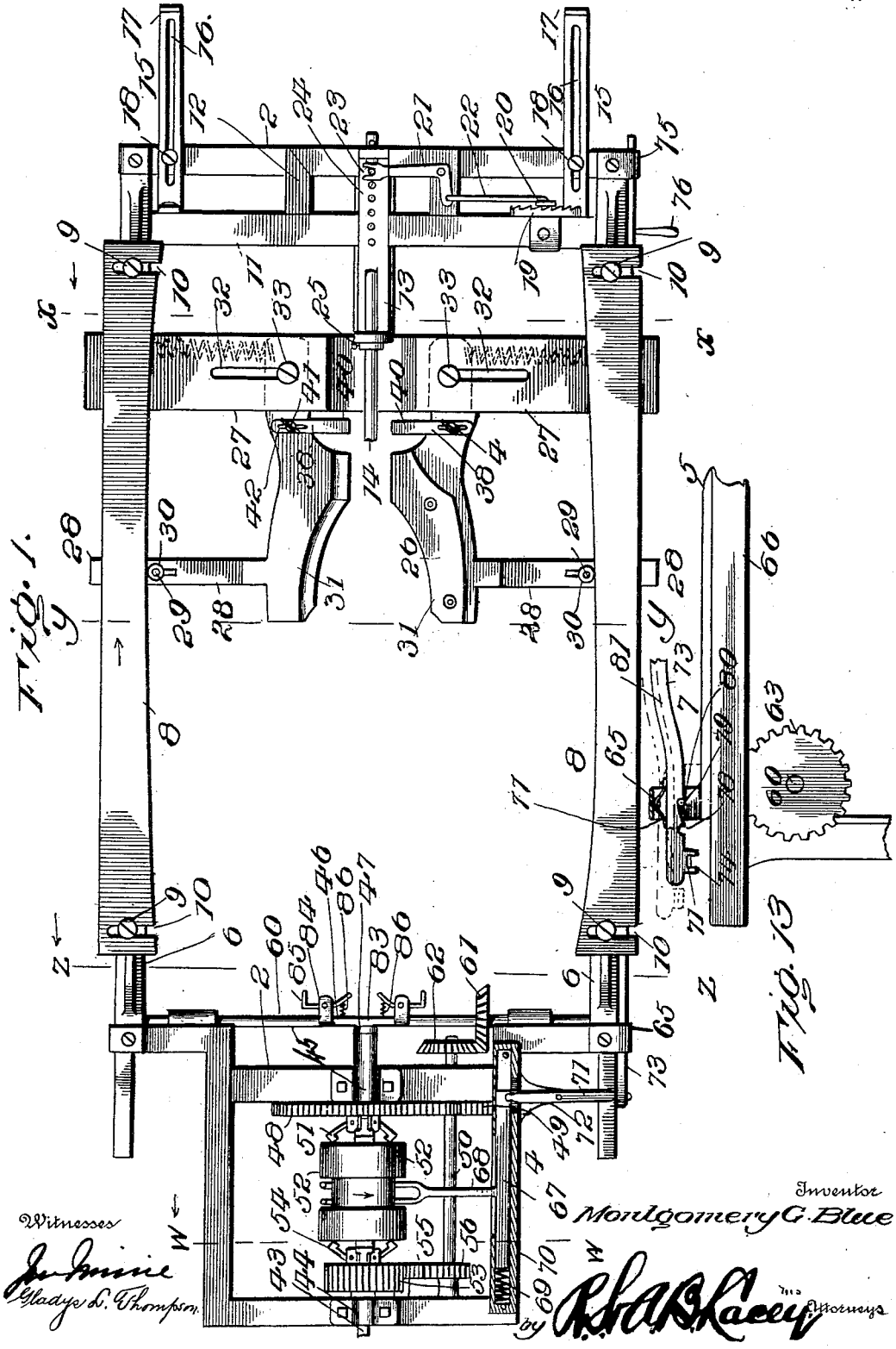

Fig. 1.

Fig. 13.

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LATHE FOR TURNING IRREGULAR FORMS.

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(No Model.) 4 Sheets—Sheet 2.

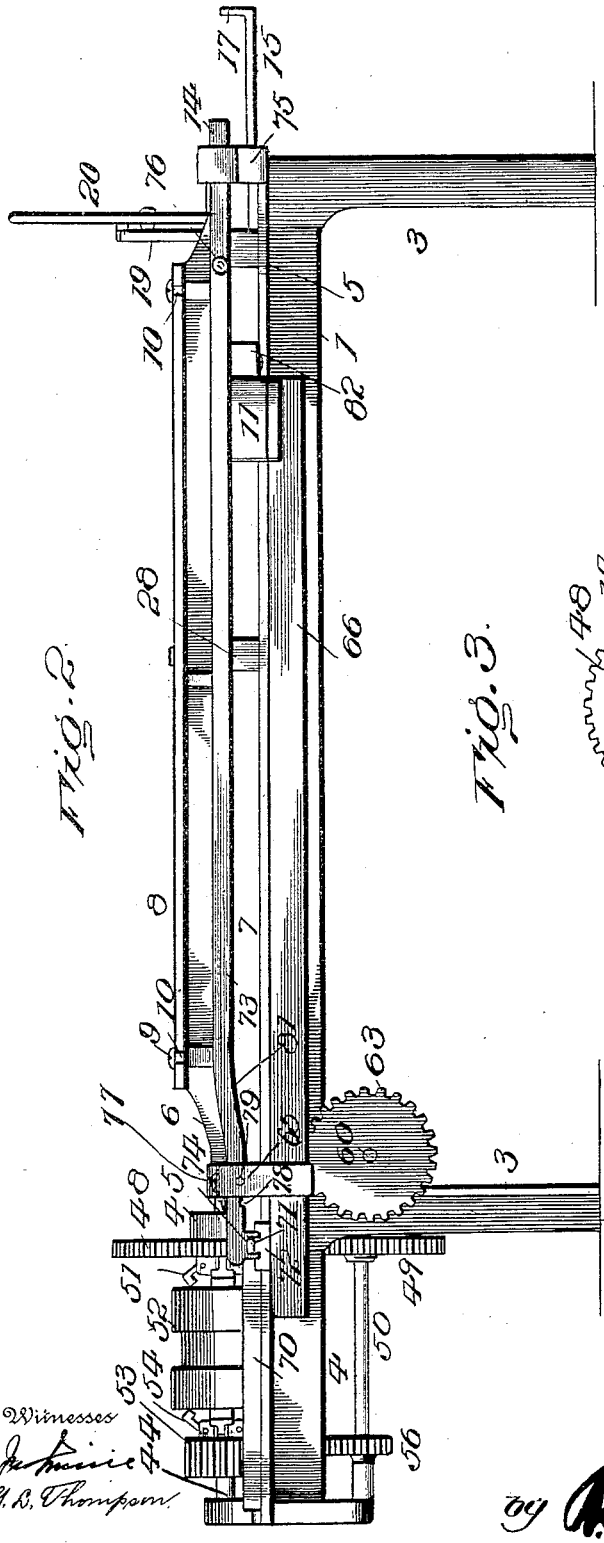

FIG. 2.

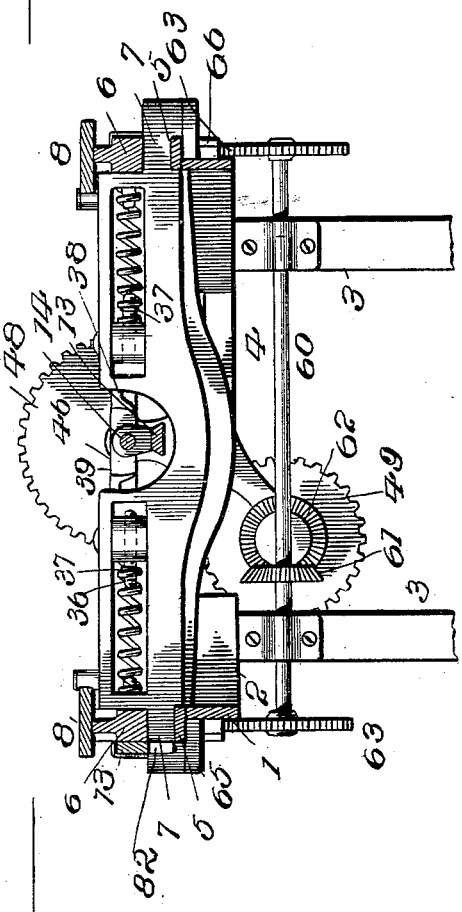

FIG. 3.

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(Application filed May 25, 1899.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

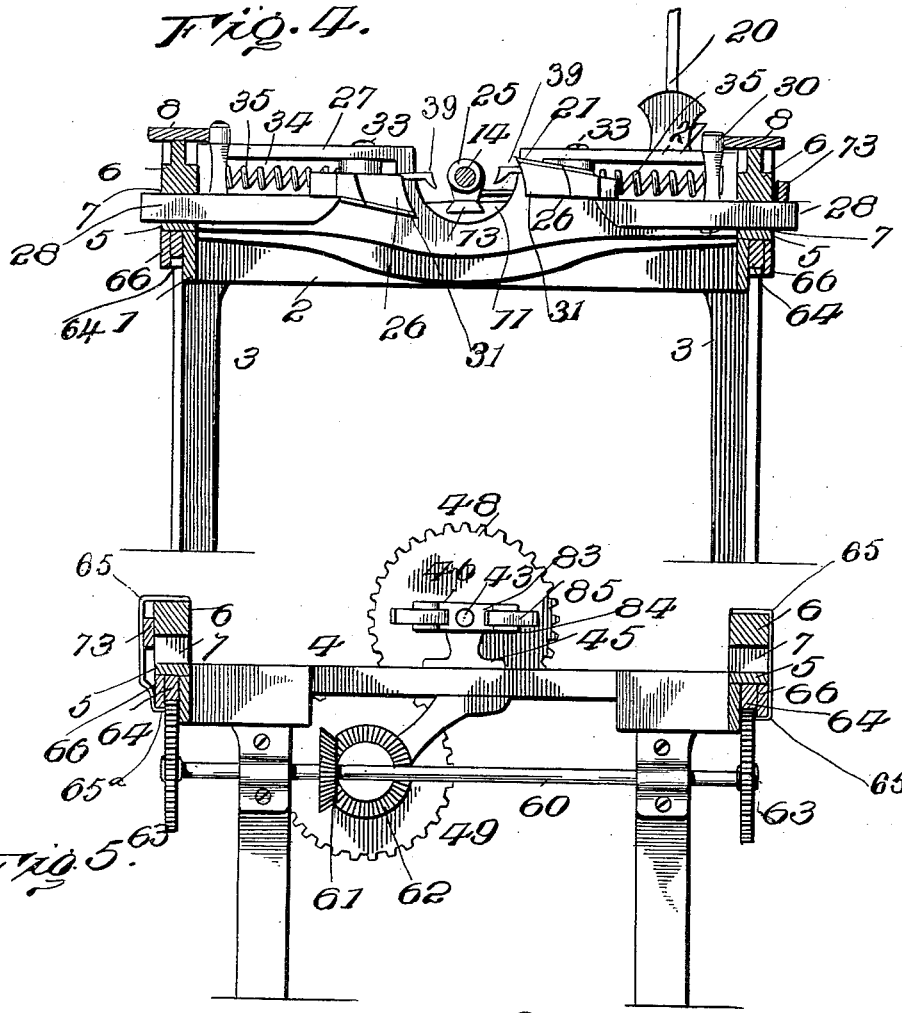
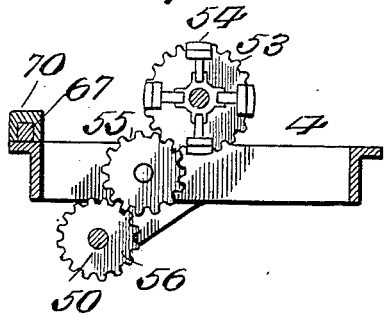


Fig. 5.

Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

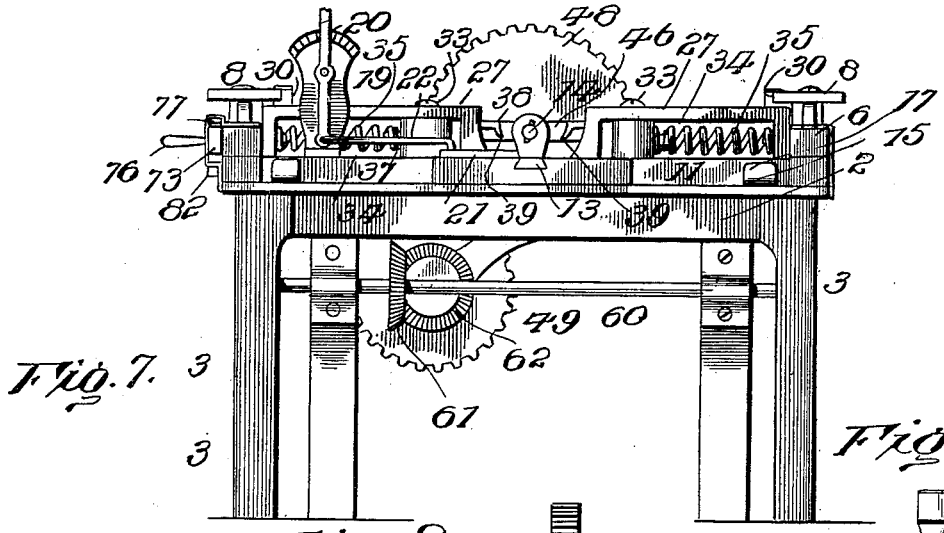


FIG. 7.

FIG. 14

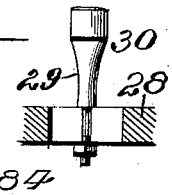


FIG. 8.

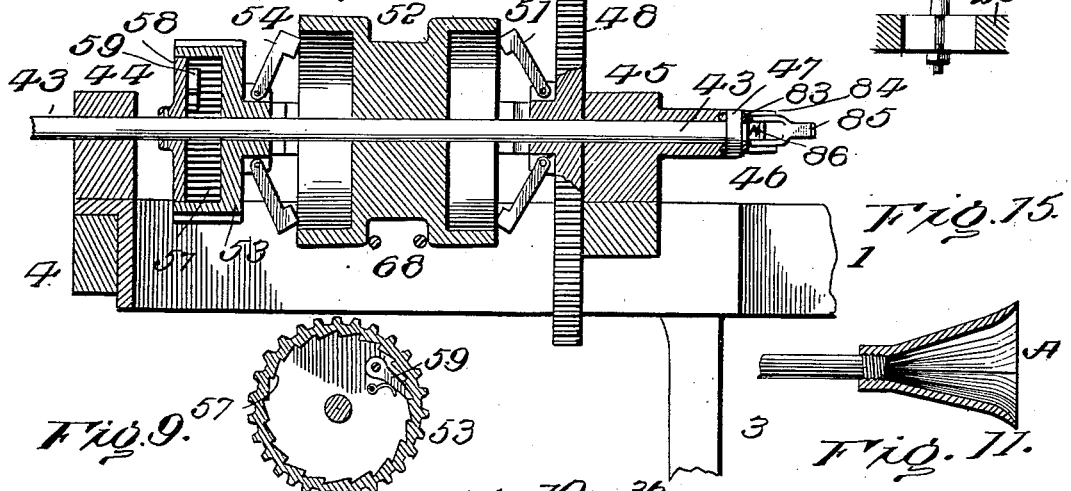


FIG. 15.

FIG. 9.

FIG. 11.

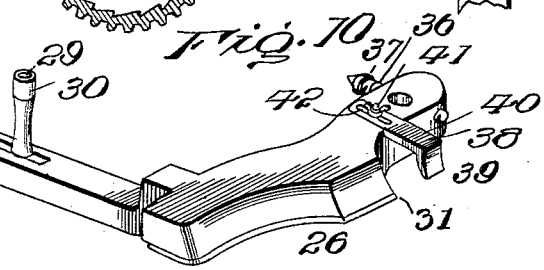


FIG. 10.

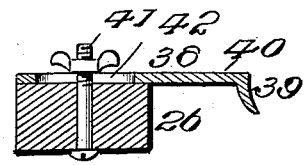
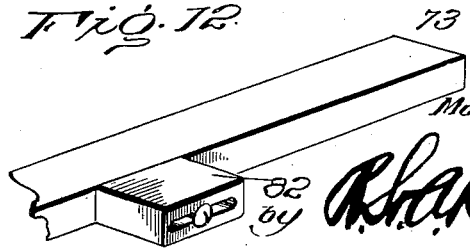


FIG. 12.



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UNITED STATES PATENT OFFICE.

MONTGOMERY G. BLUE, OF LOCKINGTON, OHIO.

LATHE FOR TURNING IRREGULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 653,786, dated July 17, 1900.

Application filed May 25, 1899. Serial No. 718,171. (No model.)

To all whom it may concern:

Be it known that I, MONTGOMERY G. BLUE, a citizen of the United States, residing at Lockington, in the county of Shelby and State of Ohio, have invented certain new and useful Improvements in Lathes for Turning Irregular Forms; 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.

This invention relates to lathes of the type specially organized for turning irregular forms, such as handles for tools, implements, and sundry articles. While particularly designed as a woodworking-machine, it is obvious that many of the features may be applied to metal-working lathes and machinery of kindred nature in which the body to be shaped is rotated against traveling knives, cutters, or bits, formers or templets moving the knives in or out at the predetermined points, according to the required shape of the finished article.

In its organization the machine comprises a head-spindle, a tail-spindle, a cutter-head provided with movable bits or knives, controlling mechanism for moving the bits laterally, a feeding mechanism for advancing and retracting the cutter-head, actuating mechanisms for the head-spindle, and feeding mechanism including a ratchet and pawl and clutch contrivance, and starting, reversing, and stopping mechanism, and adjustable mountings and operating mechanism for the tail-stock.

The machine as illustrated embodies the vital principle and essence of the invention; but when adapting the novel features to other forms of machines for special work it is to be understood that such changes in the disposition of the parts, proportion, and minor details of construction as may be necessary to the new location may be resorted to without departing from or sacrificing any of the advantages of the invention.

The improvement consists, essentially, of the novel features, details of construction, and combinations of parts, which hereinafter will be more particularly set forth, illustrated, and finally pointed out in the subjoined claims.

Referring to the drawings, Figure 1 is a top plan view of a machine illustrating the invention. Fig. 2 is a side view thereof. Fig. 3 is a transverse section on the line X X of Fig. 1 looking in the direction of the arrow. Fig. 4 is a cross-section on the line Y Y of Fig. 1 looking in the direction of the arrow. Fig. 5 is a transverse section on the line Z Z of Fig. 1 viewed in the direction designated by the arrow. Fig. 6 is a cross-section on the line W W of Fig. 1, the arrows indicating the direction of observation. Fig. 7 is a view of the rear end of the machine. Fig. 8 is an enlarged longitudinal section of the head-spindle, its mountings, and the parts applied directly thereto. Fig. 9 is a detail view of the gear-wheel loosely mounted upon the head-spindle and the ratchet-and-pawl mechanism for connecting it thereto. Fig. 10 is a detail view of one of the bit or knife heads. Fig. 11 is a detail section of a bit-head, showing the guide adjustably connected therewith. Fig. 12 is a detail view of a rear end portion of the operating-rod, showing the stop adjustably connected therewith and against which the cutter-head impacts when nearing its return stroke to throw the machine out of gear. Fig. 13 is a detail view of the front end portion of the operating-rod and the parts coöperating therewith, the dotted lines showing the manner of releasing the rod by the arm or extension of the adjacent bit-head when the cutter-head is reaching the limit of its forward movement. Fig. 14 is a detail view of a bit-head arm, showing the manner of adjustably connecting the pin or stub-arm therewith. Fig. 15 is a detail view of a different form of holding means to be applied to the head-spindle for securing straight work.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The framework for supporting the operating or working parts of the machine may be of any substantial construction and form, according to the nature of work for which the machine is devised, and, as shown, it comprises longitudinal bars 1, a rear cross-bar 2, posts or legs 3, and an offstanding rectangular frame 4 at the end opposite the cross-bar 2, all the parts being rigidly connected in

any of the usual ways. Horizontal flanges 5 project outward from the longitudinal bars 1 in the plane of their top edges and constitute guides for the terminal portions of the cutter-head and the rack-bars coöperating therewith in the manner presently to be explained. Beams 6 are placed upon the longitudinal bars 1 and are spaced therefrom, the spaces 7 forming guideways for the outer arms or extensions of the bit-heads and the terminal portions of the cutter-head. The formers or templets 8 have adjustable connection with the top side of the beams 6 and are held in place by clamp-screws 9 passing through transverse slots 10 of the templets and entering the beams 6. These templets control the lateral movements of the bits or cutters, and the outline of their inner edges corresponds with the profile of the finished article.

A transverse beam 11 is provided centrally with an offstanding frame 12 and forms therewith an adjustable support for the tail-stock 13, the end portions of said beam entering the spaces 7 and movable therein lengthwise of the machine-frame to bring the tail-spindle 14 nearer to or farther from the head-spindle. Plates 15 are secured at their inner ends to the beam 11 and project outwardly therefrom in parallel relation and are formed with longitudinal slots 16, their outer ends being upturned, as shown at 17, forming hand-holes to be grasped when operating the plates to adjust the beam 11 to the required position. Clamp-screws 18 pass through the longitudinal slots 16 and enter the cross-bar 2 and secure the plates 15 and beam 11 in an adjusted position.

The tail-stock 13 is slidable upon the beam 11 and frame 12, so as to advance and withdraw the tail-spindle. The base portion of the tail-stock has its longitudinal edges outwardly and downwardly beveled and snugly fitted into corresponding seats or depressions formed in the top side of the parts 11 and 12, whereby vertical displacement of the tail-stock is obviated. A bracket-stand 19 is secured upon one end of the transverse beam 11, and its upper portion is toothed or notched, and an operating-lever 20 is fulcrumed thereto intermediate of its ends, the lower end being operatively connected with the tail-stock, whereby upon moving the said lever the tail-stock is slid in its seat in the manner set forth. A bell-crank lever 21 is fulcrumed at the elbow to a portion of the frame 12, and its longitudinal arm is connected by a link 22 with the lower end of the operating-lever 20, the terminal portion of the horizontal arm being slotted, as shown at 23, to receive one of a series of pins 24, projecting upward from the tail-stock 13, whereby relative adjustment of said bell-crank lever with the tail-stock is obtained. The tail-spindle 14 is journaled in the vertical extensions or pillow-blocks at the ends of the tail-stock and is prevented from longitudinal play therein. A collar 25 is applied to the inner or forward portion of the tail-spindle and obtains a bearing against the adjacent vertical extension or pillow-block of the tail-stock. In order to reduce the friction between the collar 25 and the subjacent bearing of the tail-stock, a ball-bearing is interposed between the relatively-movable faces, one or both of the latter being grooved to provide a race in which antifriction-balls are seated in the usual manner.

The bit or knife heads 26 are pivoted a short distance from their rear ends to the cutter-head 27 and are movable laterally or transversely at their free ends and are provided with outwardly-extending arms 28, which project into the guide-spaces 7 to prevent vertical movement or play of the bit-heads. Pins or stub-arms 29 rise vertically from the arms 28 and are adapted to bear against the inner edges of the formers or templets 8 and coöperate therewith to control the lateral movements of the bits when the machine is in operation. In order to reduce the frictional contact between the parts 29 and the templets to the smallest amount possible, rollers 30 are applied to the upper ends of the pins or stub-arms 29 and are positioned so as to travel upon the directing edges of the said templets. The central portion of the bit-heads is straight, and the end portions curve outwardly in opposite directions, and the bits or knives 31, secured to the forward portions of the bit-heads, conform in outline thereto. It will thus be seen that the advancing ends of the knives or bits flare outwardly, whereas their rear ends approach, and this is of advantage, since it enables the blank or body to be turned to be gradually conformed to the required or finished shape, the rear or straight portions of the bits smoothing and finishing the article, which is roughened by the advancing ends of the bits or cutters. The bit-heads 26 have adjustable connection with the cutter-head to admit of their being brought closer together or separated, according to the diametric extent of the article being shaped. For this purpose the end portions of the cutter-head are longitudinally slotted, as shown at 32, and receive the pivot-fastenings 33 of the bit-heads. Horizontal slots 34 are formed in the end portions of the cutter-head 27 and receive the rear end portions of the bit-heads and intersect with the vertical longitudinal slots 32.

The bit-heads are normally held separated at their free ends by means of coil-springs 35, which are applied to the rear ends of the said heads and interposed between them and the outer closed ends of the horizontal slots 34 of the cutter-head. These springs maintain the rollers 30 of the parts 29 in contact with the directing edges of the templets 8. Inasmuch as the bit-heads have adjustable connection with the cutter-head, it is necessary to make provision for the relative change of position of the bit-heads with reference to the coil-springs 35, so that the latter may perform the

function for which they have been provided. Set-screws 36 are applied to the rear ends of the bit-heads and are fitted into transversely-threaded openings thereof and are provided near their outer ends with shoulders 37 to bear against the inner ends of the coil-springs 35, the latter having their outer ends fitted into recesses formed in the outer walls of the horizontal slots 34. The terminal portions of the set-screws exterior to the shoulders 37 enter the inner ends of the coil-springs and center and hold them in position. Upon rotating the set-screws the tension of the coil-springs can be varied according to the nature of the work, and provision is had for allowing for the adjustment of the bit-heads with reference to the cutter-head to vary the distance between the cutting edges of the bits.

In order that the bits may not take too large a bite upon the article or body being operated upon, guides 38 are applied to the bit-heads and are located in the rear of the bits or cutters and consist of bearing-heads 39 and shanks 40, the latter having adjustable connection with the bit-heads by means of clamp-screws 41, passing through slots 42, formed in the shanks 40, and entering the bit-heads. The inner or opposing faces of the bearing-heads 39 are made hollow or concave, so as to conform approximately to the circumference of the article and coöperate therewith in a positive manner, so as to prevent splintering of the blank or article, which would result if the bits were permitted to obtain an unrestricted bite thereon. The extent of the initial operation of the bits is controlled in a great measure by the relative position of the guides 38, which are moved in or out in order to secure the desired result. It will be observed that the inner edges of the forward portions of the bit-heads are beveled in opposite directions in order to correspond to the bevel of the cutting edges of the knives. This opposite beveling of the bit-heads is necessary when it is remembered that they are disposed upon opposite sides of the axial center of the machine, so as to operate upon diametrically-opposite portions of the article or body under operation.

The head-spindle 43 is journaled in bearings 44 and 45, applied to the front and rear cross-bars of the frame 4, and is provided at its inner end with a chuck 46 to grasp the end of the blank or article in position for operation. A collar or shoulder 47 is provided on the head-spindle a short distance from its inner end and bears against the outer expanded end of the bearing 45, one or both parts 45 and 47 being grooved to provide a race, in which are seated antifriction-balls forming a ball-bearing to reduce the friction to a minimum amount. A gear-wheel 48 is loosely mounted upon the spindle 43 and intermeshes with a corresponding gear-wheel 49, secured upon a longitudinal shaft 50. A half-clutch 51 is applied to the outer or forward face of the gear-wheel 48 and coöperates with a corresponding clutch member upon the adjacent side of the drive-pulley 52, loose and slidable upon the head-spindle. A gear-wheel 53 is loosely mounted upon the outer end portion of the spindle 43 and is provided upon its inner side with a half-clutch 54, corresponding to the half-clutch 51 and adapted to act jointly with the corresponding clutch member upon the adjacent or opposing side of the drive-pulley 52. This gear-wheel 53 is in mesh with an idler 55, which in turn is in meshing relation with a gear-wheel 56, secured upon the outer end of the longitudinal shaft 50. The drive-pulley 52 is operated from a suitable source of power by means of a belt (not shown) in the ordinary manner and is continuously driven in the same direction when the machine is in operation, the arrow thereon denoting its direction of rotation. The clutches provided between the drive-pulley and the gear-wheels 48 and 53 are of the friction type and are constructed so as to insure a firm and positive grip of the coöperating elements when brought together without requiring the expenditure of a great amount of force to compel engagement of the parts. When the drive-pulley is in clutched engagement with the gear-wheel 48, the mechanism for returning the cutter-head to a normal or starting position is brought into active operation. At this time the head-spindle 43 remains stationary, because the drive-pulley 52 and gear-wheels 48 and 53 turn loosely thereon. When the drive-pulley 52 is thrown into gear with the gear-wheel 53, the head-spindle is rotated and the feeding mechanism brought into active operation to advance the cutter-head as the work progresses. The gear-wheel 53 has a ratchet-and-pawl connection of ordinary construction with the head-spindle, thereby admitting of a reverse movement of the said gear-wheel 53 when the drive-pulley 52 is clutched to the gear-wheel 48 and the shaft 50 is rotated to return the cutter-head to its initial position. As shown, the gear-wheel 53 is recessed in its outer face, the rim encircling the recess being toothed, as shown at 57. A wheel or disk 58 is secured to the head-spindle 43, so as to rotate therewith, and is provided with pawls 59, which engage with the teeth 57 and cause rotation of the head-spindle 43 when the drive-pulley 52 is clutched directly to the gear-wheel 53.

When the tail-stock is advancing toward the head-stock, the gears 63 and 67 and shaft 60 revolve forwardly, while the shaft 50 and its gears 49 56 revolve toward the shipper-bar 67, as do also the head-spindle 43, drive-pulley 52, and gear 53, for the reason that the pulley 52 will be clutched to gear 53 and the pawls 59 of the wheel or disk 58 will engage the teeth 57. In this operation the idler 55 and gear 48 must necessarily revolve in the reverse direction to the tail-spindle, pulley 52, and gear-wheel 53 for obvious reasons. When, on the other hand, the driver 52 is clutched to gear 48 to retract the tail-spindle,

the gears 63 67 and shaft 50 and its gears 49 56 revolve in a direction away from the shipper-bar and the drive-pulley 52 and gear 48 toward said shipper-bar. The gear 53 also revolves toward the shipper-bar and reversely to the driver 52 and gear 48, and the tail-spindle remains stationary, because the pawls 59 of the wheel or disk 58 will slip or ride over the teeth 57. It will thus be apparent that when the tail-stock advances the tail-spindle, driver 52, and shaft 50 must revolve in the same direction and that, on the other hand, when the tail-stock recedes the driver 52 and the shaft 50 must revolve in reverse directions, while the tail-spindle must remain stationary in order to prevent rotation of the blank operated upon. It will also be seen that the gear 53 must turn loosely on the head-spindle when the tail-stock recedes, but have a fixed engagement with said spindle when the tail-stock advances. It will thus be clear that as the gears 48 and 49 and the gears 53, 55, and 56 are constantly in mesh, and shaft 50 is therefore all the time driven from the train of gears at one end or the other, and from whichever end it is driven itself drives the gears at the other end, the ratchet is provided in order that the shaft 50 may not drive the spindle 43 through gear 53 when said shaft is driven by gear 44.

A transverse shaft 60 is journaled in bearings at the forward end of the machine-frame, and a beveled gear 61, secured thereon at an intermediate point, intermeshes with a companion beveled gear 62, applied to the inner end of the longitudinal shaft 50. Gear-wheels 63 are secured to the outer ends of the transverse shaft 60 and mesh with rack-bars 64, secured at their rear ends to the projecting terminal portions of the cutter-head 27. These rack-bars 64 are placed in the angular spaces formed between the outer sides of the longitudinal bars 1 and the lower faces of the horizontal flanges 5 and are retained in place at their forward ends by means of keepers 65. The transverse shaft 60 is adapted to be driven in reverse directions according as the cutter-head is required to be advanced or to be returned to a starting position after having completed its forward travel. As previously stated, the direction of rotation of the shafts 50 and 60 is dependent upon the position of the drive-pulley 52, which when in engagement with the gear-wheel 48 causes the shaft 60 to rotate in such a direction as to return the cutter-head to a normal position, and when said drive-pulley is in engagement with the gear-wheel 53 the shaft 60 is rotated in a reverse direction and causes a forward or advance movement of the cutter-head. The end portions of the cutter-head 27 extend through the guide-spaces 7 and beyond the outer edges of the horizontal flanges 5 and are constructed so as to embrace the latter upon three sides, thereby preventing vertical play of the cutter-head. The rack-bars 64 have their rear ends attached in any substantial manner to the portions of the cutter-head underlapping the horizontal flanges 5, so as to touch the longitudinal bars 1 at their inner sides. A strip 66 is applied to or formed with the outer side of each of the rack-bars and overlaps the teeth or cogs thereof and serves to exclude chips, dust, and foreign matter from the toothed portions of the rack-bars and from lodging upon the upper portions of the gear-wheels 63. The inner bent ends 65^a of the keepers 65 bear upon the lower edges of the strips 66 and support the rack-bars at their forward ends and prevent crowding or binding thereof upon the teeth of their actuating gear-wheels 63. Mechanism is provided and combined with the operating parts to automatically reverse the movement of the cutting mechanism, throw the head-spindle out of gear, and stop the action of the machine after the cutter-head has been reset or returned to a starting position. This mechanism consists, essentially, of the following instrumentalities: A shipper-bar 67 is slidably mounted upon a side bar of the frame 4 and has an arm 68 projecting therefrom and engaging with the drive-pulley 52. A spring 69 is applied and coöperates with the shipper-bar to move it inward or toward the tail end of the machine and to hold the drive-pulley in clutched engagement with the gear-wheel 48 when the shipper-bar is unrestrained. The spring 69 is of the coil and expansible type and is disposed at the outer or forward end of the shipper-bar, and a housing 70 incloses both the spring and shipper-bar. A lever 71 is fulcrumed intermediate of its ends upon a bracket extension 72 of the frame 4, and its inner end interlocks with the shipper-bar 67 by projecting into a notch formed in the side thereof. An operating-rod 73 extends lengthwise of the machine and is disposed subjacent to one of the longitudinal bars 1, and its forward end is loosely and positively connected with the outer end of the lever 71 and is bent downwardly and slotted, as shown at 74, to receive the outer reduced end of the lever 71. This construction admits of a limited vertical movement of the operating-rod at its forward end, which is essential, as will appear presently, without resulting in disengagement of the parts 71 and 73. The rear end of the operating-rod passes through a keeper 75 and has an offstanding handle 76 to be grasped by the attendant when it is required to start the machine. The forward end of the rod 73 passes through the keeper 65 and is normally pressed downward by a spring 77, of substantially bow form and fitted into the upper portion of the keeper 65. A notch 78 is formed in the lower edge of the front portion of the rod 73 and is adapted to receive a pin 79, located at the head end of the machine, so as to hold the drive-pulley 52 in clutched engagement with the gear-wheel 53. A shoulder 80 is provided in the lower edge of the rod 73 and a short distance in the rear of the notch 78, and the portion of the rod between

the shoulder 80 and the notch 78 inclines, thereby admitting of the rod 73 being moved rearwardly when it is required to throw the drive-pulley 52 from an intermediate position, so as to bring the operating mechanism into gear. When the shoulder 80 is in engagement with the pin 79, the drive-pulley occupies a position midway between the wheels 48 and 53 and the machine is out of gear, and when the rod 73 is moved so as to cause the pin 79 to become seated in the notch 78 the machine is in gear, the head-spindle rotating and the cutting mechanism advancing. The operating-rod 73 has an inclined or cam portion 81 near its front end, which normally projects across the path of the arm 28 of the bit-head on the same side of the machine with the said operating-rod, whereby when the cutting mechanism is nearing the limit of its advancing movement said arm 28 will engage with and ride upon the inclined portion 81 and lift the forward end of the rod 73 a sufficient distance to clear the notch 78 from the pin 79, thereby permitting the spring 69, which is at all times under tension, to act to move the shipper-bar so as to throw the drive-pulley 52 away from the gear-wheel 53 and into clutched engagement with the gear-wheel 48, thereby reversing the movement of the shafts 50 and 60 and causing a return of the cutting mechanism to a starting position. A stop 82 is applied to the rear portion of the operating-rod 73 and is disposed so as to be struck by the cutter-head as the latter is nearing the limit of its return stroke, whereby the operating-rod is moved rearwardly a distance to throw the drive-pulley out of clutched engagement with the gear-wheel 48, when the shoulder 80 will engage with the pin 79 and hold the machine out of action.

The chuck 46, applied to the inner end of the head-spindle 43, is removably fitted thereto, and consists of a base 83, having spaced ears 84 at its ends and spring-actuated grippers 85, pivoted intermediate of their ends to the said ears 84. These grippers 85 are of elbow form, and their horizontal members are pivoted at an intermediate point between the ears 84 and are spaced a distance from the base 83. Springs 86 are interposed between the base 83 and the inner terminals of the members of the grippers parallel therewith and are constructed and positioned so as to hold the outer or longitudinal members of the grippers about at right angles to the plane of the base 83 and in position to receive between them the end of the blank or article to be turned.

In the practical operation of the machine the tail-beam, consisting of the supports 11 and 12 of the tail-stock, is adjusted to vary the distance between the head and tail spindles according to the length of the article to be shaped. After the parts have been properly adjusted the blank is placed between the head and tail spindles, with its forward end resting against the inner terminals of the grippers 85. The lever 20 is operated to cause a forward or inward movement of the tail-stock, which causes the tail-spindle to grip the blank and to force the latter against the inner terminals of the grippers, which latter, turning upon the pivotal supports, bring their outer longitudinal members into forcible engagement with the sides of the blank, which latter is firmly and securely held in place. After the blank is made secure the lever 20 is engaged with a notch or tooth of the bracket-stand 19, thereby fixing the position of the tail-stock and preventing accidental loosening or displacement of the blank. The attendant now grasps the handle 76 and moves the rod 73 rearward a distance to bring the notch 78 into engagement with the pin 79 to throw the machine into gear. The blank is rotated, and the cutting mechanism is simultaneously advanced. When the cutting mechanism is approaching the limit of its forward movement, the arm or outer extension 28 of the bit-head adjacent to the rod 73 will engage with and ride upon the inclined portion 81 of said rod and disengage it from the pin 79, when the spring 69, being unrestrained, will throw the shipper-bar 67 and bring the drive-pulley 52 into clutched engagement with the gear-wheel 48 and reverse the movement of the cutting mechanism and cause it to return to a starting position in the manner set forth. As the cutting mechanism is nearing the limit of its return movement it will engage with the stop 82 in the manner set forth and move the rod 73 and shipper-bar and throw the machine out of gear, when the attendant can release the finished article and place a new blank in position for a repetition of the operation just described.

The pins or stub-arms 29 have adjustable connection with the arms or extensions 28 of the bit-heads 26 to admit of a relative independent and lateral adjustment of the parts 30 and 26 to suit the character of work in hand.

The chuck 46 is removably attached to the spindle 43, so as to be replaced by a holder of different form—such, for instance, as shown in Fig. 15, which is a bell-shaped spur A, the flaring or bell-shaped portion being ribbed on its inner side to prevent slipping of the work. This form of holder is used for straight work and the chuck 46 for D work, such as shovel-handles or other irregular work.

Having thus described the invention, what is claimed as new is—

1. In a machine of the character set forth, the combination, with a frame having longitudinal guides and longitudinally-extending templets, of a reciprocating cutter-head mounted in said guides, a transverse tail-beam also mounted in said guides to slide longitudinally of the frame, a stock slidable longitudinally of the frame in guides in the tail-beam and carrying a series of pins at the rear end thereof, plates projecting rearwardly from the beam and having handholds whereby the beam may be adjusted from the rear

of the frame in the frame-guides, a bell-crank lever having one arm thereof bifurcated to form an open slot to engage either one of the pins on the stock, an operating-lever, and a link or analogous connection between the operating-lever and other arm of the bell-crank lever.

2. In a machine of the character described, the combination of a frame, templets applied to opposite sides of and extending longitudinally of the frame, a cutter-head reciprocating longitudinally between the templets, a pair of bit-heads pivoted to the cutter-head so as to be movable toward and from each other in a horizontal plane and laterally of the frame and having members traversing the templets, and springs acting upon the bit-heads to force the same apart and hold said members in engagement with the templets.

3. In a machine of the character described, the combination of a frame having longitudinal guideways, templets applied to the frame above said guideways, a reciprocating cutter-head movable in the guideways, a pair of opposing bit-heads pivotally connected to the cutter-head so as to be movable toward and from each other and having arms entering the guideways and carrying rollers traversing the templets, and springs acting on the arms of the bit-heads to force said heads outwardly and hold the rollers in engagement with the templets.

4. In a machine of the character described, the combination of a frame, a templet applied to and extending longitudinally of the frame, a longitudinal reciprocating cutter-head extending lengthwise transversely of the frame and provided with a longitudinal slot, a bit-head pivotally mounted in said slot to swing laterally of the frame and carrying a roller traversing the templet, a spring arranged in said slot and acting on the bit-head to force it outwardly and hold the roller thereof in engagement with the templet, and means for varying the tension of said spring.

5. In a machine of the character described, the combination of a frame, a templet applied thereto, a reciprocating cutter-head, and a bit-head pivotally connected to the cutter-head and controlled in its lateral movement by the templet, said bit-head having straight rear finishing portions and flaring forward ends, cutters secured thereto and similarly constructed, and guides applied to the bit-head in rear of said finishing portions.

6. In a machine of the character described, the combination of a head-spindle, a cutting mechanism, actuating mechanism for reciprocating the cutting mechanism and including a shaft, independent sets of gearing between the head-spindle and the said shaft for rotating the latter in reverse directions, one of said sets of gearing being loosely mounted upon the head-spindle and the other having a ratchet-and-pawl connection therewith, a driver loosely mounted upon the head-spindle and adapted to be moved into clutched engagement with either of said sets of gearing, a shipper-bar for operating the driver, an operating-rod for actuating the shipper-bar, and means forming part of both the operating-rod and cutting mechanism for locating said rod and holding the driver out of action or in clutched engagement with the gearing for operating the head-spindle and actuating the feed mechanism to advance the cutting mechanism.

7. In a machine of the character described, the combination of a spindle, of gear elements loosely mounted upon the spindle and spaced apart, a ratchet and pawl between one of the gear elements and the spindle, a driver mounted to slide and to turn loosely upon the spindle, independent clutches for throwing the driver into engagement with one or the other of the said gear elements, a shaft, connections between said shaft and the aforementioned gear elements for causing one of said elements to rotate the shaft in the reverse direction from the other, a cutting mechanism, a feeding mechanism for reciprocating the cutting mechanism and actuated from the aforesaid shaft, a spring-actuated shipper-bar operatively connected with the driver and normally tending to hold the said driver in clutched engagement with the gear element loosely mounted upon the said spindle and opposite the gear element having the pawl-and-ratchet engagement therewith, and a rod operatively connected with the shipper-bar and having an inclined portion projecting across the path of a portion of the cutting mechanism.

8. In a machine of the character described, the combination of a spindle, cutting mechanism, feeding mechanism for reciprocating the cutting mechanism, actuating mechanism comprising two independent sets of gearing and a driver adapted to be clutched with either set of gearing for moving the feeding mechanism in reverse directions, a shipper-rod for moving the driver and spring-controlled to return the same to its normal position, a keeper having a pin, and a rod sliding through the keeper and connected at its front end with the shipper-bar and provided adjacent thereto with notches to engage said pin, at its rear end with a stop to abut against a part of the cutting mechanism and between said parts with an inclined surface to be engaged by another part of the cutting mechanism.

9. In a machine of the class described, the combination with the frame provided with a longitudinal guideway, a templet applied to the frame, a reciprocating cutter-head, of a bit-head pivotally connected with the cutter-head and having an outwardly-extending arm entering the said guideway and forming a support for the free end of the bit-head, and a pin or stub-arm projecting from the said outwardly-extending arm and bearing against the directing edge of the templet to control the movements of the bit-head, substantially as set forth.

10. In combination, in a machine of the character set forth, side longitudinal guideways, a reciprocating cutter-head directed in its movements by the said guideways, templets located adjacent to the guideways and disposed parallel with the line of travel of the cutter-head, bit-heads loosely connected at one end with the cutter-head and having outwardly-extending arms at their free ends to enter the aforesaid guideways and support the bit-heads at their free ends, and pins or stub-arms projecting from the said outwardly-extending arms of the bit-heads and adapted to bear against the directing edges of the templets to control the lateral movements of the bit-heads, as and for the purpose set forth.

11. In a machine of the class described, the combination of a head-spindle, reciprocating cutting mechanism, actuating mechanism for imparting a reciprocating movement to the cutting mechanism and including a shaft, independent sets of gearing connecting the said shaft with the head-spindle and adapted to rotate the shaft in reverse directions, one of the said sets of gearing having a ratchet-and-pawl connection with the head-spindle, a driver loosely mounted, clutches between the said driver and the said sets of gearing, and means for shifting the driver to throw either set of gearing into active operation according to the required direction of rotation of the aforementioned shaft, substantially as and for the purpose set forth.

12. In combination, a head-spindle, a cutting mechanism, actuating mechanism for reciprocating the cutting mechanism and including a shaft, independent sets of gearing connecting the head-spindle with the said shaft for rotating the latter in reverse directions, one of the said sets of gearing being loosely mounted upon the head-spindle and the other having a ratchet-and-pawl connection therewith, a driver loosely mounted upon the head-spindle and movable longitudinally thereon, clutches between the driver and the said sets of gearing, and means for throwing the driver into clutched engagement with one or the other of the aforesaid sets of gearing, substantially as and for the purpose set forth.

13. In combination, a spindle, gear elements loosely mounted upon the spindle and spaced apart, a ratchet and pawl between one of the gear elements and the spindle, a driver mounted to slide and to turn loosely upon the spindle, independent clutches for throwing the driver into engagement with one or the other of the said gear elements, a shaft, connections between said shaft and the aforementioned gear elements, a cutting mechanism, a feeding mechanism for reciprocating the cutting mechanism and actuated from the aforesaid shaft, a spring-actuated shipper-bar operatively connected with the driver and normally tending to hold the said driver in clutched engagement with the gear element loosely mounted upon the said spindle and opposite the gear element having the ratchet-and-pawl connection with the spindle, a rod operatively connected with the shipper-bar and having an inclined portion projecting across the path of a portion of the cutting mechanism, and locking means for securing the operating-rod when the shipper-bar is moved against its controlling-spring, substantially as and for the purpose set forth.

14. In combination, a spindle, a cutting mechanism, a feeding mechanism, actuating mechanism for the feeding mechanism including a shaft, independent gearing between the said shaft and the spindle and having loose connection with the latter, a ratchet-and-pawl connection included in the other set of gearing, a driver adapted to be brought into clutched engagement with either set of gearing for rotating the shaft in reverse directions, a spring-actuated shipper-bar normally tending to hold the driver in clutched engagement with the gearing for returning the cutting mechanism to a starting position, an operating-rod having an inclined portion normally projecting in the path of a portion of the cutting mechanism, means for securing the operating-rod when the latter is moved to throw the driver into an intermediate position or into clutched engagement with the gearing for operating the spindle, and feeding mechanism to advance the cutting mechanism, and a stop applied to the operating-rod and projecting in the path of the cutting mechanism for throwing the machine out of gear when the cutting mechanism has reached a normal position after being operated, substantially as described.

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

MONTGOMERY G. BLUE. [L. S.]

Witnesses:
F. M. MILLER,
E. A. RITTER.