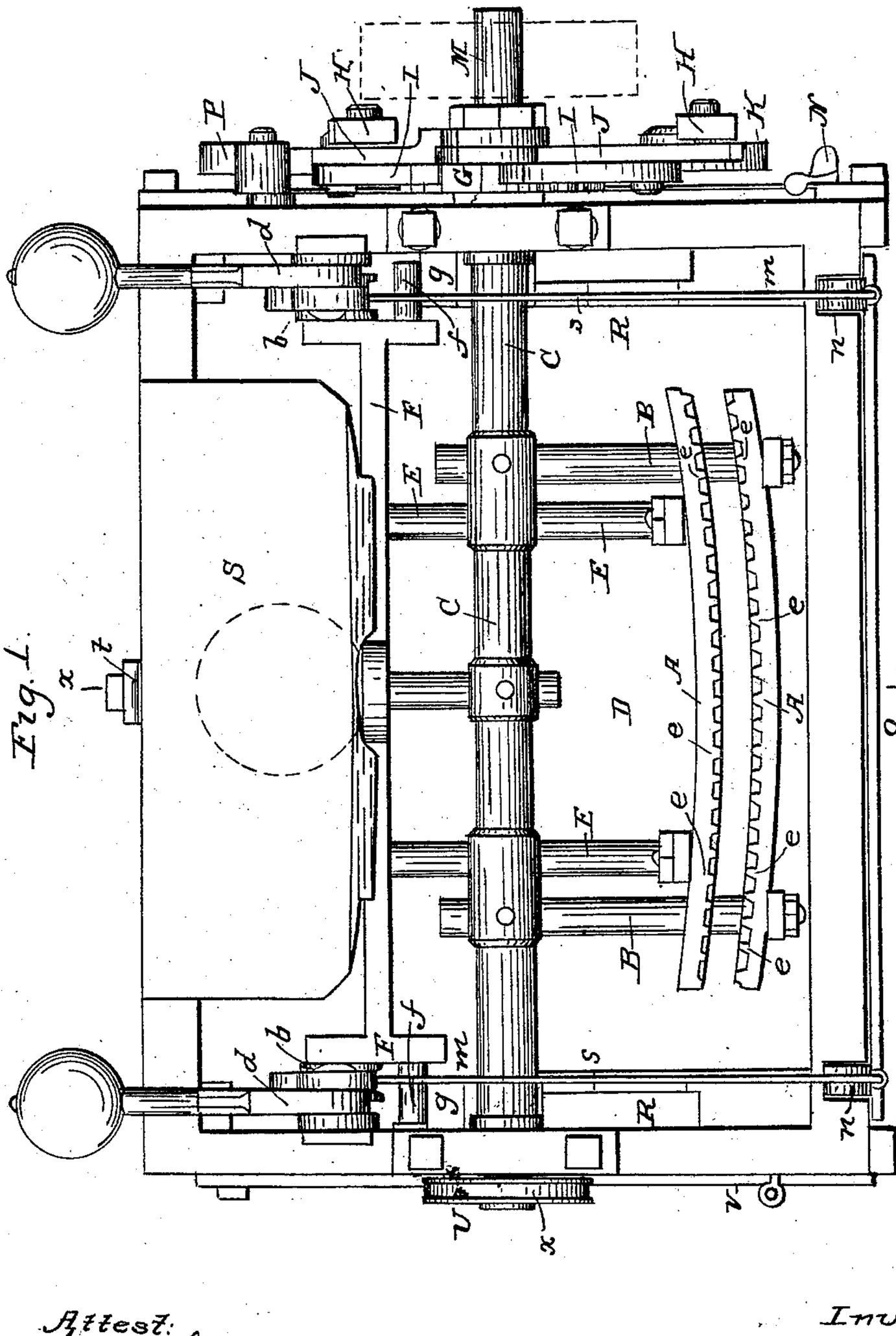
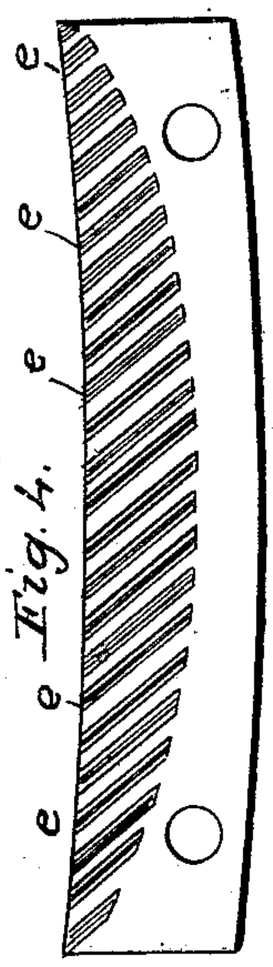
2 Sheets—Sheet 1.

HOLMAN & KELLY.

Tempering Scythes.

No. 29,973. Patented Sept. 11, 1860.





Attest:
Albert M. Smith
Wm. H. Seagrove

Inventors:
Ansel Holman
Oliver A. Kelly

2 Sheets—Sheet 2.

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Fig. 2.

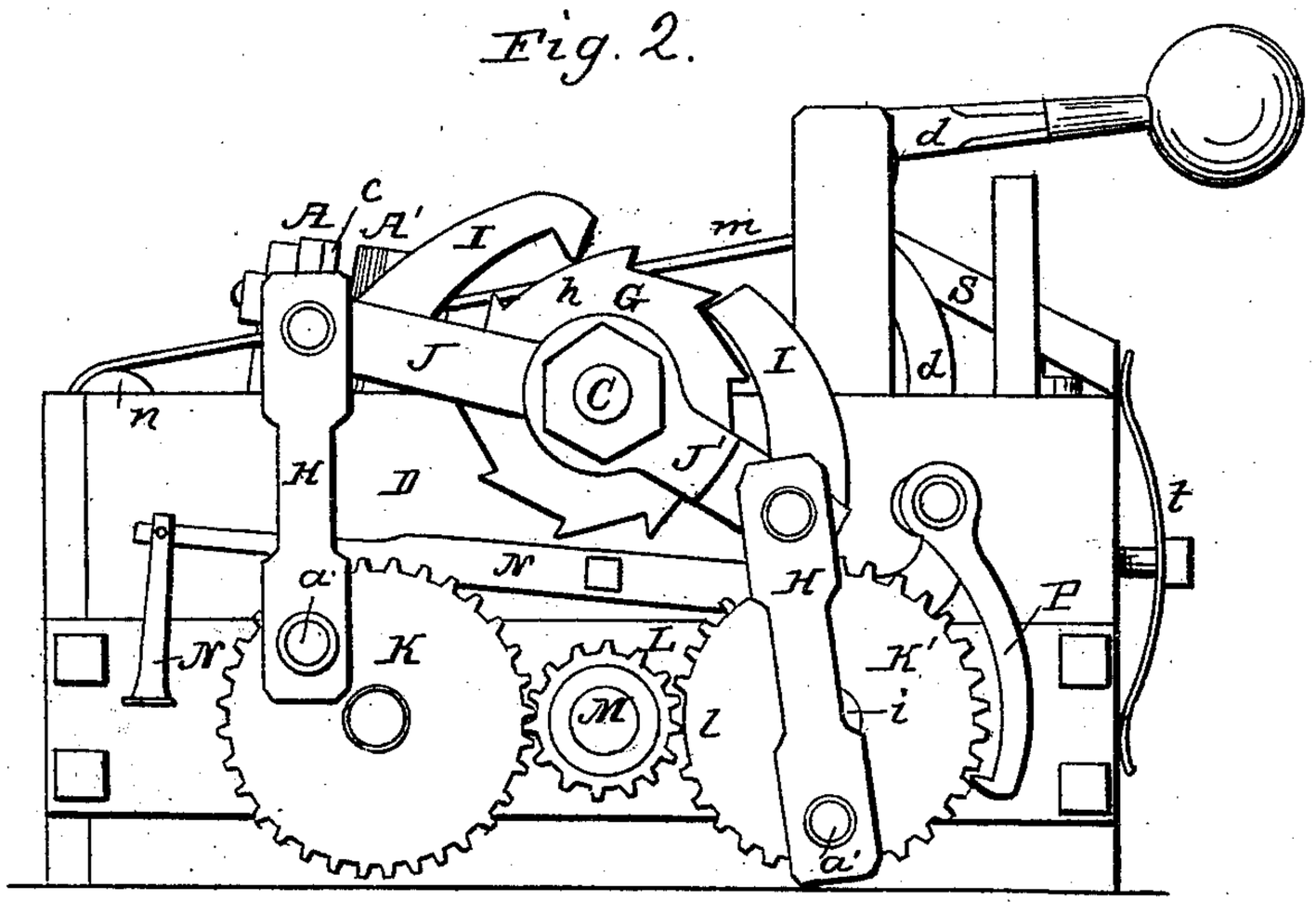
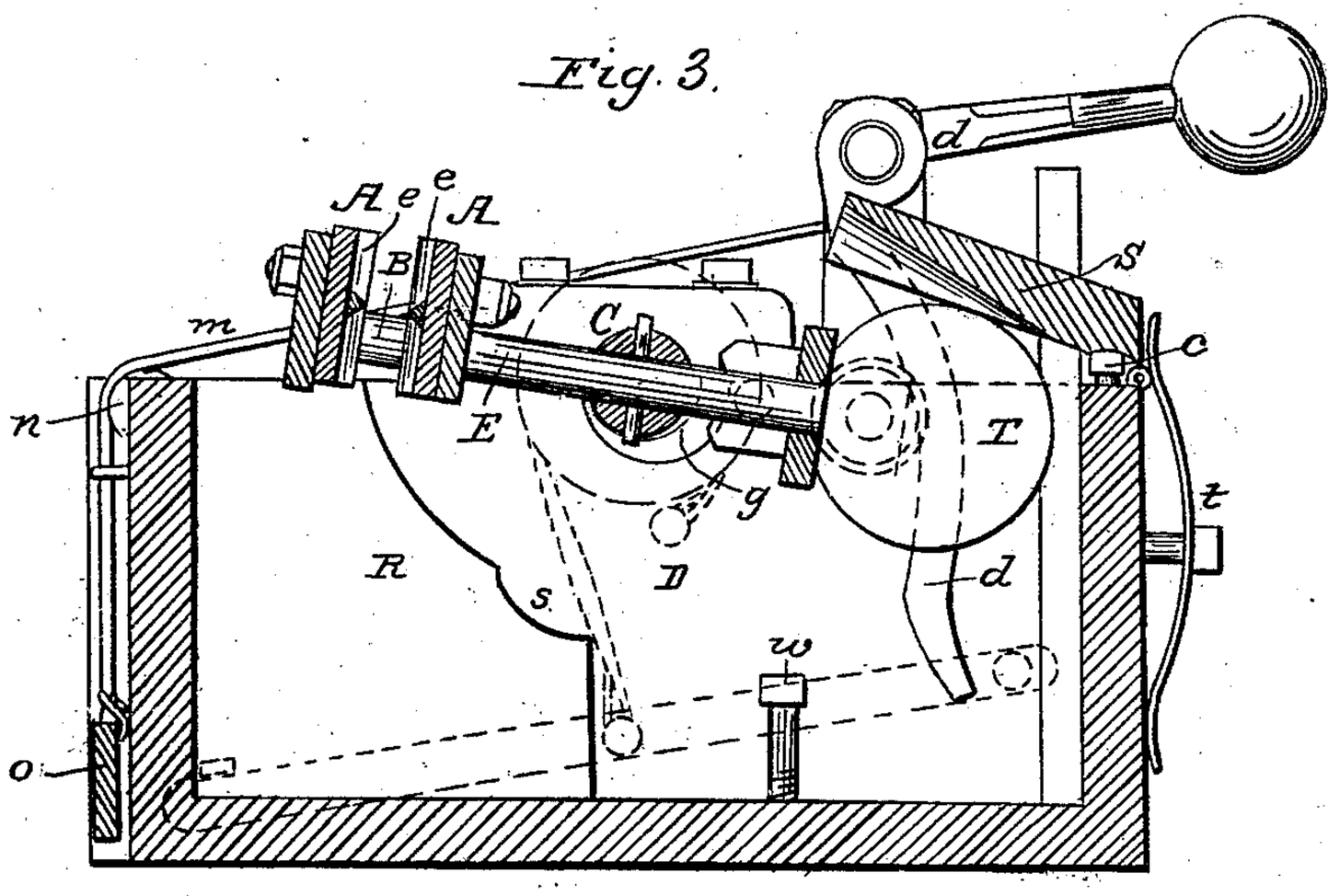


Fig. 3.



Attest:
Albert W. Smith
Wm. H. Seagrave.

Inventors:
Ansel Holman
Alvin Kelly

UNITED STATES PATENT OFFICE.

ANSEL HOLMAN AND OLIVER A. KELLY, OF SLATERVILLE, RHODE ISLAND.

MACHINE FOR HARDENING SCYTHES.

Specification of Letters Patent No. 29,973, dated September 11, 1860.

To all whom it may concern:

Be it known that we, ANSEL HOLMAN and OLIVER A. KELLY, of Slaterville, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machinery for Hardening Scythe-Blades and other Articles; and we do hereby declare that the following is a full, clear, and exact description of our said invention, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan of an apparatus embodying our improvements, Fig. 2 represents an end view of the same, Fig. 3 a cross-section thereof at the line *x x* of Fig. 1, and Fig. 4 is a view of the inner face of one of the clamps.

The principal object of our invention is to harden scythe blades automatically without any other hand work than the placing of the heated blade in the machine. The apparatus we have devised for this purpose consists of a set of clamps for holding the blade and of mechanism for immersing the same in the hardening liquid, moving the clamps therein until the blade is cooled, and delivering the blade after hardening upon a suitable receiving table.

Our invention is divided into several parts the object of the first of which is to insure the free access of the hardening liquid to the surface of the blade while it is prevented from warping by the clamp.

To this end, the first part of our invention consists in combining a set of clamps of suitable size and form to hold the blade between them, with ribs arranged upon the faces of the clamps next the blade in such manner that the ribs on one side of the blade extend in directions crosswise to the ribs on the other side of the blade so that the blade to be hardened is firmly sustained while the hardening liquid is permitted to have free access to its surface, through the spaces between the ribs.

The object of the second part of our invention is to insure the proper form of the hardened blade, and it consists in combining a set of clamps curved in a direction the reverse of that in which the blade warps in hardening, with mechanism for closing the clamps upon the blade and immersing them in the hardening liquid.

The third part of our invention consists in the combination of clamps for holding the blade with mechanism that immerses them rapidly in the hardening liquid, and then moves the clamps slowly therein to give time for the cooling of the blade.

The fourth part of our invention consists in the combination of clamps for holding the blade during immersion with mechanism that moves the clamps laterally in the hardening liquid, so as to stir up the liquid, equalize its temperature, and change the position of the liquid in contact with the clamps.

The fifth part of our invention consists in the combination of clamps for holding the blade during immersion with mechanism that reverses and opens the clamps, so that the blade is delivered automatically from the clamps after hardening.

The sixth part of our invention consists in mounting a receiving table in such manner with reference to the clamps the mechanism for operating the same, and the vat of hardening liquid, that the hardened blades are received upon the said table after the hardening has been effected.

The seventh part of our invention consists in the combination of a shaft to which an intermittent rotary motion is to be imparted with a continuously revolving shaft, by means of a ratchet wheel having teeth which differ in size secured to the former and a reciprocating pawl operated by the latter; so that the shaft to which the ratchet wheel is secured ceases to revolve when it reaches a position indicated by the location of a longer tooth on the ratchet wheel, notwithstanding the continued reciprocating movement of the pawl.

The eighth part of our invention consists in the combination of the next preceding combination with a second pawl having an intermittent reciprocating motion, so that the ratchet wheel can be set in motion when desired by bringing the second pawl into action.

All the parts of our invention are embodied in the apparatus for hardening scythe blades represented in the accompanying drawings.

The clamps A A′, which hold the blade, are mounted upon a pair of arms, B B, which project radially from a rotating shaft C. This shaft extends lengthwise over the center of a vat D, that contains the hardening liquid, and its journals are supported in suitable boxes which are secured to the ends of the vat. One of the clamps, A, is rigidly

secured to the arms B B; the other clamp (A′) is perforated to slide upon the arms toward and from the fixed clamp, so as to grip the blade to be hardened between the two and to release it after hardening is effected. The movable clamp (A′) is connected with a sliding frame consisting of a pair of arms, E E, which slide in perforations in the shaft C, and of a cross bar F by which the arms are connected at the side of the shaft opposite to the clamps. The ends of the cross bar are fitted with a pair of friction wheels, *b b*, which by the rotation of the shaft are borne against weighted levers *d d*, the pressure of which forces the movable clamp toward the fixed clamp, so as to secure the blade to be hardened between the two. The ends of the cross bar are also fitted with pins, *f f*, which bearing against cam blocks *g* secured to the ends of the vat, prevent the weighted levers from closing the clamps until the proper time. The clamps are curved in a direction the reverse of that in which the blade warps in hardening and to the same extent, so that the blade is bent in the process of clamping before its immersion in the hardening liquid and is hardened in this bent form. The adjacent faces of the clamps are fitted with feather edged ribs *e e*, which in this instance are cast fast to the clamps, and extend obliquely in opposite directions across their faces, so that the ribs upon the opposite faces of the blade cross each other.

When the scythe blade is entered between the clamps its back rests upon the upper sides of the arms B B. The ribs of the clamp A′, which fits against the flat side of the blade, extend far enough across the clamp to bear against the whole breadth of the blade; but the ribs of the clamp A, which fits against the side of the blade on which the ridge projects that stiffens the blade longitudinally, extend only down to this ridge as shown at Fig. 4, so that the lower ends of the feather edged ribs are in a curve the same as that of the scythe blade. Hence the blade is held firmly, while at the same time the hardening fluid is permitted to have free access to its surface through the space between the ribs.

The proper curve of the clamps is obtained experimentally as follows: A straight sample blade of the kind to be hardened is heated to the proper temperature and immersed unclamped in the hardening liquid; then the curve of the clamps is made the reverse of that which this sample blade assumes in hardening; and, if on trial, the curvature of the clamps is found to be not exactly correct, it may be adjusted by filing the feather edged ribs.

The rapid clamping and immersion of the blade into the liquid in the vat, the slow movement of the clamps in the liquid, and the delivery of the hardened and cooled blade are all effected by the rotation of the shaft C by the following means: The end of this shaft C is fitted with a ratchet wheel G, having one tooth *h* (Fig. 2) longer than the remainder. The teeth of this ratchet wheel are acted upon by a pawl I which is pivoted to a lever J, that vibrates upon the end of the shaft, and is connected by a rod H with a crank pin *a* that projects from the face of a cog wheel K. The teeth of this cog wheel engage with those of a pinion L secured to a shaft M, to which a continuous revolving motion is imparted by power. A second pawl I′ is pivoted to a second vibrating lever J′, which is connected by a rod H′ with the crank pin of a second cog wheel K′. This second cog wheel (K′) is mounted upon a stud *i* in such manner that its teeth engage with those of the pinion L, and a portion of its teeth are removed so that it ceases to be driven by the pinion whenever the space *l*, made by the removal of the teeth, comes opposite to the pinion teeth, and consequently then ceases to cause the second pawl I′ to reciprocate and act upon the teeth of the ratchet wheel G. The teeth of the second wheel are caused to engage with those of the pinion by slightly turning the second wheel, which operation is conveniently effected by means of a foot lever N fitted with a hanging hook P, whose end engages with the teeth of the second wheel K′.

A pair of straps *m* are secured to the weighted levers *d*, and extend across the vat in the tracks of the friction wheels *b b*. These straps pass over a pair of pulleys *n* and are secured to a weight O, so that as the friction wheels are carried around by the revolution of the shaft C, they are borne upon by the weighted straps *m m* to hold the movable clamp in the position in which it has been placed by the action of the weighted levers. A pair of cam blocks R are also secured to the ends of the vat to bear upon the friction rollers *b b*, and prevent the release of the blade between the clamps until the latter rise sufficiently from the hardening liquid. A receiving table S is hinged to the hinder side of the vat and is held in its position by a spring *t*. This spring permits the inner edge of the table to rise when the clamps in rising press against its under side; but as soon as the clamps pass, the spring depresses the table to its lowest position, so that it is beneath the clamps and intercepts and receives the blade when the clamps open to permit its escape. The opening of the clamps is effected in this instance by the weight of the movable clamp and the sliding frame to which it is secured, which causes the movable clamp to move from the fixed one when the friction rollers *b b* reach depressed portions *s s* of their cam blocks.

In order to facilitate the operation of the

machine the weight of the clamps and their appurtenances upon one side of the shaft C is counterbalanced by a fixed weight T secured to an arm projecting from the opposite side of the shaft C.

The operation of the apparatus thus described is as follows. The vat D is filled with the hardening liquid, and the shaft M is caused to revolve continuously by means of a belt applied to a pulley secured to this shaft, or in some other convenient manner. By the revolution of this shaft the cogwheel K is caused to revolve and impart a continuous reciprocating movement to the pawl I; but as, in the position in which the parts are represented in the drawing, the pawl bears upon the inclined face of a tooth *h* which is longer than the range of movement of the pawl, the latter merely slides to and fro upon the ratchet wheel without imparting any motion to it or to the shaft C to which it is secured. Then the scythe blades, which have been heated to the proper temperature in a suitable furnace, are subjected one at a time to the apparatus. The workman standing at the front of the vat drops the blade edgewise and back downward between the clamps, so that its back rests upon the two arms, and immediately applies his foot to the lever N, by which he throws the teeth of the second cogwheel K′ into gear with those of the pinion L. The turning of the cogwheel by the pinion causes the second pawl to act upon the teeth of the ratchet wheel and put the shaft C in motion. As the shaft turns, the pins *f f* pass their ends of the cam blocks *g g*, thus permitting the weighted levers *d d*, which are bearing upon the friction wheels *b b*, to force the movable clamp toward the fixed clamp and secure the blade between the two. As the shaft continues to turn, the clamps with the blade between them are depressed and immersed in the hardening liquid contained in the vat. The turning of the shaft by the action of the second pawl I′ ceases as soon as the space in the teeth of its cog wheel K′ comes around to the teeth of the pinion, and then this second pawl remains out of gear and motionless until it is again thrown into gear by the movement of the foot lever N, but as the movement of the shaft has turned the long tooth of the ratchet wheel past the first pawl I, the shorter teeth are now within the range of motion of this pawl, and it, acting upon these short teeth, continues to turn the shaft until the long tooth again comes around to its first position. As the shaft turns under the action of the second pawl, the clamps are carried around in the vat and are raised therefrom in a reversed position; as they pass through the vat the movable clamp, although permitted to yield slightly to the spring of the hardened blade which tends to warp straight from its curved form, is prevented from releasing it by the action of the cam blocks R R upon the friction wheels. The continued raising of the clamps causes them to pass by the receiving table, which yields and flaps upward to permit their passage, and flaps back again when they have passed; and when the receiving table has reassumed its position beneath the edges of the reversed clamps, the depressed parts *s s* of the cam blocks R R permit the friction wheels *b b* and the sliding frame with the movable clamp to move from the fixed clamp, thus releasing the hardened blade and permitting it to drop from the clamps upon the receiving table. After the hardened blade has dropped the clamps continue to revolve until they are returned to the position whence they started; in arriving at this position the friction wheels *b b* are again brought into contact with the weighted levers, which tend to close the clamps, and this closing is prevented by the action of the blocks *g g* upon the pins *f f*. The movement of the shaft C stops when the long tooth of the ratchet wheel comes within the range of motion of the pawl I, so that the clamps remain open and at rest until the second pawl is again thrown into gear by the foot lever after the second heated blade has been introduced between the clamps by the workman. Hence the location of the long tooth upon the ratchet wheel, or, in other words, the location of a long space between the acting faces of two adjacent teeth, determines the particular point at which the rotating shaft C stops.

On examining Fig. 2 it will be seen that the connecting rods H H′ of the two vibrating levers J J′ act upon their respective levers at different distances from their centers of motion, the point of application of the connecting rod H′ to the vibrating lever of the second pawl I′ being nearer the center of motion than the corresponding point of the vibrating lever of the first pawl I, while the two crank pins *a a′* have the same throw. From this arrangement it follows that the second pawl I′ moves a greater distance with the same revolution of the driving shaft M, and turns the shaft C more rapidly than the first pawl (I) does; hence it permits the rapid closing of the clamps and effects their rapid immersion in the hardening liquid, while the first pawl, acting more slowly and turning the shaft at intervals, works the clamps through the hardening fluid, causing the latter to flow through the space between the ribs, and gives time for the cooling of the blade between them. The movement of the shaft C while the pawls are retrograding is prevented by a friction brake consisting in this instance of a strap *x* acting upon a pulley U secured to the end of the shaft, and a brake lever V, shown in dotted lines in Fig. 3,

which is held in place so as to strain the strap upon the pulley by an adjustable pin.

The position of the inner side of the receiving table S with reference to the clamps is regulated by means of a screw bolt *c*, upon the head of which the lower side of the table bears. The too great vibration of the weighted levers *d*, *d* which effect the closing of the clamps, is prevented by stops *w* with which the ends of the levers come in contact when the friction wheels *b b* in their forward movement leave the edges of the levers.

The hardening liquid which we prefer to use is water, and we prefer to change the water in the vat by keeping a stream of water flowing into it from a pipe and permitting the surplus water to escape through an overflow pipe. The speed of the apparatus is such that the clamps when started make a revolution in about 24 seconds. Their lateral movement in the vat has the effect of stirring up the liquid therein, and equalizing its temperature which is advantageous; and the arrangement of the clamp ribs obliquely in opposite directions or crosswise to each other reduces the portions of the blade pressed upon simultaneously by the opposite ribs to the smallest dimensions, and permits the hardening liquid to have free access to one side at least of every part of the blade except those small portions where the ribs cross each other.

As the apparatus we have described is a machine which hardens and delivers the blades automatically without requiring the attention of the workman after he places the blade between the clamps, and starts the machine, and as the time required for this purpose is exceedingly brief, the workman is left free to devote his time and attention to the heating of the blades preliminary to hardening.

Although the apparatus thus described is specially adapted to the hardening of scythe blades, we are aware that parts of our invention may be applied with advantage to the hardening of other articles, the construction of the apparatus being properly adapted to the peculiarities of such articles as circumstances render expedient. We are also aware that parts of the apparatus we have described may be modified, but the arrangement and construction of the apparatus which we have described and represented are the best with which we are acquainted.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of clamps of suitable size and form to hold the blade to be tempered with ribs arranged upon the faces of the clamps next the blade to be hardened in directions crosswise to each other, substantially as set forth.

2. The combination of a set of clamps curved in a direction the reverse of that in which the blade warps in hardening, with mechanism for closing the clamps upon the blade and immersing them in the hardening liquid, substantially as set forth.

3. The combination of clamps for holding the blade, with mechanism that immerses them rapidly in the hardening liquid and then moves them slowly therein, substantially as set forth.

4. The combination of clamps for holding the blade during immersion, with mechanism that moves the clamps laterally in the hardening liquid, substantially as set forth.

5. The combination of clamps for holding the blade during immersion, with mechanism that reverses and opens the clamps, so that the blade is delivered automatically from the clamps, substantially as set forth.

6. Mounting a receiving table in such manner with reference to the clamps, the mechanism for operating the same, and the vat of hardening liquid, that the hardened blade is received upon the said table after hardening is effected.

7. The combination of a shaft to which an intermittent rotary motion is to be imparted, with a continuously revolving shaft, by means of ratchet wheel having teeth of different size and a reciprocating pawl substantially as set forth.

8. The combination of the next preceding combination with a second pawl substantially as set forth.

In testimony whereof we have hereunto subscribed our names.

ANSEL HOLMAN.
OLIVER A. KELLY.

Witnesses:
NELCOME SMITH,
JOS. K. F. MANSFIELD.