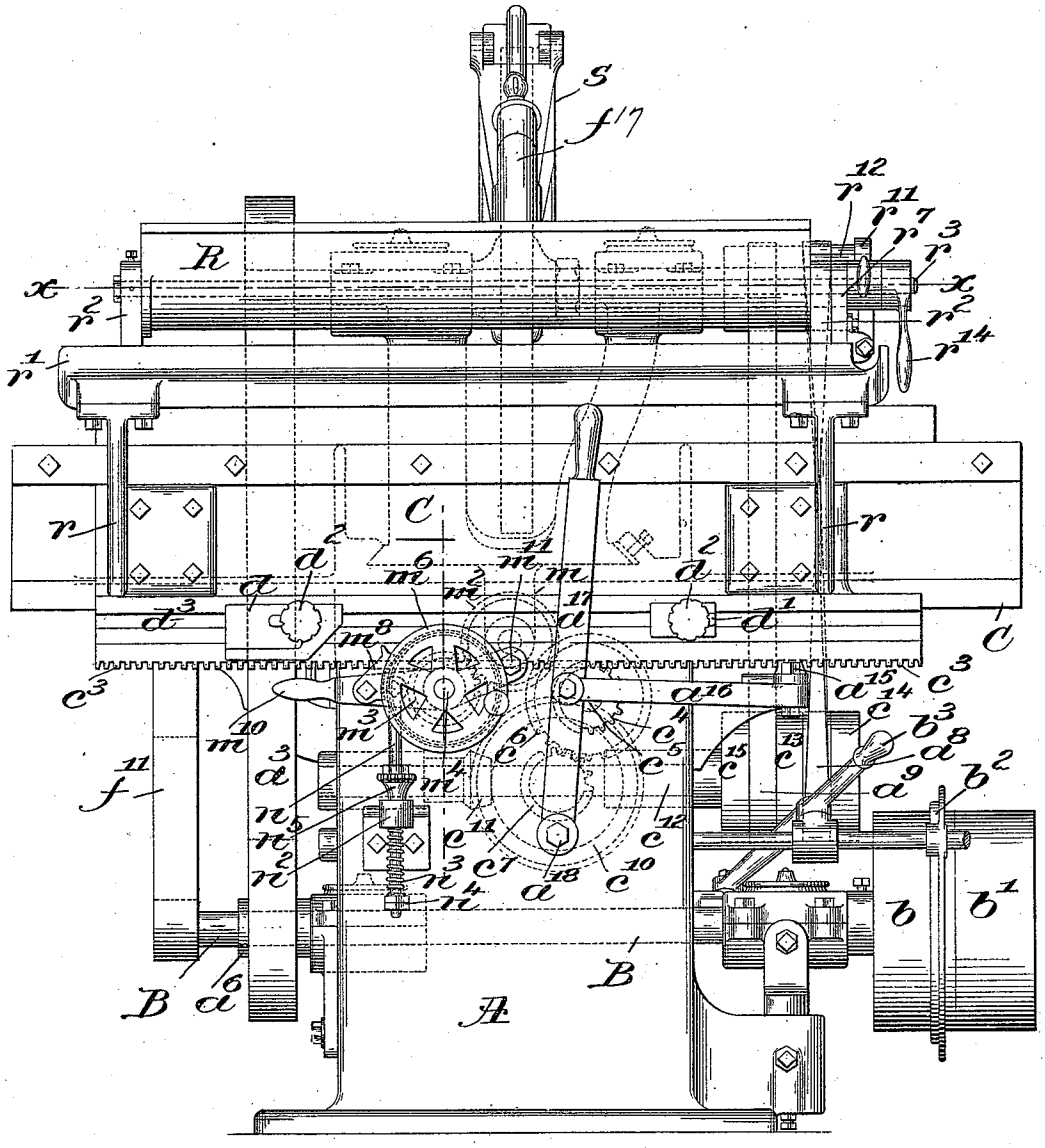
(No Model.) 5 Sheets—Sheet 1.

C. W. H. BLOOD.

GRINDING MACHINE.

No. 553,828. Patented Feb. 4, 1896.

Fig. 1.



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Attys.

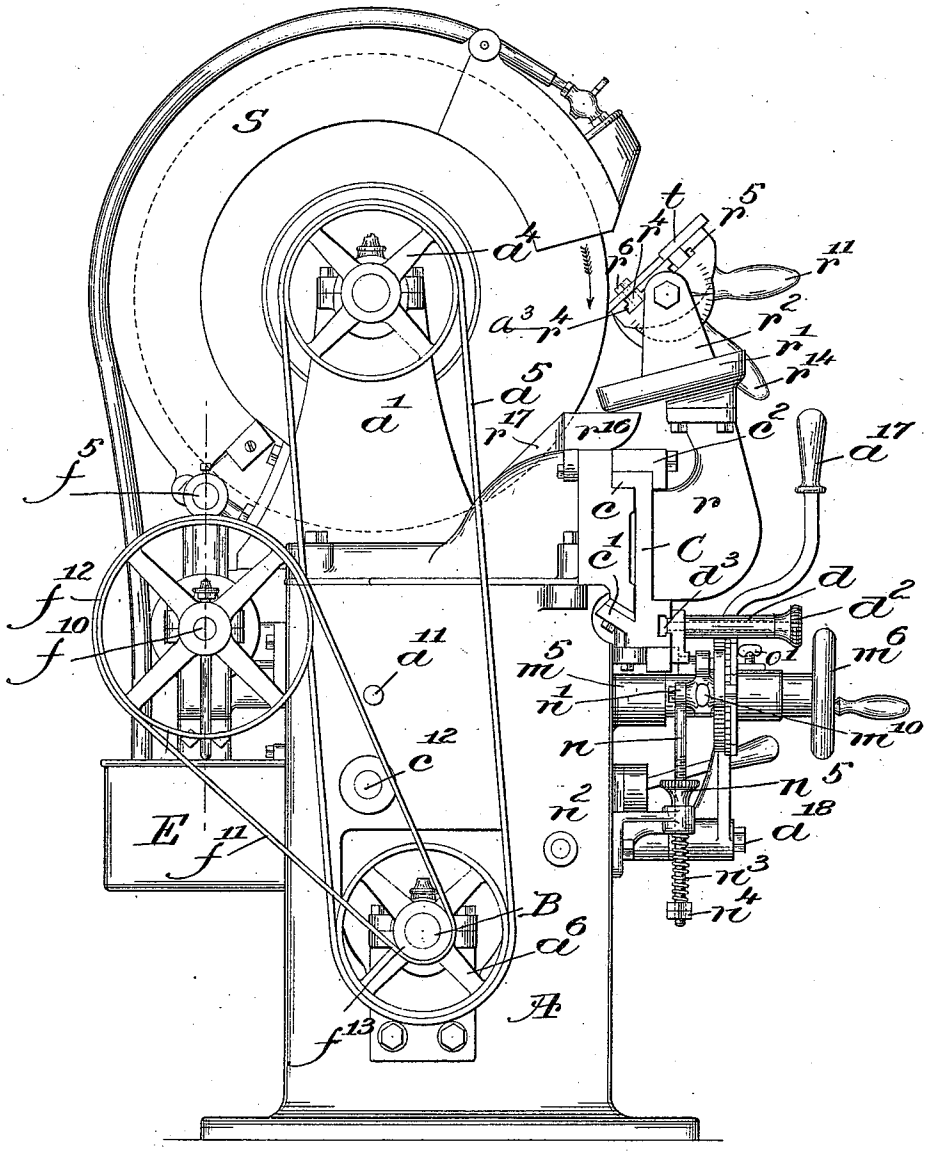
(No Model.) 5 Sheets—Sheet 2.

C. W. H. BLOOD.

GRINDING MACHINE.

No. 553,828. Patented Feb. 4, 1896.

Fig: 2.



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(No Model.) 5 Sheets—Sheet 3.

C. W. H. BLOOD.

GRINDING MACHINE.

No. 553,828. Patented Feb. 4, 1896.

Fig. 3.

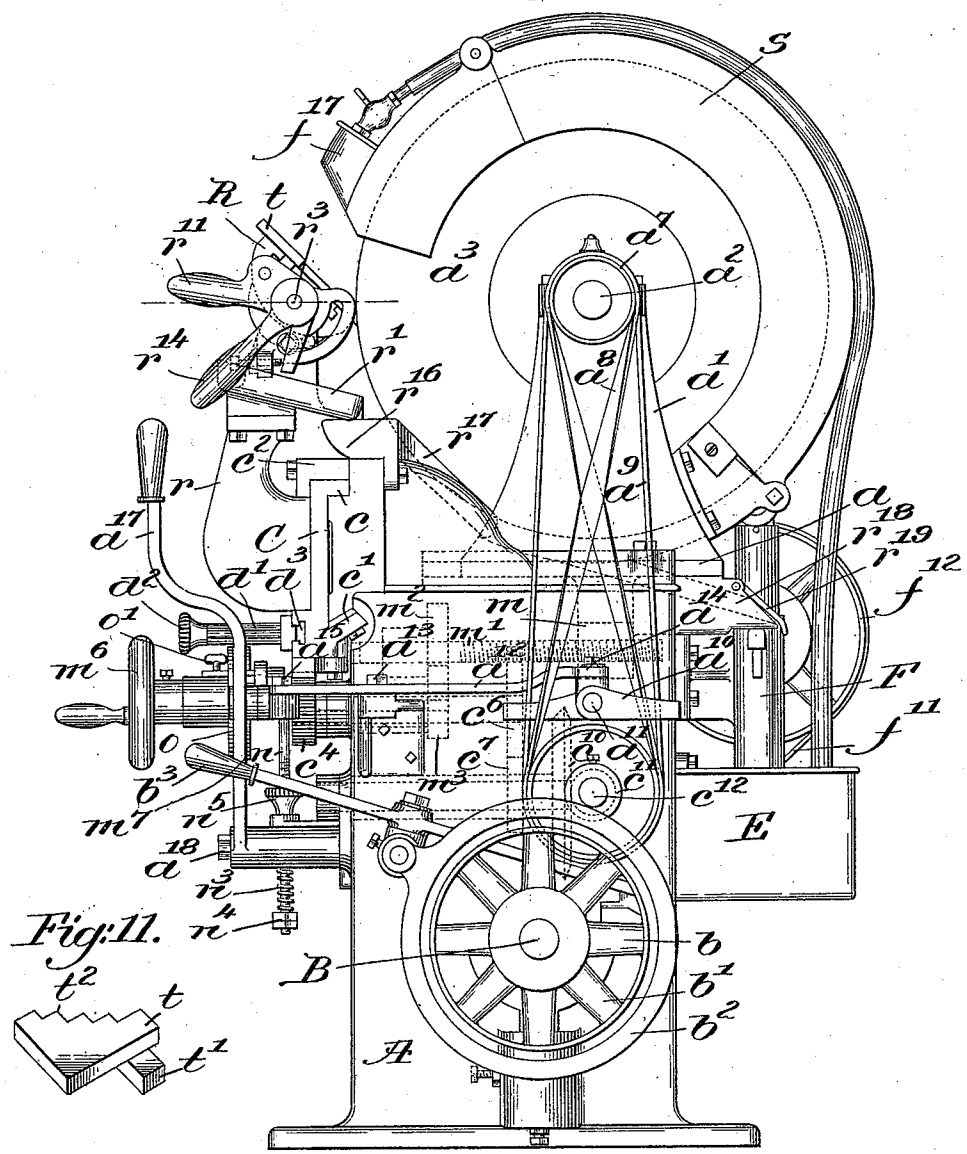


Fig. 11.

Fig. 9.

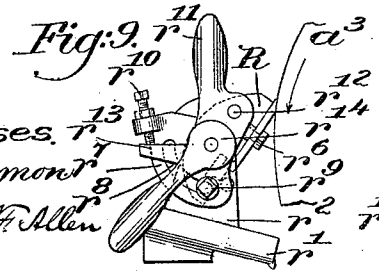
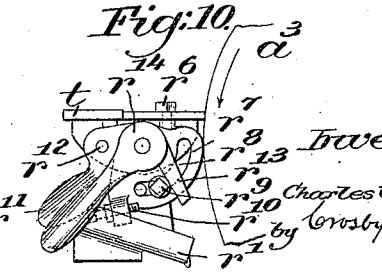


Fig. 10.



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(No Model.)

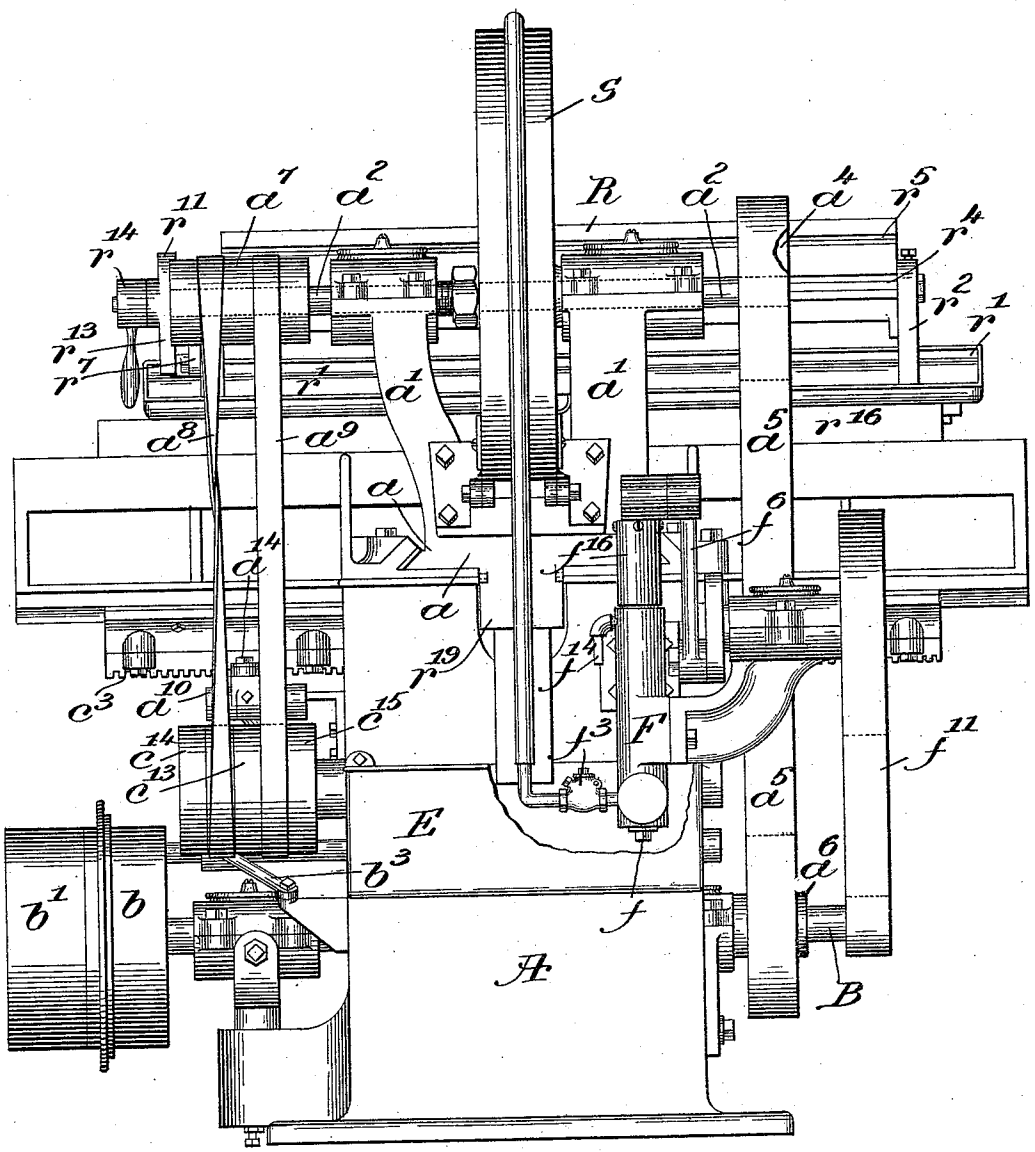
5 Sheets—Sheet 4.

C. W. H. BLOOD.

GRINDING MACHINE.

No. 553,828. Patented Feb. 4, 1896.

Fig. 4.



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(No Model.) 5 Sheets—Sheet 5.

C. W. H. BLOOD.

GRINDING MACHINE.

No. 553,828. Patented Feb. 4, 1896.

Fig:6.

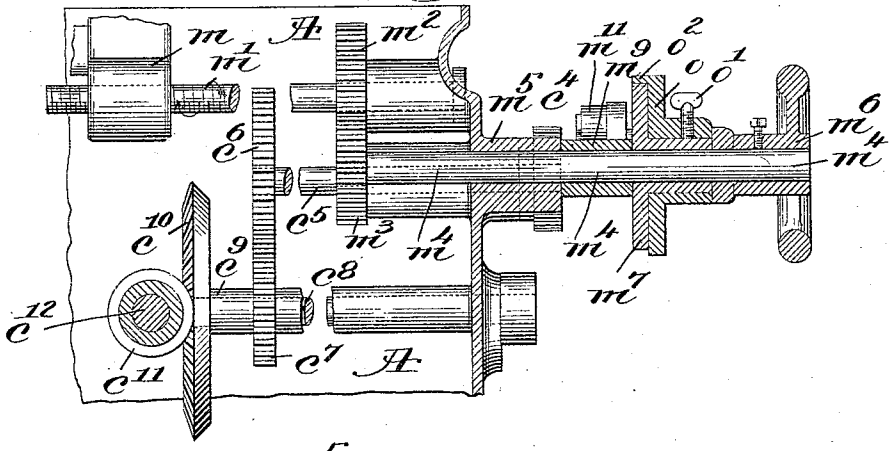


Fig:8.

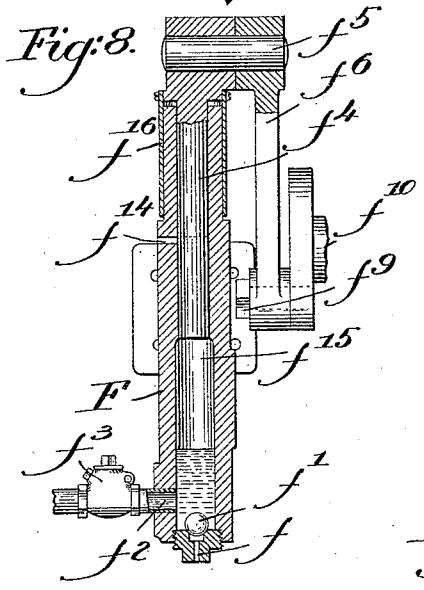


Fig:7.

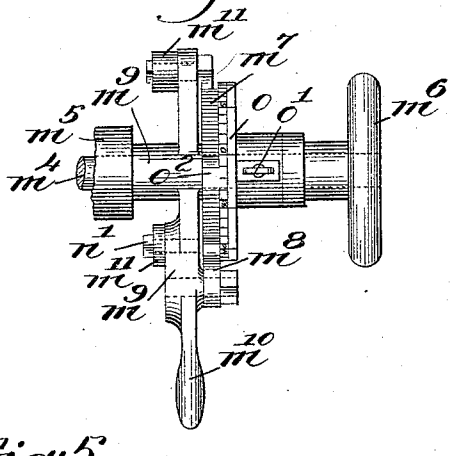
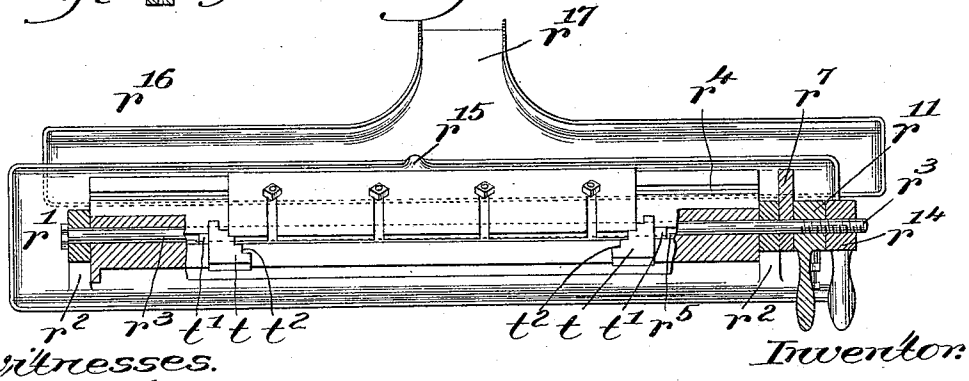


Fig:5.



Witnesses.

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Edward F. Allen.

Inventor.

Charles W. H. Blood,

by Crosby & Gregory Attys.

UNITED STATES PATENT OFFICE.

CHARLES W. H. BLOOD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE S. A. WOODS MACHINE COMPANY, OF SAME PLACE.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 553,828, dated February 4, 1896.

Application filed April 26, 1894. Serial No. 509,153. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. H. BLOOD, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Grinding-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to grinding-machines used for grinding and sharpening knives or cutting-blades, particularly those used in connection with woodworking-machines.

In machines of this kind as usually constructed the knife or blade to be sharpened is bolted or clamped to a suitable carrier which is caused to move in front of a grinder, usually a rotating wheel, which latter uniformly grinds or sharpens the cutting-edge of the knife or blade, a stream of water being constantly directed upon the surface of the grinder to keep the latter wet, and thereby facilitate the sharpening operation and prevent heating of the grinder.

One of the principle features of my invention relates to the pump for supplying the grinder with water. It is desirable, both for economy and convenience, that the same water be used over and over, being pumped from a reservoir through a suitable delivery-pipe which directs it against the grinder, from which it falls and is caught by a suitable return which again conveys it to the reservoir. Water when thus used becomes filled with particles of emery or of whatever substance the grinder consists, which soon cuts and ruins the working parts of the pump, giving rise to much trouble.

My invention comprehends a pump in which the plunger is separated from the water by an air-cushion, which, as will be hereinafter described, does not interfere with the operation of the pump, yet keeps the plunger of the latter free from the water, and thereby free from the cutting action of the grit contained therein.

Another feature of my invention lies in the pivoted rest having a flat face upon which the knife or blade to be ground is secured, the said rest being arranged adjacent the grinder and capable of rotation into position with either of the edges of its flat face adjacent the grinder, and means to secure a knife or blade to said rest, whereby the direction of movement of the grinder with relation to the cutting-edge of the knife or blade may be reversed, substantially as will be described.

Yet another feature of my invention consists in the employment of a plurality of adjustable positioning devices to insure a position of the knife or blade to be ground parallel with the line of motion of the rest, to thereby avoid uneven grinding or balancing of the knife or blade.

Other features of my invention, which can best be understood after a description of a machine embodying the same, will be hereinafter described and pointed out in the claims.

In the drawings, Figure 1 is a front elevation of a grinding-machine, showing one embodiment of my invention; Figs. 2 and 3, right and left hand elevations, respectively, of the machine shown in Fig. 1; Fig. 4, a rear elevation of the same; Fig. 5, a sectional detail partial elevation of the parts, taken on the horizontal dotted line $x\,x$, Fig. 1; Fig. 6, an enlarged sectional detail showing the feeding mechanism for the grinder; Fig. 7, yet another detail showing the construction and operation of a disengaging device embodying my invention; Fig. 8, a sectional detail of a preferred form of pump; Figs. 9 and 10, detail views showing different positions of the rest upon which the work is secured, and Fig. 11 a perspective view of one of the positioning devices by itself.

Referring to the drawings illustrating the preferred embodiment of my invention, A is the base or standard, of suitable shape and construction to sustain the working parts, said standard, as herein shown, being provided at its upper end with suitable guideways extending from the front toward the back to receive the reciprocating grinder-head a, shown as provided with two vertically-extended arms $a'\,a'$, in the upper ends of which is journaled a shaft a^2, fast upon which, between the said arms, is arranged a grinder a^3, shown as a wheel of suitable construction and material—such, for instance, as emery.

The grinder-shaft a^2, as shown, is provided

at one end (see Fig. 2) with a pulley a^4, driven by a belt or sprocket-chain a^5 from a pulley a^6 on the main driving-shaft B, journaled in suitable bearings at the bottom of the standard, and provided at the right of the machine, Fig. 1, with fast and loose pulleys b b', the driving-belt for which is under the control of a suitable belt-shipper b^2, part of which is broken away in Fig. 1 and which is actuated by a suitable handle b^3.

C is the carrier upon which the work-rest, to be described, is arranged, the said carrier, as herein shown, being provided along its upper edge with an inturned square lip c and at its lower edge with an inclined or dovetail lip c', which co-operate with corresponding bearing or guiding surfaces formed at the upper end of the standard A of the machine.

Referring to Figs. 2 and 3, the upper-edge guide c of the grinder is inclosed and protected by an angle-strip c^2, secured to the standard, and which also constitutes a part of the guide to retain the carrier in proper operative position, the said angle-piece, however, entirely concealing the guiding-surfaces at the upper edge of the carrier, and thereby preventing grit of any sort reaching and injuring, by cutting, the contacting guiding-surfaces.

The carrier C is herein shown as provided along its lower edge with a rack c^3, in mesh with and driven by a spur-wheel c^4, fast on the front end of a shaft c^5, journaled in the standard and provided with a spur-wheel c^6, in mesh with and driven by a smaller spur-pinion c^7 loosely journaled on an inwardly-projecting stud c^8 on the front of the standard, (see Fig. 6,) but fast on a sleeve c^9, journaled upon said stud, and carrying on its opposite end, as herein shown, the bevel-wheel c^{10}. The bevel-wheel c^{10} is in mesh with and driven by a bevel-pinion c^{11} on the main feed-shaft c^{12}, journaled in suitable bearings in the sides of the standard and provided at its end, at the right of the machine, Fig. 1, with three pulleys c^{13} c^{14} c^{15}, (see Figs. 1 and 4,) the middle pulley, c^{13}, being fast upon said shaft, while the outside pulleys, c^{14} c^{15}, are loose thereupon.

The grinder-shaft a^2, (see Fig. 4,) at its end opposite the pulley a^4, is provided with a long fast pulley a^7, which is connected with the pulleys c^{14} c^{15} by the crossed and open belts a^8 a^9, the said belts being normally in the position shown in Fig. 4, both running upon their loose pulleys c^{14} and c^{15} respectively.

Movement to the right of both belts, Fig. 4, causes the fast pulley c^{13} and its shaft c^{12} to be rotated by the cross-belt a^8, while movement of the said belts to the left, Fig. 4, causes the open belt a^9 to impart rotation to the said pulley and shaft.

The belts a^8 and a^9 are controlled by a suitable belt-shifter a^{10} mounted to slide upon a suitable shaft a^{11}, projecting at the right of the standard A.

The belt-shifter a^{10} is made to slide upon its shaft a^{11} for the purpose of changing the positions of the two belts referred to by means of a lever a^{12} pivoted at a^{13}, (see Fig. 3,) and jointed at a^{14} at one of its ends to the said belt-shifter, and at its opposite end jointed at a^{15} to one end of a link a^{16}, in turn pivoted to and intermediate the length of a handle-lever a^{17} fulcrumed at a^{18} on the standard at the front of the machine. This lever a^{17} is automatically moved at each end of the reciprocating movement of the carrier C by means of lugs d d', secured to the face of the carrier immediately above the rack at the lower edge thereof, and made adjustable on the said carrier by means of the nuts d^2 d^2, the co-operating bolts for which pass through the said lugs and have their T-heads fitted to and to slide in the horizontal dovetailed grooves d^3 at the bottom of the said carrier.

One or the other of the lugs d d' strikes the shipper-lever a^{17} just before the end of the movement of the carrier in each direction to shift the belts and cause the carrier to be moved in an opposite direction, the length of movement of the carrier being determined by the position of the lugs thereupon, which permit the lever a^{17} to remain unmoved for a greater or less length of time.

The reservoir C at or near its opposite ends is shown provided with two brackets r r which, at their upper ends, are bolted to and sustain a long trough r', (see Fig. 5,) from which rise two standards r^2 r^2, which carry the pivot-rod r^3 for the knife-rest R.

The knife-rest, as herein shown, consists of a nearly semicylindrical casting having its flat face planed accurately to receive the knife or blade to be sharpened, the said face being also provided, as herein shown, with two longitudinal ⊥-slots r^4 r^5, to receive the T-headed bolts r^6, by which the knife or blade is secured in position.

Referring now particularly to Figs. 5, 9 and 10, the pivot-shaft r^3, outside one of its end supports r^2, has loosely and adjustably mounted upon it a sector-plate or stop-carrier r^7, shown as provided with an arc-shaped slot r^8, through which is passed a clamping-bolt r^9 tapped into the adjacent standard r^2, and by means of which the position of the sector-plate or stop-carrier may be adjusted. The stop-carrier r^7 is provided with a lug in which is tapped the stop-screw r^{10}, constituting an adjustable stop. (See Fig. 10.) Outside the stop-carrier r^7, and loosely mounted upon the end of the pivot-shaft r^3, is a lever r^{11}, which is connected with the end of the rest R by a pin r^{12}, (shown in Figs. 1, 9 and 10,) so that rotation of the handle r^{11} upon the pivot-shaft causes a corresponding rotation of the carrier also about said pivot-shaft. The handle r^{11} is provided with a depending finger r^{13} which co-operates with the stop-screw r^{10} to limit the rotative movement of the carrier, the adjustment of the stop-screw, either in its lug on the stop-carrier or for long adjustment, as when changing the carrier to reverse the direction of movement of the grinder with relation to

the knife edge, by movement of the carrier itself, determining the position of the rest with relation to the grinder, thereby determining the angle or bevel at the cutting-edge of the knife or blade. The outer end of the pivot-rod r^3 is threaded to receive the handle-nut r^{14}, which, when turned in the proper direction, draws the pivot-rod to the right, Fig. 5, and thereby clamps the standards r^2 tightly against the ends of the work-rest to hold the latter firmly in proper position during the grinding operation. The trough r', fixed upon the tops of the brackets r referred to, is shown as provided at its middle with an outlet-spout r^{15}, which discharges into a long fixed trough r^{16}, carried at the top and front of the standard, and to be hereinafter referred to.

Referring now to Figs. 2, 3, and 4, the fixed trough r^{16} referred to has a discharge-spout r^{17}, which delivers into a suitable trough r^{18}, formed in the grinder-head a, and shown in dotted lines, Fig. 3, said trough at its outlet end discharging into a water-reservoir E, suitably attached to and at the rear side of the standard, a flap-valve r^{19} acting to prevent the returning water shooting over the reservoir. The trough r^{18} extends down in front of and close to the grinder to catch the discharge from the grinder thrown off by rotation of the latter and conducts the same to the pump, to be returned again for further use.

F is the pump-cylinder, (see detail Fig. 8,) the same at its lower end having an inlet or suction opening f, controlled by a suitable valve, as f'.

The delivery for the pump is shown at f^2, the same being provided with a suitable check-valve f^3 to prevent return of the water into the pump-cylinder when once forced therefrom.

The pump-cylinder F is fitted to receive the reciprocating plunger f^4, provided at its upper end with a pin f^5, to which is connected one end of a link f^6, actuated from a crank-pin f^9, fast on a shaft f^{10}, journaled in suitable bearings secured to the rear side of the standard (see Fig. 2) and driven from the main shaft B by a belt f^{11}, run upon suitable pulleys f^{12} f^{13}.

As herein shown, the pump-plunger f^4 has a reciprocating movement from a position shown in full lines, Fig. 8, to that shown by dotted lines, and at a point preferably immediately below the limit of its upstroke I have provided the pump-cylinder with a lateral air-inlet, as f^{14}, (see Fig. 8,) which at each upstroke of the plunger admits a certain quantity of air to the interior of the cylinder. This air-inlet f^{14} admits air at each upstroke of the plunger, and thereby maintains at all times an air-cushion between the end of the plunger and the surface of the water drawn into the pump-cylinder, thereby preventing any grit or particles of emery or grinding substance with which the water in the reservoir becomes charged from reaching and thereby cutting and injuring the plunger. The air-cushion referred to also enables the operator to stop the delivery of the water from the pipe f^2 without stopping the pump, the air between the plunger and the water being simply compressed at each reciprocation of the plunger. The air-cushion is shown at f^{15}, Fig. 8.

The inlet of the pump-cylinder is contracted, so that when the plunger moves up the water cannot enter sufficiently fast to fill the cylinder behind the retracting plunger, causing the latter to rarefy the air in the cylinder and constituting the air-cushion, in order that a small quantity of air may be drawn in through the air-inlet f^{17} to replenish the cushion, more or less air being forced out with the water at each stroke. The upper end of the pump-cylinder is shown surrounded by a sleeve f^{16}, attached to the upper end of the plunger, and which prevents any dust or grit lodging upon the upper end of the cylinder and working down onto the bearing-surface of the plunger.

Referring to Fig. 6, m is an arm depending from the grinder-head, said arm, at its end, being threaded to receive the feed-shaft m' journaled in suitable bearings in the interior of the standard A. The feed-shaft m' has fast upon it a spur-wheel m^2, driven by a spur-wheel m^3, fast on a shaft m^4, journaled on a boss m^5, projecting from the front of the standard, said shaft being fitted at its extreme end with a hand-wheel m^6, by which it may be rotated by hand. The shaft m^4, between the hand-wheel m^6 and the boss m^5, has mounted fast upon it the ratchet-wheel m^7, with which co-operates a pawl m^8 on the yoke m^9, loosely mounted upon the said shaft between the ratchet-wheel and the boss, (see Figs. 6 and 7,) and provided at one end with a handle m^{10}, and at its opposite end with a roll-stud m^{11}, which normally lies in the path of movement of the plate-like base of the lug d on the reciprocating carrier C. Just before the carrier reaches the limit of its movement to the right, Fig. 1, said lug will act upon and depress said roll, thereby turning the yoke upon the shaft m^4 and causing its pawl to engage the ratchet-wheel and turn the latter and its shaft m^4 and feed-shaft m' to feed the grinder slightly toward the knife or blade upon the rest. The yoke and pawl are returned to their normal positions again, as soon as the lug has passed over the roll, by means of a rod n jointed at n' to the yoke and passed through a bracket n^2 secured to the front of the standard, (see Fig. 1,) and below said bracket surrounded by a spring n^3 interposed between the said bracket and a nut n^4 threaded upon the end of said rod, which latter is depressed at each outward movement of the roll m^{11} and returns the said roll and pawl to their normal positions at once upon passage of the lug d. A stop-nut n^5 threaded upon the rod n above the bracket n^2 limits the return movement of the pawl, and thereby determines the number of teeth through which the ratchet-wheel will be moved when the roll m^{11} is depressed by the lug on the

carrier, full return movement of the pawl providing for a longer throw of the pawl at the next depression, and vice versa.

The operation of my improved machine may be briefly described as follows, viz: The knife or blade to be sharpened is first bolted to the rest by means of the bolts r^6, (shown best in Fig. 5,) the knife or blade being first positioned upon the rest by means of the step positioning devices t t shown, which insures proper alignment or positioning of the knife or blade in parallelism to the line of reciprocation of the rest and its carrier. The positioning devices t t are each provided with a guide-block t' adapted to slide in the ⊥-slots in the rest, so that said devices may be readily slid along into proper position to receive the ends of the knife, which latter may be placed in two of the notches or stops t^2 in said devices. It matters not which of the notches the knife is placed in, for in any event the said knife is positioned parallel with the line of reciprocation of the rest, thereby insuring accuracy of grinding and balancing. The operator now turns the handle m^6 to move the grinder up to the edge of the knife, and the stop-pin r^{10}, Fig. 10, is adjusted to bring the rest to the proper angular position for grinding the desired face at the cutting-edge of the knife or blade. The operator next moves the belt-shipper f^3 to start the machine, rotation of the main shaft B causing rotation of the grinder in the direction of the arrow, Fig. 2, and also therefrom through the crossed and open belts a^8 a^9 causing rotation of the shaft c^{12}, which latter causes the carrier C, upon which the rest and knife or blade are mounted, to be reciprocated, say, for instance, to the right, Fig. 1, causing the cutting-edge of the blade to be gradually fed in front of and ground by the grinder in well-known manner. Just before the carrier reaches the limit of its movement to the right the lug d strikes the shipper-lever a^{17} and moves the latter to the right to shift the belts a^8 a^9, to return the carrier in the opposite direction to its first position, the said lug at the same time depressing the roll m^{11} on the feed-yoke and causing the pawl m^8 to engage its ratchet-wheel and feed the grinder slightly toward the knife or blade upon the rest. Just before the limit of the return movement to the left, Fig. 1, is reached the lug d' strikes the shipper-lever a^{17} and again shifts the belts a^8 a^9, to cause the carrier to be once more moved to the right, Fig. 1, this operation being continued until the knife has been properly ground, the grinder at each complete reciprocation being fed slightly toward the knife or blade by the pawl and ratchet referred to. In the present construction I have provided a simple disengaging device to disengage the feed from the grinder after the knife or blade has been ground a predetermined amount, determined by the judgment of the operator at the time the blade is positioned upon the rest.

Referring to Figs. 6 and 7, o is a disk mounted loosely upon the hub of the ratchet-wheel m^7 and provided with a set-screw o', by which it may be secured in adjusted position on the said hub. The disk o is provided at its outer edge with a short shield o^2, (shown best in Fig. 7,) which overlies the ratchet-wheel m^7 and conceals several of the teeth thereof. The periphery of the disk o is scaled or marked in suitable manner, as shown in Fig. 7, to enable the operator to turn the disk on and with relation to the ratchet-wheel before the machine has started, for the purpose of fixing the amount to be ground. After the operator has turned the disk into the proper position it is secured by means of the set-screw o', and thereafter, during operation of the machine, when the ratchet-wheel, by successive pushes of the pawl m^8, has been rotated such distance as will bring the shield o^2 on the disk, which rotates with it, into position between its teeth and the pawl the latter will be prevented from engaging said teeth, and the feed must cease.

Referring to Figs. 2 and 3, it will be seen that the flat face of the rest R is in a position forming an acute angle with the grinder, to thereby cause the latter to grind from the top of the knife or blade down or toward the cutting-edge thereof. Sometimes, however, workmen prefer to grind a knife or blade from the cutting-edge toward the top thereof, and such being the case, in my improved machine the operator, by turning the clamping-nut r^{11} upon the pivot-rod r^3, loosens the rest, which may be turned over into the position Fig. 9, so that the grinder will act upon the knife or blade first at the cutting-edge, moving thereafter toward the top of the same, as shown.

Fig. 10 shows the rest in a substantially horizontal position necessary for grinding shear-blades and the like, showing the range of adjustment of said rest for various classes of work.

While I prefer to embody my invention in a machine substantially like that herein shown and described, yet my invention is not limited in this respect, for it may be varied in many ways without departing from the spirit and scope of the invention.

I have herein shown and described a novel pump, wherein the plunger is not brought into contact with the grit in the water or liquid circulated; but I do not herein claim the said pump as a part of this invention, for the same forms the subject-matter of another application, Serial No. 553,252, filed June 19, 1895, pending concurrently herewith.

Having described my invention, and without limiting myself as to details, what I claim, and desire to secure by Letters Patent, is—

1. In a grinding-machine, the combination with a grinder, of a pivoted rest having a knife-holding face arranged adjacent to said grinder and rotatable into position presenting either edge of said knife-holding face to the grinder, whereby the direction of movement of the grinder with relation to the cutting-edge of the knife or blade may be reversed,

and means to hold the said rest in adjusted position with either of the edges of its holding-face presented to said grinder, substantially as described.

2. In a grinding-machine, the combination with a grinder, of a rest arranged adjacent thereto, supports in which said rest is pivoted, means to secure a knife or blade to said rest, a stop-carrier on and adjustable with relation to said support and a stop for the rest adjustable on said stop-carrier, combined adjustment of the said carrier and stop relatively to said support determining the angular position of the said rest, substantially as described.

3. In a grinding-machine, the combination with a grinder, of a rest, end supports therefor, a pivot-rod extended through said supports and rest, and about which said rest may be rotated to present either edge of its knife-holding face to said grinder, and a clamping-nut threaded upon one end of said rod to clamp the rest in any adjusted position, substantially as described.

4. In a grinding-machine, a grinder combined with a knife-rest, and means to impart a relative feeding movement to the said grinder and knife-rest and a plurality of positioning devices on and longitudinally movable of the said rest to accommodate knife-blades of varying lengths and against which a knife or blade may be placed to insure accuracy of alignment, substantially as described.

5. In a grinding-machine, a grinder, a traveling work-rest, and a support therefor; a pawl-and-rachet feed mechanism to feed the grinder and work-rest one toward the other; and a shield adapted to be interposed between the said pawl and its ratchet; and means to vary the position of said shield to determine the extent of feed of said mechanism, and thereby the extent of grind, substantially as described.

6. In a grinding-machine, a grinder, combined with a carrier, a knife-rest, and a positioning device longitudinally movable thereon and having a series of steps at one edge against one or another of which the knife or blade to be ground may be positioned to assist in aligning the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. H. BLOOD.

Witnesses:

FREDERICK L. EMERY,

JAMES ROBERTS.