(No Model.) 2 Sheets—Sheet 1.

J. G. OLIVER & G. C. BARDONS.

AUTOMATIC VALVE MILLING MACHINE.

No. 555,116. Patented Feb. 25, 1896.

Fig. 1.

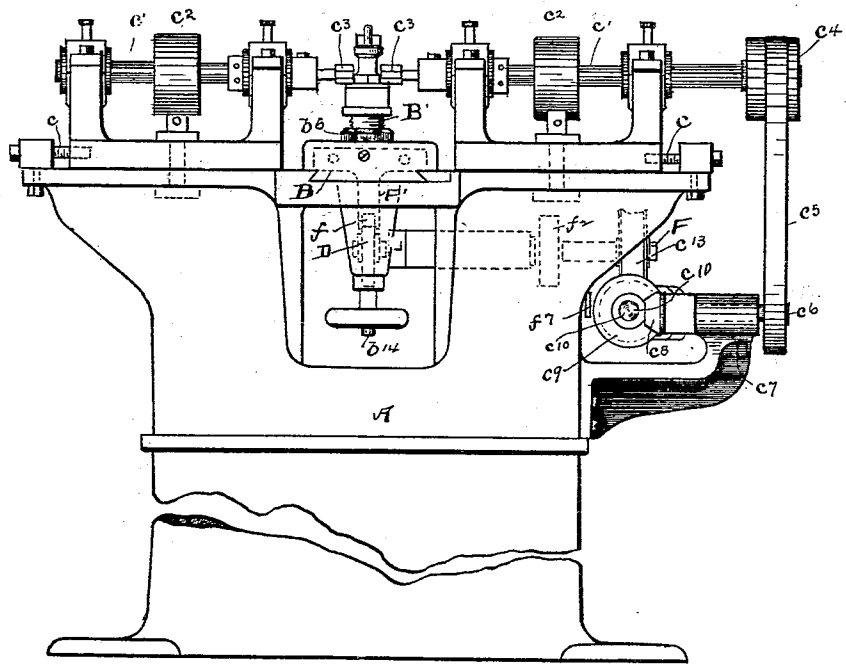
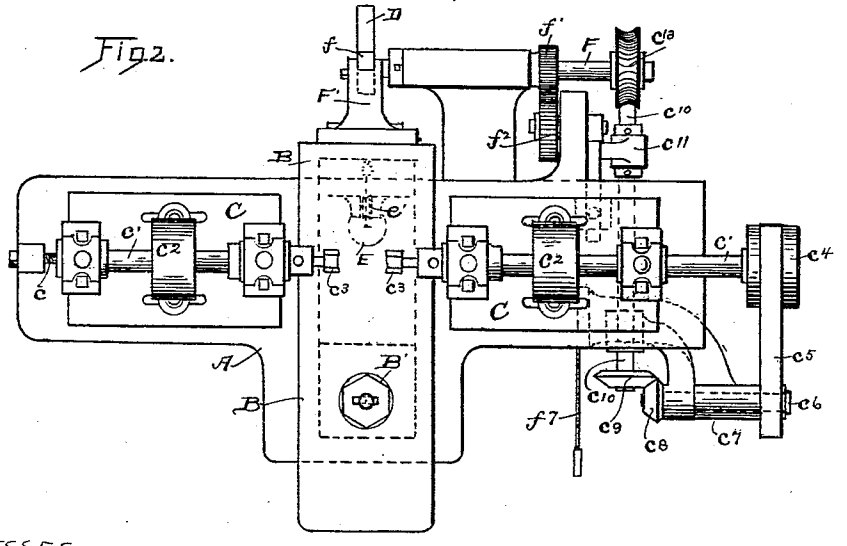


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

J. G. OLIVER & G. C. BARDONS.

AUTOMATIC VALVE MILLING MACHINE.

No. 555,116. Patented Feb. 25, 1896.

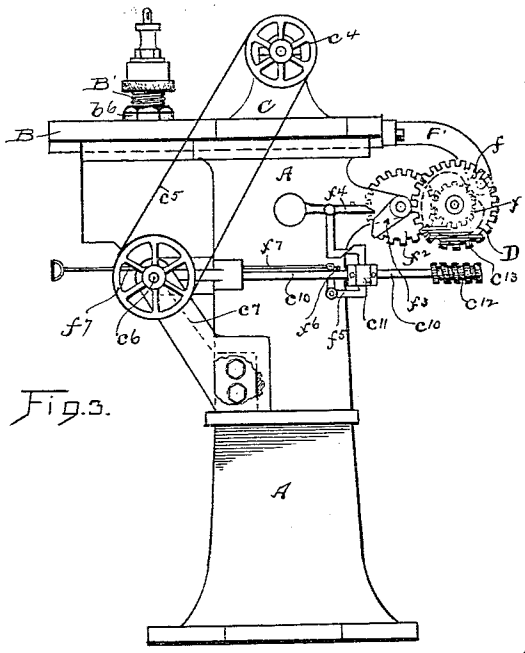

Fig. 3.

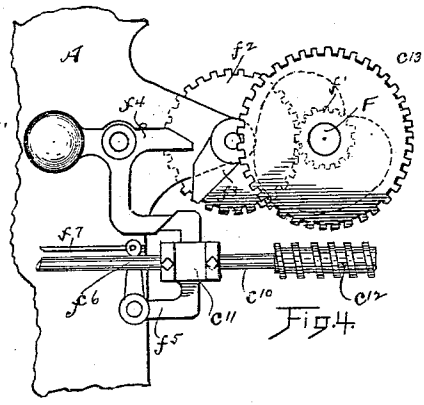

Fig. 4.

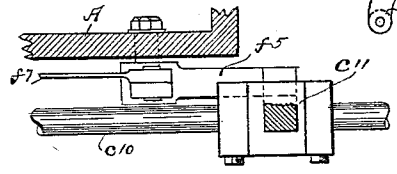

Fig. 5.

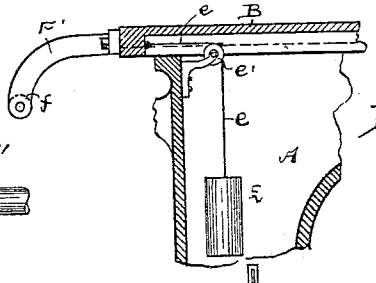

Fig. 6.

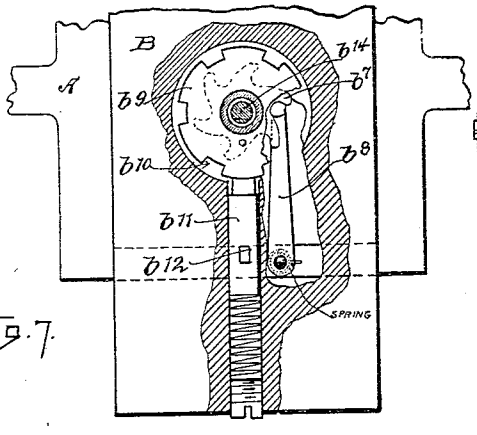

Fig. 7.

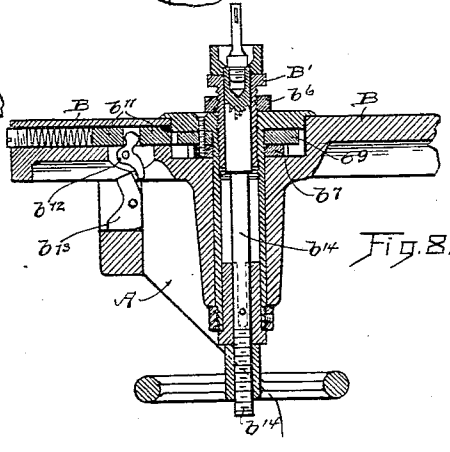

Fig. 8.

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UNITED STATES PATENT OFFICE.

JOHN G. OLIVER AND GEORGE C. BARDONS, OF CLEVELAND, OHIO.

AUTOMATIC VALVE-MILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 555,116, dated February 25, 1896.

Application filed October 22, 1894. Serial No. 526,657. (No model.)

To all whom it may concern:

Be it known that we, JOHN G. OLIVER and GEORGE C. BARDONS, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Automatic Valve-Milling Machines; and we 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.

Our invention relates to improvements in automatic valve-milling machines; and it consists substantially of a work-holder slide, a pair of rotative cutters, mechanism for moving the work-holder and rotating the work on the holder and passing the same between the cutters, also of automatic means whereby the work-holding slide is stopped when the work is completed.

Figure 1 is a front elevation. Fig. 2 is a top plan view. Fig. 3 is an end elevation. Fig. 4 is a detail end elevation of the automatic stop for the work-holder slide. Fig. 5 is a plan view of the work-releasing mechanism. Fig. 6 is a diagrammatic elevation of a part of the machine in cross-section. Fig. 7 is a detail view of the means for rotating the work-holder. Fig. 8 is an elevation in section of Fig. 7.

A suitable standard or hollow column A is provided, which has transverse ways upon its upper face wherein the work-holding slide B is placed and wherein it is reciprocated. Upon each side of this slide there are the heads C, which can be adjusted by the screws c. These heads carry the spindles c', which have mounted thereon the pulleys c^2 and the cutters c^3. The right-hand side head has an extension-spindle which connects with the work-holder-slide-actuating mechanism.

The slide B is moved in a rearward direction by reason of the cam D and in its forward movement it is actuated by the weight E, suspended from cable e, which passes over a suitable sheave e' and is attached to the slide in any convenient manner. These parts may, however, be reversed—that is, the weight might move the slide rearwardly and the cam in its forward direction, or the movement of the slide might be made positive in both directions by a grooved cam or in any other suitable manner, if such were desired. It should be understood that we do not limit ourselves to the specific details as shown. The slide carries a work-holder B′ at its forward end, which holds the work in a movable manner, so that it is readily replaced. The work-holder B′ is adjustable in a vertical direction and is held by a lock-nut b^6. It is also rotated periodically by a ratchet b^7, which is engaged by a pawl b^8 that is held by the frame. This pawl has a slight horizontal movement against the tension of a suitable spring so as to keep it engaged with the ratchet-teeth.

In order that the work may be held firmly in position while it is being milled, we provide a locking-disk b^9, placed upon the work-holder spindle just above the ratchet-wheel b^7. This disk has notches b^{10}, the same in number as the teeth of the ratchet-wheel. We also provide a spring-pressed bolt b^{11} for engaging the notches and a trip b^{12}, which as the slide moves forward engages a second trip b^{13} on the frame, thus withdrawing the bolt, so that the ratchet-wheel which is secured to the work-holder spindle b^{14} can turn the work, which as soon as it has moved the proper distance is again locked by the bolt mentioned.

The spindle c' at the right-hand end has a pulley c^4, which connects with a belt c^5 to a second pulley which is secured to the short shaft c^6. This shaft is supported by the bearing c^7, and it carries a bevel-gear c^8, which meshes with another bevel-gear c^9, secured to the rearwardly-extending shaft c^{10}. The shaft c^{10} at its front end has bearing in a pivoted bracket which is supported upon the shaft c^6, between the bearing c^7 and the bevel-gear c^8.

The shaft c^{10} extends rearwardly where it is provided with a bearing-block c^{11} and a worm c^{12}, which meshes with a worm-gear c^{13} upon the shaft F. The shaft F is supported by a suitable bearing, and it carries a cam D and a small pinion f'.

The cam engages a roller f secured upon the projection F′ of the work-holder slide, whereby as the cam rotates the slide is moved so as to bring the work between the cutters.

In ordinary valve-milling the hexagonal form is almost universally used, so that with

this form the slide moves rearward three times, when all six faces will be completed.

In order to stop the slide automatically after the third movement, we place a small pinion f' on the shaft F and meshing therewith, a spur-gear f^2 supported upon a bearing-bracket extending rearwardly from the machine-frame, whereby the pinion makes three revolutions to one of the spur-gear. The short spur-gear shaft carries a finger f^3 which engages a gravity-catch f^4 having a depending hook-ended projection which serves to hold the bearing c^{11} of the shaft c^{10} through a hook projection from this bearing, so that the worm and gear are all held in mesh. As the catch is disengaged the bearing drops by gravity, disengaging the worm and thus stopping the slide. The bearing drops upon a bell-crank lever f^5, which is held at a predetermined position by a pin f^6. When the machine is to be started up again the bell-crank f^5 is rocked by a hand-rod f^7. This raises the bearing c^{11} and the shaft c^{10}, whereby the worm c^{12} engages the worm-gear c^{13} and also allows the depending hook of the gravity-catch to drop in place under the hook of the bearing c^{11}, thus holding these parts engaged until again to be released, when the operation will be the same as already described.

It is obvious that with a change of gears we could automatically regulate this stop-motion for squares or octagons or any other number of faces. Therefore we do not limit ourselves to the specific ratio mentioned. Of course the parts b^9 b^7 would be changed accordingly. We could also inclose all of the working parts outside of the slide in suitable housings, as desired. The work is held in place by a hand wheel or lever which is quickly loosened, so that a new piece may be placed upon the machine.

In practice we place a series of machines side by side, so that as one is being supplied with work the others are active, thus turning out a maximum product with minimum cost of plant and labor.

It should also be understood that we do not limit ourselves to the use of a pair of cutters, whether placed upon the same axial plane or otherwise, for it is obvious that a single cutter, or more than two, would operate all right, turning out work at various speeds.

The cutters could also be placed in advance of each other along the path of travel of the slide, and the work-holder could be moved so as to present a new face to each succeeding cutter, if such arrangement of parts were desired, or, furthermore, for finely-finished work the slide would successively pass adjacent succeeding cutters without being moved, thus subjecting the work to more than one operation upon any face, if such were desired. Of course the work could be passed between a pair of cutters more than once without changing the position of the same, thus in a measure effecting the same end.

It is of course obvious that the work-holder could be moved at each end of the movement of the slide, so that the cutters would be operative upon the faces of the work as the slide moves in each direction.

What we claim is—

1. A movable slide and an automatically-indexing work-holder, carried thereby and means for automatically moving the slide, substantially as set forth.

2. A movable slide and an automatically-indexing work-holder, carried thereby, means for automatically moving the slide and means for automatically stopping the slide when desired, substantially as set forth.

3. A movable slide and support, a work-holder on such slide comprising a spindle capable of rotary and endwise movement a ratchet connected therewith, a dog pivotally secured to the slide-support, a locking member adapted to hold the spindle from rotation and means for releasing the locking device as the dog actuates the ratchet to rotate the spindle, and again engage the same after the ratchet has been moved, substantially as set forth.

4. In milling-machines the combination of a reciprocating work-holding slide with a movable work-holder capable of a rotary and endwise movement supported thereon, a locking member for maintaining the holder against rotation, a dog or pawl for rotating the same and means for making either one of the last two members inoperative while the other is in operation, substantially as specified.

5. In milling-machines the combination of a reciprocating work-holding slide, with a cam for moving the same a weight spring or the like to work in opposition to the cam, a revoluble work-holder on the slide, a bed or frame in which the slide moves, a stop or pawl secured to such bed for rotating the holder and a pawl or tripping mechanism also secured on such bed, the same being adapted to unlock the rotating holder only during the time the rotating pawl is in action, substantially as specified.

6. In milling-machines, the combination of a movable slide, a rotating work-holder supported thereby, a bed in which the slide is adapted to move, with a periodically-actuating cam, a weight or the like to work in opposition to the cam and intermittent power connections for rotating the cam, substantially as specified.

7. In milling-machines the combination of a pair of adjacent cutters and power connections therefor with a reciprocating slide, a work-holder thereon, a cam or the like for moving the slide in one direction, means external of the power connections for moving the slide in an opposite direction, a shaft for rotating the cam, a detachable power-shaft operating with the cam-shaft, a tripping mechanism actuated by the cam-shaft to detach the power-shaft at predetermined periods, substantially as specified.

8. In milling-machines the combination of a power-shaft of a cutting mechanism, a supplementary shaft, a pivoted bearing therefor whereby the one end of the shaft may be moved in a direction other than rotarily a bearing at the free end of the shaft, a movable catch or stop adapted to hold the free end of the shaft in a fixed position, with a movable work-holding slide and periodic power connections between the pivoted shaft and such slide, substantially as specified.

9. In a movable slide, periodic power connections for moving the same in one direction and a weight spring or the like for moving the same in an opposite direction, a suitable frame support for the slide and actuating mechanism, a movable work-holder a stop on the frame support for moving the work-holder at the end of each to-and-fro movement of the slide.

10. In milling-machines, the combination of a frame a pair of cutter-supports rotating cutters in the supports and means for rotating the same, with a work-holding slide, a work-holder upon the slide, a cam for moving the slide in one direction, a weight or the like for moving it in an opposite direction a locking member adapted to hold the work-holder against rotation, a fixed pawl for rotating the holder and a trip for releasing the locking member during the time the pawl moves it into a new position, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN G. OLIVER.
GEORGE C. BARDONS.

Witnesses:
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GEO. H. SCHWAN.