(No Model.) 3 Sheets—Sheet 1.

C. E. ROBERTS.

MACHINE FOR MILLING TABLE KNIVES.

No. 555,125. Patented Feb. 25, 1896.

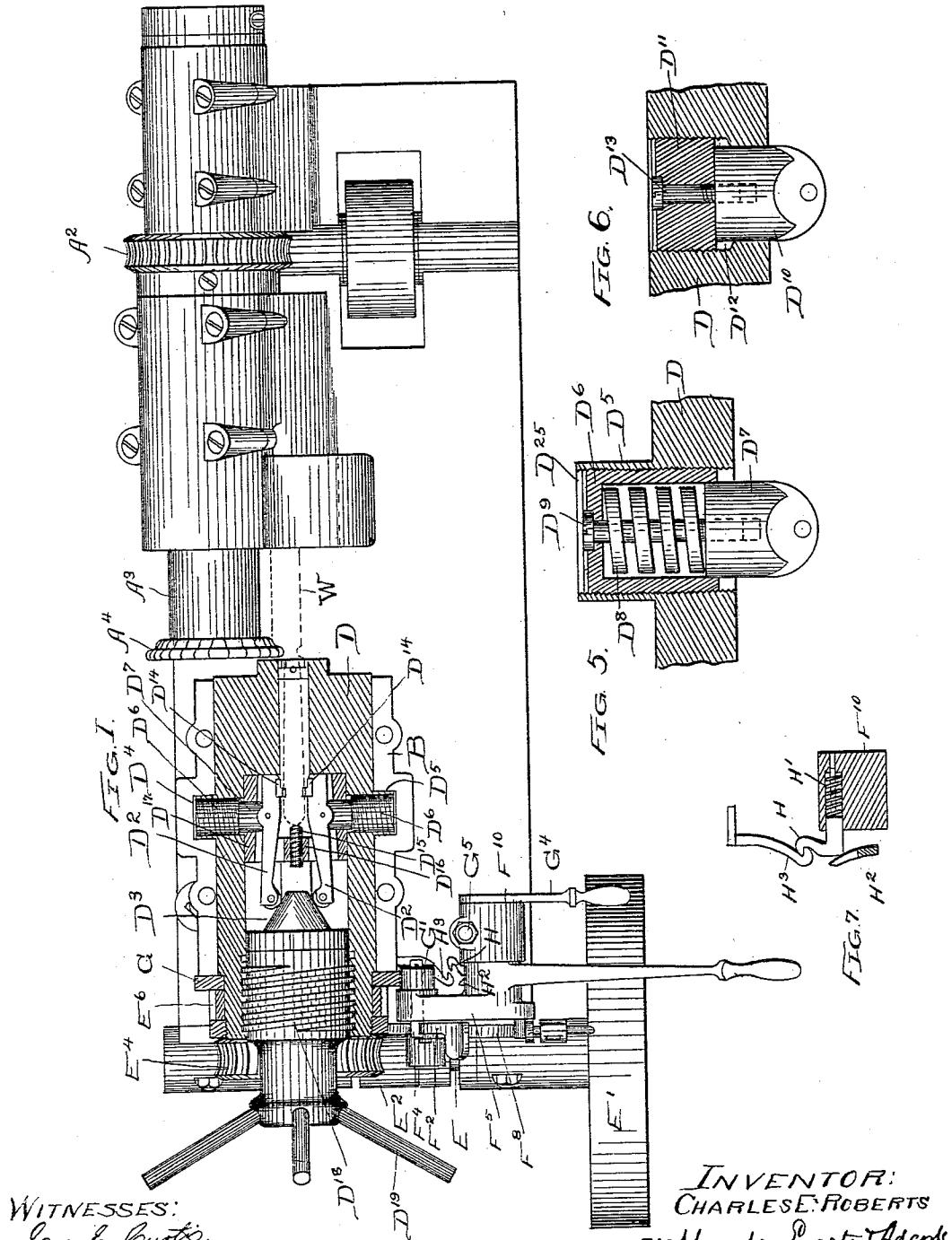

FIG. 1.

FIG. 6.

FIG. 5.

FIG. 7.

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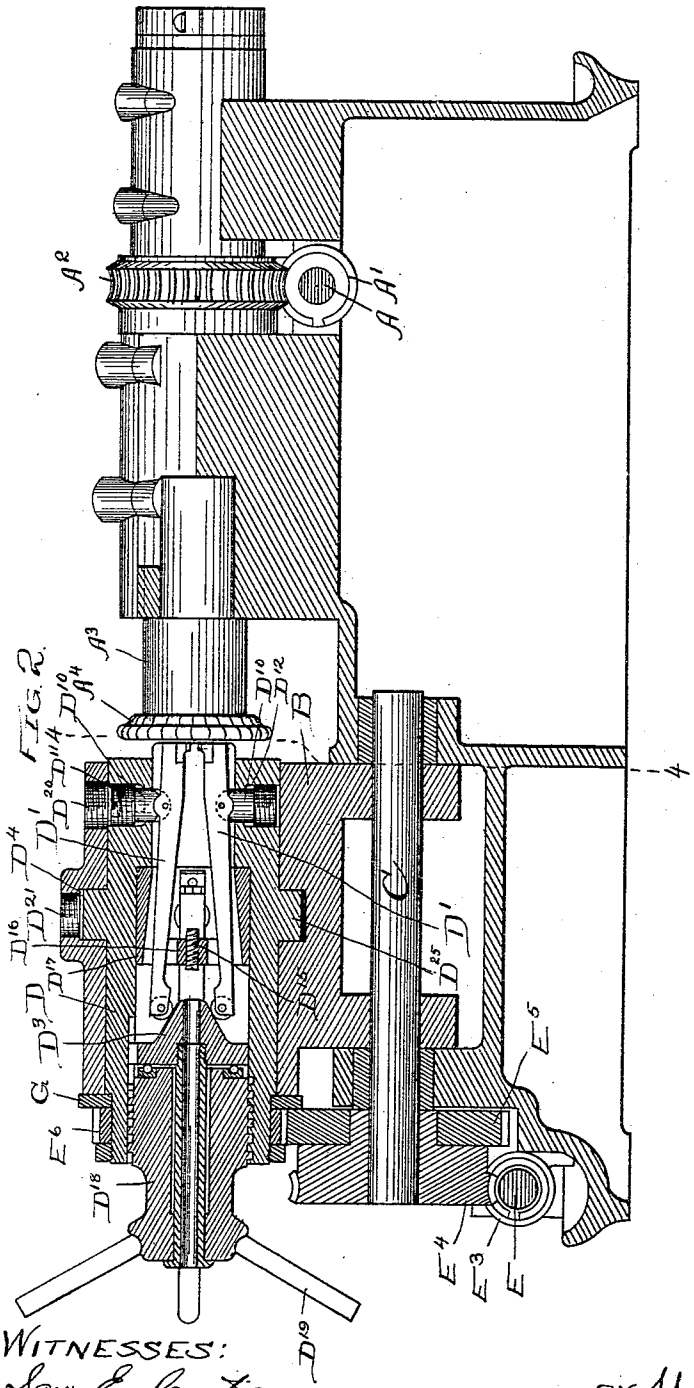
FIG. 2.



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(No Model.) 3 Sheets—Sheet 3.

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FIG. 3.

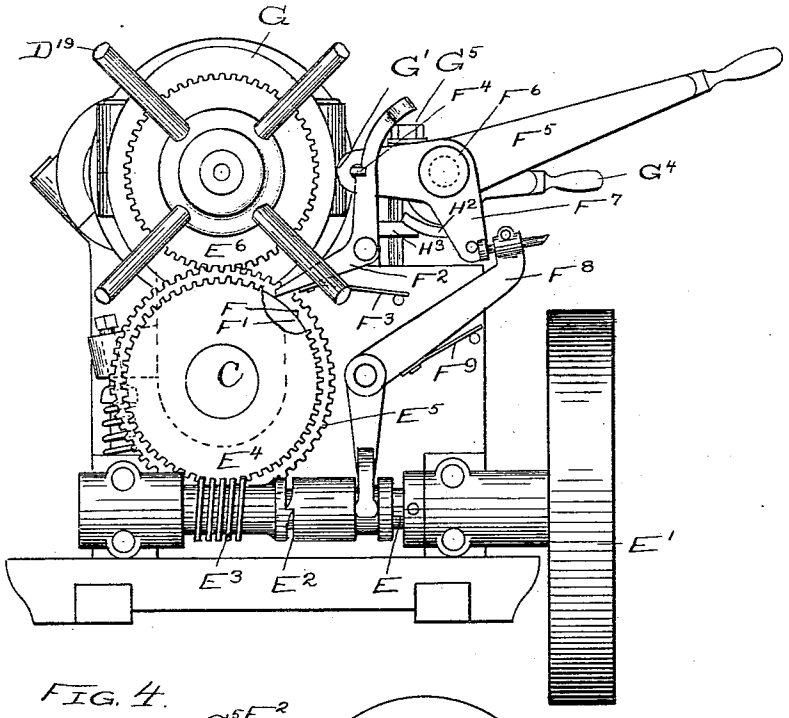
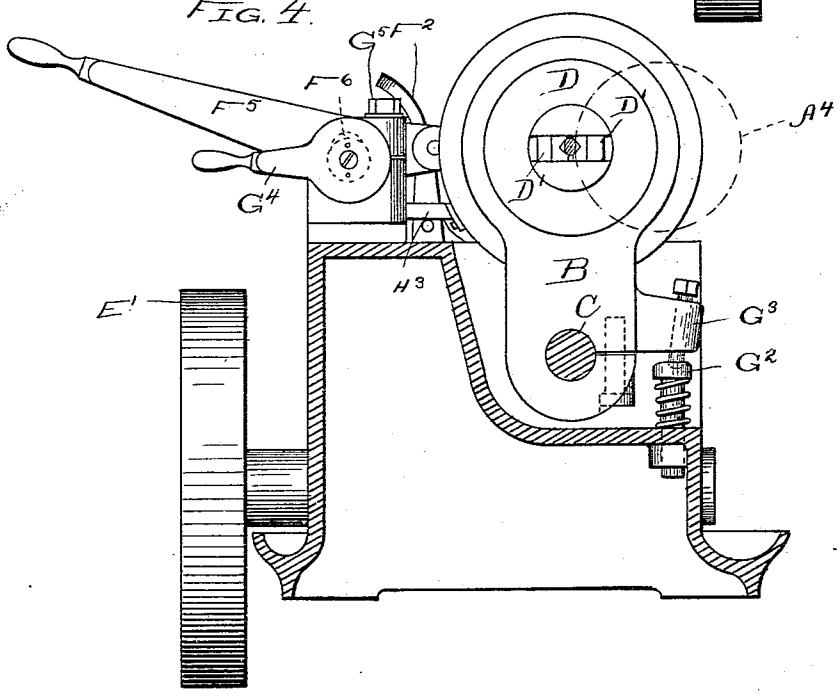


FIG. 4.



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UNITED STATES PATENT OFFICE.

CHARLES E. ROBERTS, OF OAK PARK, ASSIGNOR TO THE NATIONAL CUTLERY COMPANY, OF ROCKFORD, ILLINOIS.

MACHINE FOR MILLING TABLE-KNIVES.

SPECIFICATION forming part of Letters Patent No. 555,125, dated February 25, 1896.

Application filed February 11, 1895. Serial No. 538,036. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ROBERTS, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Milling Table-Knives, of which the following is a specification.

This invention relates to the construction of a milling-machine adapted to finish the bolster portion of solid-handle table-knives.

The leading feature of the invention consists in the combination, with a milling-cutter, of a chuck or holder for carrying the knife-blank, a driving-gear for actuating said holder adapted to turn through a single revolution at each operation and a second gear transmitting power from said driving-gear to the holder and adapted to turn the latter through a complete revolution and a fraction over, whereby the point at which the milling-tool commences to cut is finished uniformly with the remainder of the surface operated upon by it. This and other features of the invention are fully set forth in the description below, and illustrated in the accompanying drawings, in which—

Figure 1 is a plan, partly in section, of my improved machine. Fig. 2 is a longitudinal vertical section. Fig. 3 is an end elevation. Fig. 4 is a transverse vertical section on the line 4 4 of Fig. 2. Figs. 5 and 6 are detail sectional views of the bearing-blocks supporting the clamping-levers of the blank-carrier. Fig. 7 is a detail view of parts hereinafter described.

In said drawings, A represents a drive-shaft provided with a worm A′, meshing with a worm-gear A^2 upon the journal A^3 carrying the milling-tool A^4. This milling-tool is shaped to adapt it to the work to be done, having its portion of largest diameter rounded at the crown so as to adapt it to finish the grooved or reduced portion of the bolster, and also having a sloping-surfaced portion of less diameter adapted to act upon the end of the knife-blade. This will be fully understood from Fig. 1, where the blank W appears in broken lines.

B represents a frame secured fast upon a shaft C, which is capable of a slight rocking motion in its bearings. Said frame gives a bearing to the rotatable blank-holder or chuck, which consists of a cylinder D, rocking arms D′ D^2 adapted to clamp the handle of the blank, and a movable cone D^3 for operating the arms carried in said cylinder. The rocking arms D′ are adapted to engage the handle in proximity to the bolster, and the arms D^2 are shorter than arms D′ and are adapted to engage the extremity of the handle, and the movable cone is adapted when moved forward to force all said arms into clamping action. The interior of that portion of the frame B which encircles the blank-holder is grooved, as shown at D^4, and the cylinder D is provided with an outstanding ridge D^{25} filling and moving in this groove, such groove and ridge preventing any longitudinal movement of the cylinder D. Openings D^5 are provided at opposite sides of the ridge and are threaded so that they receive and adjustably hold the thimbles D^6 in which the bearing-blocks D^7 of the clamping-arms D^2 are inserted.

Springs D^8 are placed in the thimbles and exert a constant inward pressure upon the bearing-blocks, but their action is limited by bolts D^9. The bearing-blocks D^7 are by this construction permitted to move outwardly against the springs as much as may be necessary to enable the cone to be forced to the proper point to secure the necessary firmness of action by the rocking arms D^2. The arms D′ are unlike this in that they are furnished with unyielding bearing-blocks D^{10}, which are inserted in openings D^{12} in cylinder D and held against movement in one direction by the thimbles D^{11}, threaded in the openings D^{12}, and in the other direction by the bolts D^{13} passing through the end of the thimble in a manner similar to the bolt D^9 of the other clamping-arms. The arms D′ are considerably longer than the arms D^2, and are made of spring metal in order that they may bend if necessary to enable them to accommodate themselves to the variations in size of the knife-blank. They are less yielding however than arms D^2, and are adapted to bear upon the sides of the knife-handle, while the arms D^2 are provided with notched blocks D^{14} adapted to engage and bear upon the edges

of the handle. An adjustable stop D^{15} regulates the positioning of the knife-blank, as will be understood from Fig. 1, wherein the knife-blank is shown in broken lines. This stop is supported in a cross-head D^{16} of the shell D^{17} fitting the bore of cylinder D.

The cone is pivotally borne upon the inner end of a screw D^{18}, the outer end of which projects outwardly at the end of the machine and is there provided with arms D^{19} by means of which it may be turned in forcing the cone into action and in withdrawing it from action. A screw-plug D^{20} in the inclosing portion of frame B gives access to the bearing-blocks of arms D', and a similar plug D^{21} gives access to the bearing-blocks of arms D^2.

The rotary movement of the cylinder D is obtained from shaft E, driven by pulley E', through the medium of clutch E^2, the worm E^3 loose on shaft E, the worm-gear E^4 loosely mounted upon shaft C and meshing with said worm, the spur-gear E^5 carried by the worm-gear, and the gear E^6 mounted upon cylinder D.

Suitable means are provided for releasing the clutch E^2 at the end of each complete revolution of the worm-gear. These means consist of the projection F upon the plain rim F' at the side of the worm-gear, a rocking lever F^2 having a spring F^3 adapted to keep said lever with its end bearing upon the rim of the worm-gear, said lever also having its upper end in engagement with the notched projection F^4 upon the hand-lever F^5 journaled at F^6 and having a downwardly-projecting arm F^7 adapted to engage with the upper end of a rocking lever F^8, the lower end of which shifts the movable part of the clutch. A spring F^9 acts upon lever F^8 and tends to keep the clutch opened. With this construction whenever the projection F trips the lever F^2 the hand-lever is permitted to rock on its pivot and release the clutch-lever F^8 so that the latter is free to move in obedience to its spring and open the clutch.

The clutch is closed by the engagement of the hand-lever F^5 when it is raised by the operator with the shifting-lever F^8. The upper end of lever F^2 is bent back into curved form, as seen at Fig. 3, so that when the hand-lever is raised the notched projection F^4 on the hand-lever will move down said curved portion without imparting motion to it.

It will be seen from what has been described that the gear E^5 will only be driven through a single rotation at each operation, and inasmuch as a single revolution of the stock or knife-blank will leave the blank in an unfinished state at the point where the milling-tool commences the cut I make the gear E^6 somewhat smaller in diameter than the gear E^5, so as to insure the turning of the blank-holder through something more than a complete revolution at each operation. By so doing I find that all parts of the blank operated upon by the milling-tool are finished alike, and the closest inspection fails to locate either the point at which the cut commenced or at which it stopped. The amount of this overrotation will be determined of course by circumstances, but it need not form any considerable portion of a revolution.

I have already referred to the rocking of the blank-holder. This motion is provided for in order to adapt the machine to work upon the elliptical shape of the knife-bolster, and it is regulated by the form G borne by the blank-holding cylinder D, an antifriction-roller G' journaled upon the hand-lever F^5 and moved into operative position when said lever is raised to close the driving-clutch, and an upwardly-moving and spring-actuated plunger G^2 supported in a stationary part of the machine and engaging an arm G^3 upon the frame B, the plunger being located at one side of the blank-holder and being constant in its action, and the roller being located at the other side and acting when positioned by the hand-lever on the form G. By this construction the blank-holder will be forced toward and allowed to recede from the milling-cutter in accordance with the shape of the bolster, and such movements are governed by the form.

As it is frequently useful to vary the extent of the rocking movement imparted to the blank-holder, I make the hand-lever loose upon its pivot F^6 and support the pivot upon an eccentric portion in the split box F^{10}, the eccentricity of this bearing portion relative to the pivot portion being indicated at Fig. 4 by the broken lines. A short hand-lever G^4 is applied to the end of the eccentric portion of the pivot and enables the turning of the pivot in its box, and such turning results in carrying the roller G' toward or away from the form G, as occasion requires. After the pivot has been thus adjusted the box is tightened upon it by the bolt G^5.

I find it desirable to lock the blank-holder frame, so it cannot accidentally swing back when the operator applies power to the arms D^{19} in releasing the cone from the clamping-arms and thus bring the blank a second time against the cutter, and I therefore provide a hook H upon the under side of the box F^{10}, which is movable laterally against the spring H', a cam H^2 borne by lever F^5 and adapted to force the hook against the spring, and a second hook H^3 upon the frame of the blank-holder, said hooks being relatively so located that when they come together (which they do when the holder is swung back from the cutter) they will engage. This engagement is broken by the raising of lever F^5 preparatory to operating upon a blank, the cam in that motion forcing hook H away from hook H^3, so that the frame is then at liberty to move toward the cutter.

It will be noticed that the cutter is located at one side of the rocking work-holder or chucking-spindle and that the roller bearing

against the form upon the spindle and determining the position of the work with reference to the cutter is located at the opposite side of the spindle. This necessitates the making of either the cutter or the roller movable, so as to allow the work and the cutter to be separated from each other for the purpose of changing the work. I prefer that the roller be movable, but do not wish to be limited to that construction.

I claim—

1. In a milling-machine, the combination with the rotatable chuck or holder carrying the knife-blank, of a rotary motor device moving through a single revolution at each operation of the machine, and transmitting mechanism actuated by said motor and adapted to impart something over a complete revolution to the holder at each operation, substantially as specified.

2. In a milling-machine, the combination with the rotatable chuck or holder carrying the knife-blank, of a rotary motor device, means for arresting the movement of said motor at the completion of each revolution thereof, and transmitting mechanism actuated by said motor and adapted to impart something over a complete revolution to the holder at each operation, substantially as specified.

3. The combination with the milling-cutter, of a rotatable chuck or holder for carrying the knife-blank, a driving-gear moving through a single revolution at each operation, and a second gear transmitting power from the driving-gear to the holder and adapted to give the latter more than a complete revolution at each operation, substantially as specified.

4. The combination with the milling-cutter, of a rotatable chuck or holder for carrying the knife-blank, a driving-gear moving through a single revolution at each operation, means for stopping said gear at the completion of each of its revolutions, and a second gear transmitting power from the driving-gear to the holder and adapted to give the latter more than a complete revolution at each operation, substantially as specified.

5. The combination with the milling-cutter, of a rotatable chuck or holder for carrying the knife-blank, a driving-gear moving through a single revolution at each operation, a clutch mechanism for actuating said gear, means for releasing the clutch at the end of each revolution of the gear, and a second gear transmitting power from the driving-gear to the holder and adapted to give the latter more than a complete revolution at each operation, substantially as specified.

6. The machine for milling cutlery provided with a rotating chuck or holder for the knife-blank, having rocking arms or levers for clamping the inner end of the handle, other and shorter arms or levers for clamping the outer end of the handle, and means for forcing said arms or levers into action, substantially as specified.

7. The machine for milling cutlery provided with a rotating chuck or holder for the knife-blank, having rocking arms or levers for clamping the inner end of the handle, other arms or levers for clamping the outer end of the handle, and a single cone movable longitudinally of the chuck for actuating said levers or arms, substantially as specified.

8. The combination in a chuck or holder for holding the knife-blank, of clamping-arms adapted to exert a yielding pressure upon different parts of the blank, and being of different length so as to adapt them to be operated by a single cone, and said cone, substantially as specified.

9. The combination in a chuck or holder for holding the knife-blank, of clamping-arms adapted to exert a yielding pressure upon one portion of the blank, and other clamping-arms of a different length from the first mentioned also adapted to exert a yielding pressure upon another portion of the blank, substantially as specified.

10. In a chuck or holder for holding the knife-blank, the combination of rocking arms for clamping one end of the knife-handle and provided with bearings adapted to yield when the arms are forced into action, with rocking arms for clamping the other end of the knife-blank and provided with unyielding bearings, and means for actuating all said arms, substantially as specified.

11. The blank-holder consisting of the cylinder D adapted to rotate, the frame inclosing it, the rocking and clamping arms having their bearings in the cylinder, acting upon one end of the knife-handle, other rocking and clamping arms acting upon the other end of the handle, and the cone and its operating-screw, moving longitudinally of the cylinder, substantially as specified.

12. In a machine for milling cutlery, a rotatable chuck or holder for the knife-blank, mounted in a rocking frame and carrying a form G, means for rotating said holder through one revolution and part of another, a movable roller bearing upon said form at one side of the frame and a spring device upon the other side thereof forcing the frame toward said roller, substantially as specified.

13. The combination with the milling-cutter, the rocking blank-holder, the clamping devices of the holder, the cone for operating said clamping devices, and means for moving said cone into and out of its operating position, of devices for locking the holder in position away from the cutter during the changing of the blanks, said devices being automatically thrown into action, substantially as specified.

14. The combination with the milling-cutter and the rocking blank-holder, of a hook carried by the holder, a hook upon a stationary part of the machine, one of said hooks being movable, the cam for releasing the movable hook from engagement, and the lever carrying the cam, substantially as specified.

15. The combination with the clamping-

arms of slidable bearing-blocks to which the arms are pivoted, springs acting on said blocks, and adjustable thimbles inclosing the blocks and springs, substantially as specified.

16. The combination with the clamping-arms of slidable bearing-blocks to which the arms are pivoted, springs acting on said blocks, adjustable thimbles in which the blocks move, and means for limiting the action of the springs, substantially as specified.

17. The combination in a milling-machine, of a stationarily-located cutter, a chucking-spindle having a rocking movement, a form upon the spindle, a spring upon one side of the spindle-support, and a movable roller located upon the side of the spindle opposite the cutter and the spring and adapted to be brought against the form, substantially as specified.

18. The combination in a milling-machine, of a cutter, a chucking-spindle for carrying the work, a form upon the spindle, a movable roller bearing upon the form and determining the rocking movements of the spindle, a spring opposite the roller, and means for moving the roller away from the form, substantially as specified.

19. The combination in a milling-machine, of a cutter, a rocking spindle adapted to rock, a form upon the spindle, a movable roller bearing upon the form, a spring acting to force the form against the roller, and a hand-lever for moving the roller away from the form, substantially as specified.

20. The combination with the rocking and chucking spindle carrying a form, of a cutter located at one side of the spindle, a bearing-roller acting upon the form and a spring acting upon the spindle-frame, the roller and spring being at opposite sides of the spindle, and the roller being movable, substantially as specified.

21. The combination in a machine for milling irregular forms, of a milling-cutter, a rocking and rotating spindle adapted to carry the work to be milled, a spring acting upon the spindle-frame, a form, a movable roller adapted to bear against the form, a clutch controlling the rotation of the spindle and a lever controlling said roller and the clutch, substantially as specified.

22. The combination in a machine for milling irregular forms of a rocking and rotating work-carrying spindle, a form, a roller and spring controlling the rocking of the spindle, a clutch controlling the rotating of the spindle, and a lever for positioning said roller and opening or closing said clutch, substantially as specified.

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Witnesses:
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