No. 869,588. PATENTED OCT. 29, 1907.

F. MÜLLER.

MACHINE TOOL.

APPLICATION FILED MAY 11, 1904.

2 SHEETS—SHEET 1.

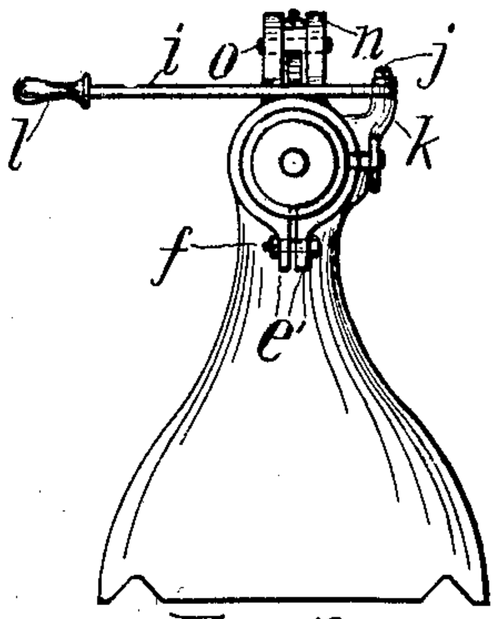

Fig 2

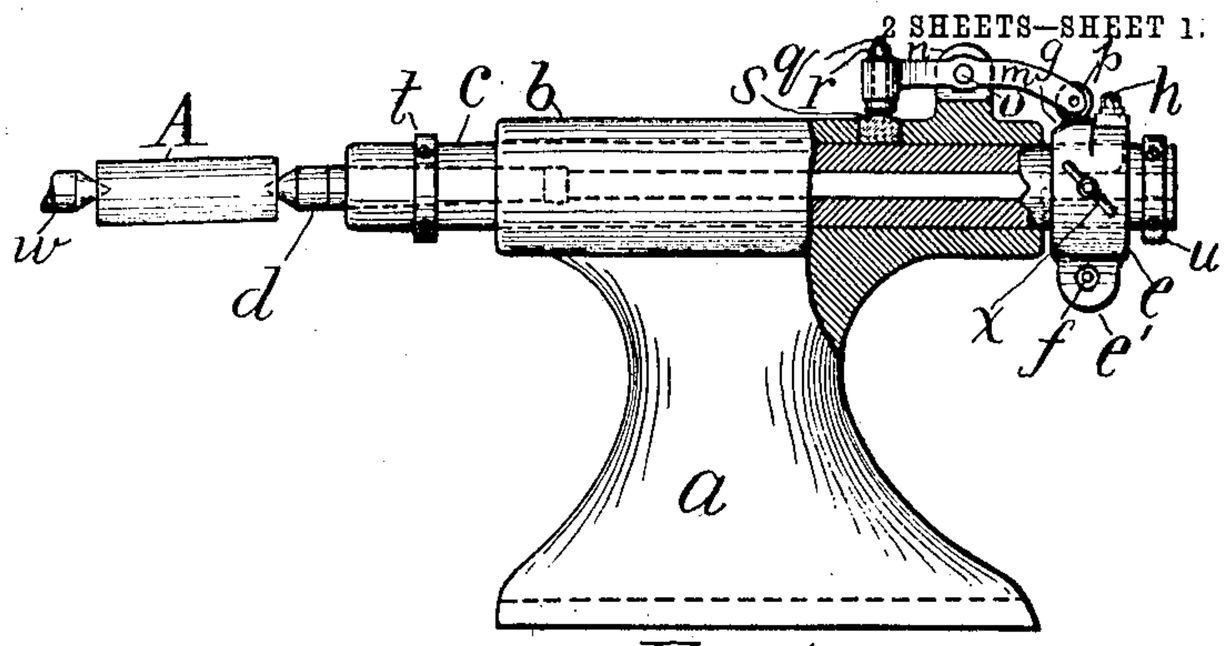

Fig. 1

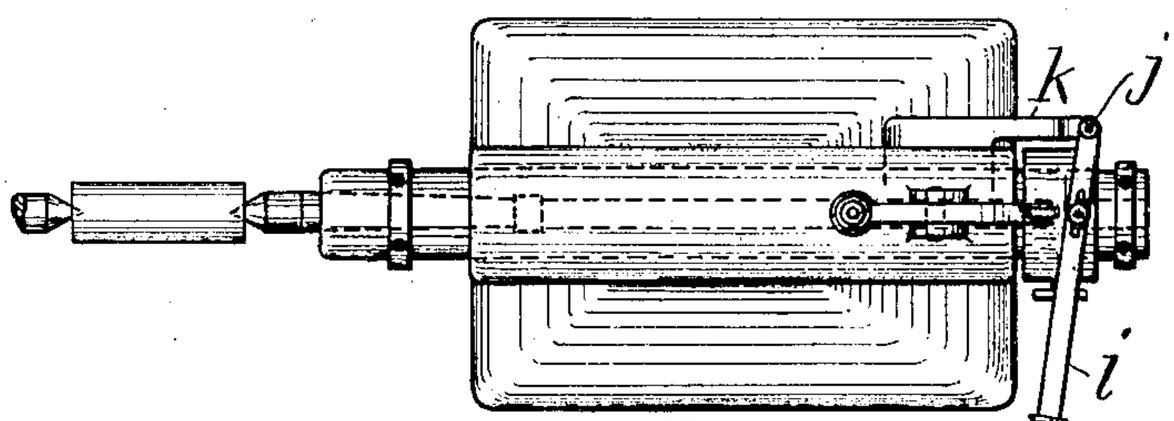

Fig. 3.

Fig. 4.

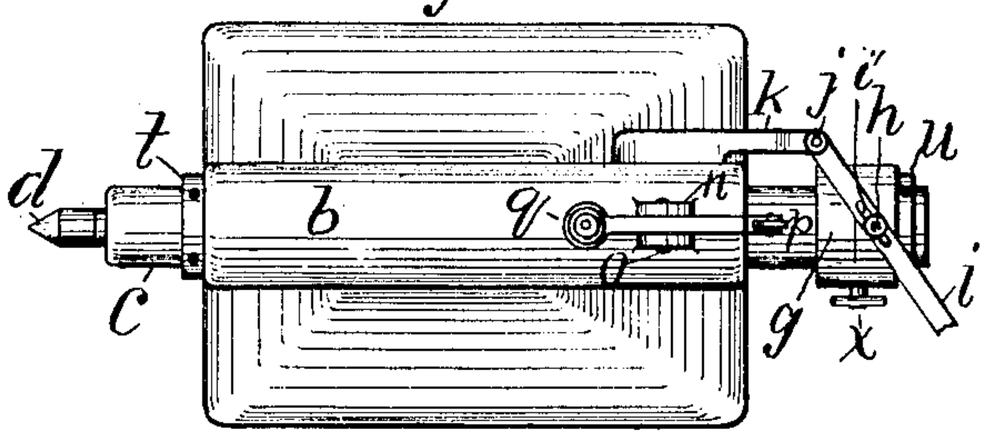

Fig. 5.

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2 SHEETS—SHEET 2.

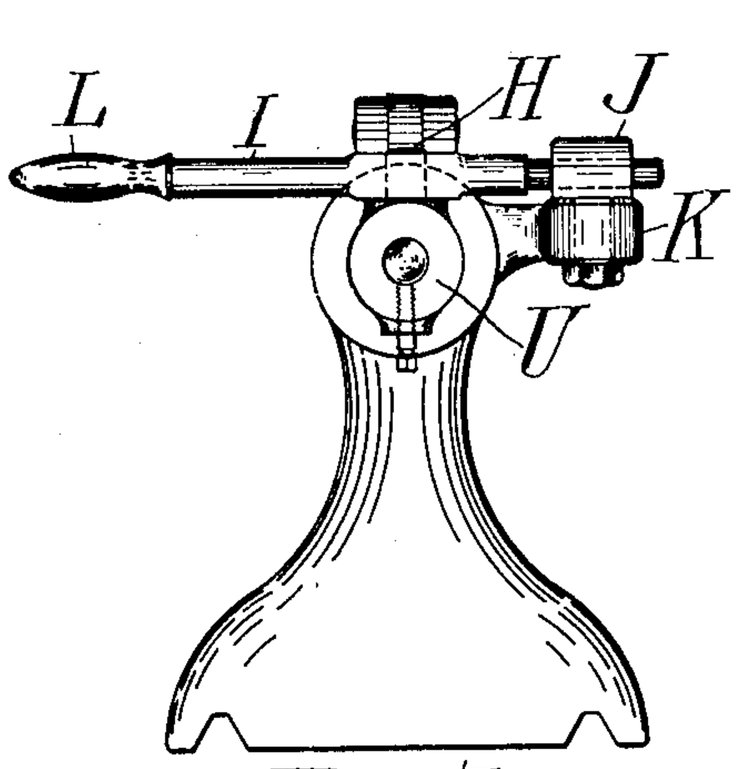

Fig. 7.

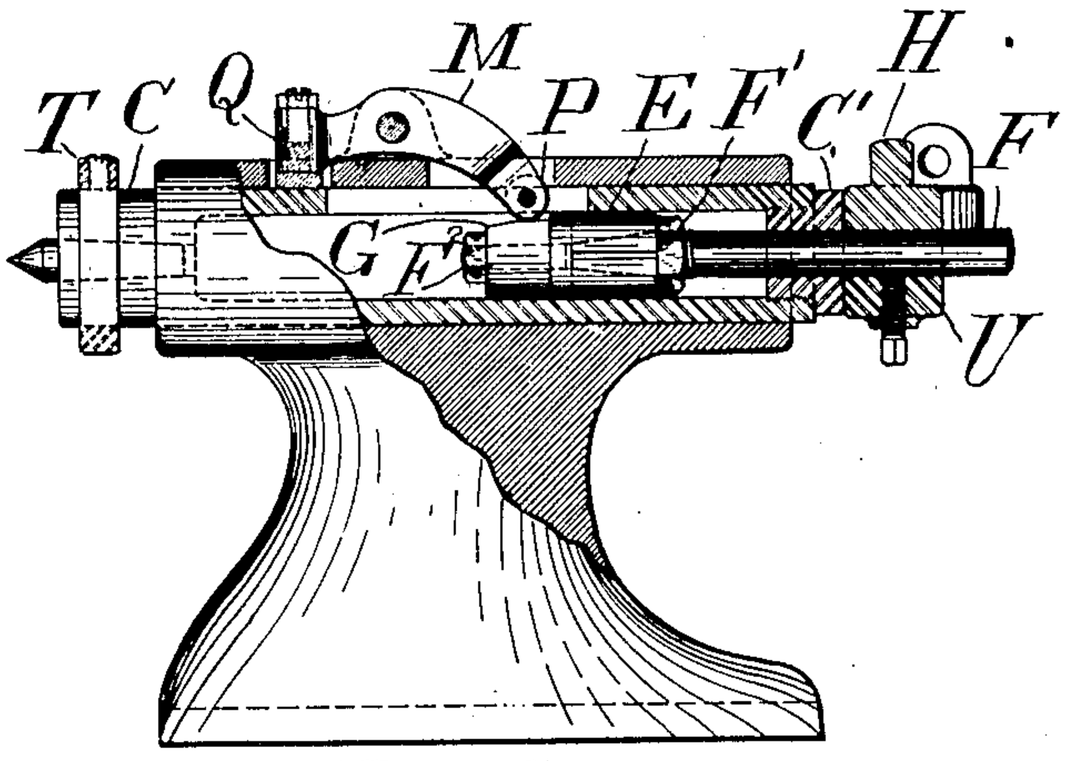

Fig. 6.

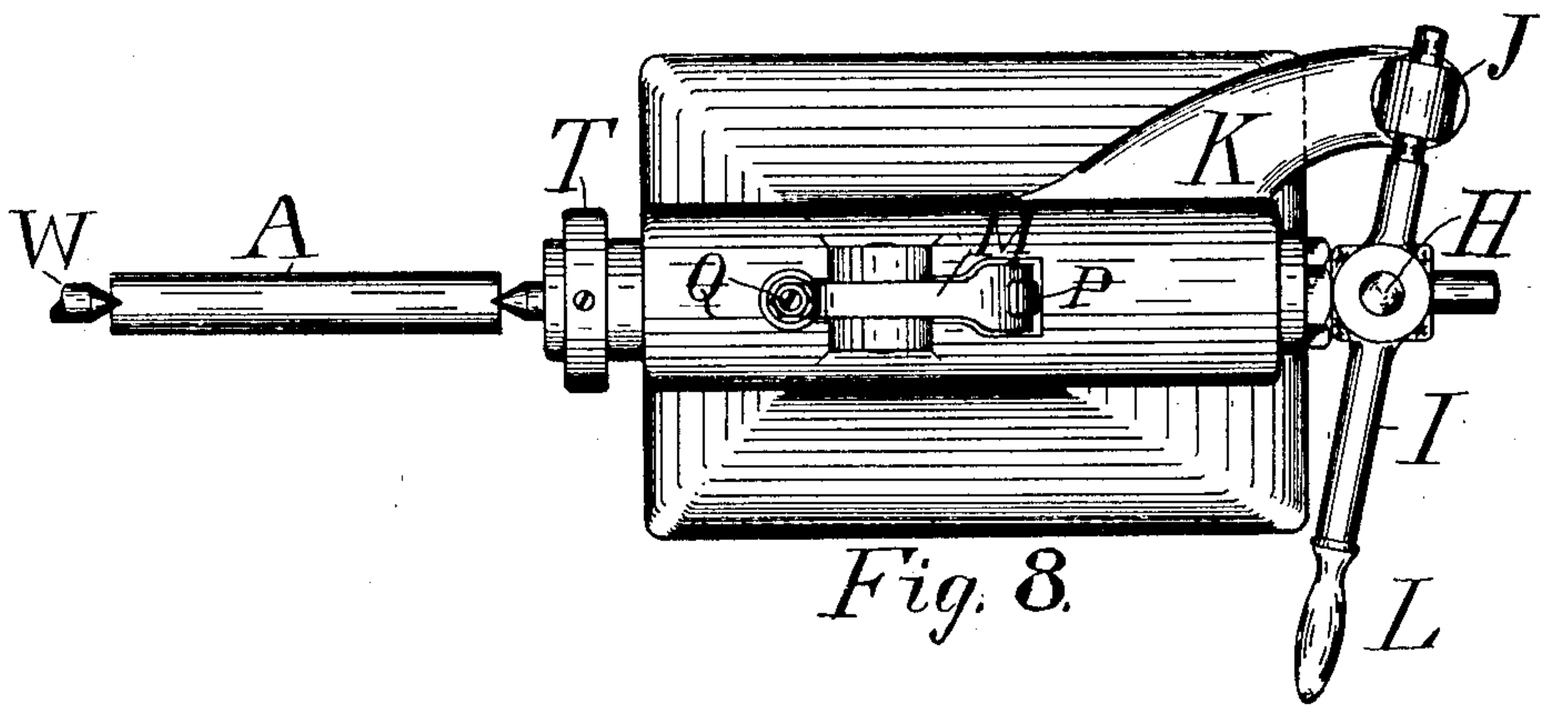

Fig. 8.

Fig. 10.

Fig. 9.

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FRIEDERICH MÜLLER, OF ELIZABETH, NEW JERSEY.

MACHINE-TOOL.

No. 869,588. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed May 11, 1904. Serial No. 207,506.

To all whom it may concern:

Be it known that I, FRIEDERICH MÜLLER, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Machine-Tools, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement designed particularly for embodiment in that class of machine tools wherein the force with which the work is held in position either for the action of a cutting or grinding tool or for application of such tool to the work, is necessarily regulated; and it is designed particularly for employment in connection with the tail-stocks of lathes, of which the dead center should be advanced upon the work with sufficient force to firmly hold the latter without opposing undue resistance to its turning, or without springing the work laterally when of such proportions as to make this liable.

Heretofore it has been customary in machines of the class described to advance the work-engaging member by hand, in order that the degree of pressure upon the work may be adjusted by the sense of touch of the operator, after which, in case the work-engaging member is a dead center, such member might be clamped in position by independent hand-operated means.

The present invention has for its object to provide the work-engaging member with means whereby it may be uniformly forced into engagement with the work under a predetermined pressure and may be secured in such operative position independently of any effort upon the part of the operator to regulate the character of such engagement.

The invention consists essentially in the combination with the work-engaging member, of a locking device or clamp for holding it in engagement with the work, and a member for yieldingly forcing such work-engaging member into engagement with the work and provided with means for positively actuating said locking device or clamp to maintain such engagement. The invention further includes certain additional constructive features which will be hereinafter described.

In the drawings annexed, Figure 1 is an elevation, partly in section, of the tail-stock of a lathe provided with my present improvement, representing the work-engaging member and coöperating parts in operative relation; Fig. 2 is a rear end view, and Fig. 3 is a plan of the same; Fig. 4 is a side elevation and Fig. 5 a plan of the tail-stock with the work-engaging member in retracted position, and with the coöperating parts in corresponding positions. Figs. 6, 7 and 8 are side, end and plan views, similar to Figs. 1, 2 and 3, respectively, of an alternative form of this improvement; and Figs. 9 and 10 are detail views of the friction member of the same.

Referring to Figs. 1 to 5 inclusive, the tail-stock comprises the usual sliding head *a* having the cylindrically bored barrel *b* in which is fitted the sliding sleeve *c* carrying at its forward end the head-spindle *d*, and having slidably mounted thereon at the opposite end a suitable yielding member or friction-piece consisting in the present instance of a split friction-collar *e* whose lateral ears *e'* are clamped adjustably together by means of the bolt *f*. The collar *e* is provided upon its forward end with a cam-projection *g* and rearwardly thereof with a screw-pin *h* entering a slot *i'* of a lever *i* pivoted at one end by means of a pin *j* to a projecting arm of a rigid bracket *k* carried by the head *a*, the other end of which lever *i* is provided with a handle *l*. A clamp-lever *m* mounted in the fixed support offered by the ears *n* projecting from the barrel *b*, by means of the pivotal pin *o*, has at its rear end a roller *p* for coöperation with the cam-projection *g* in tilting the clamp-lever *m*, the opposite end of which lever is formed with a head comprising a screw bolt *q* with lock-nut *r*. To a lateral hole in the barrel *b* is fitted a cylindrical plug *s* constituting a wearing piece upon which the head of the adjustable bolt *q* presses when the opposite end of the clamp-lever *m* engages the cam-projection *g*. This plug is not a necessary part of the device as the clamp-lever if elongated would do the work without it. The sliding sleeve *c* is provided with a stop-shoulder consisting of a collar *t* fixed thereon near its front end for engagement with the adjacent end of the barrel *b*, and has near its opposite end a similar collar *u* to limit the sliding motion of the friction collar *e* thereon in its rearward work-releasing movement. The work A having been engaged by the dead-center *d* and live spindle *w*, and the desired operation thereon having been performed by the usual action of the tool adapted for such purpose, the shifting of the hand-lever *i* backwardly operates to first retract the friction collar *e* to disengage its cam-projection *g* from the roller *p*, and in the continued movement of the lever *i*, the sliding movement of the friction collar *e* is arrested by engagement with the stop-collar *u*, thereafter causing the retraction of the sleeve *c* until arrested by engagement of its forward stop-collar *t* with the adjacent end of the barrel *b*, the work being thereby wholly released for removal from the machine. In introducing the succeeding piece of work, the operation above described is reversed, the friction of the collar *e* upon the sleeve *c*, in the initial forward motion of the lever *i*, inducing the advance of the sleeve *c* until the dead-center *d* is in firm engagement with the work, after which the friction collar *e* continues to slide upon the sleeve *c* to maintain this initial engagement with the work until its cam-projection engages the roller *p*, whereby the clamp-lever *m* is tilted and its head depressed upon the wearing piece *s* for locking the sleeve in such forward operative position.

In case it should be desired to replace the dead-

spindle *d* with a drill for boring out a piece of work interposed between the same and the live-spindle *w*, the friction collar *e* may be fixed rigidly in its rearward position upon the sleeve *c* by means of the clamp-screw *x*; when the movements of the lever *i* will be communicated positively to the tool carried by the sleeve *c*.

In the form of the invention represented in Figs. 6, 7 and 8, the several parts operate in the manner above described, but the friction member by means of which the work-engaging member is yieldingly forced into operative relation with the work is represented in different form. In these figures, the hollow sleeve C is shown bored out sufficiently to receive an expansible plunger or plug E mounted upon the forward tapered portion of a rod F between the cam-piece G and an adjusting nut F′ thereon, which rod passes through the screw-plug C′ at the rear end of the sleeve C beyond which it carries the collar U having the pin H entering a hub in the operating lever I which has a sliding and swivel connection J with the arm K and at the other end the handle L. The split ring constituting the plug E is secured in its desired position of adjustment against the forward face of the adjusting nut F′ by means of a clamp-nut F^2. As in the construction previously described, the backward shifting of the lever L operates to first retract the plug E within the hollow sleeve C out of contact with the roller P carried by the lever M to release its adjustable head Q and unlock the sleeve C from its work-engaging position, after which the contact of the nut F′ with the screw-plug C′, constituting the rear end of the sleeve, arrests the relative motion of the plug E in respect of the sleeve C, but causes the latter to be retracted for release of the work until the motion of both members is finally arrested by means of the stop-collar T. When the lever I is thrown forward, the sleeve is advanced upon the work until firmly engaged therewith, after which the plug E continues its forward motion sufficiently to bring the cam-piece G into operative engagement with the rear end of the lever M, which operates to lock the sleeve C in its forward position, the forward throw of the lever I being arrested by the engagement of the collar U with the screw-plug C′. In this form of the improvement, the degree of pressure under which the work-engaging member is advanced upon the work is regulated by the longitudinal adjustment of the split ring E upon its conical seat of the rod F, this being varied, as before indicated, by varying the position of the adjusting nut F′ against which the said ring is clamped by means of the clamp-nut F^2.

I have not illustrated herein the usual spline-and-groove connection between the sliding sleeves and the barrels of the tail-stocks by which they are carried, to prevent the rotation of the work-engaging member, as this feature obviously forms no part of the present improvement.

Although the present improvement, as herein described, is designed particularly for that class of tools in which the device for holding the work-engaging member in its operative position does not affect the operation of such member, it is evident that, by so disposing the holding device as to press the work-engaging member upon the work, it will be readily applicable to machines involving the employment of a clamping jaw required to close automatically upon articles of varying sizes and thereby necessitating a variable extent of clamping movement for such jaw. It is also evident that the characteristic feature of the present improvement is the yielding connection between the work-engaging member and its actuating means, to insure the engagement of the work under a regulated or predetermined pressure, in combination with a detent device connected therewith, whether directly or indirectly, for locking such work-engaging member in operative engagement with the work, whereby the locking of the work-engaging member normally succeeds the advancement of such member upon the work.

From the foregoing description it will be readily seen that the present invention is not limited to the specific features of construction herein shown and described, but is susceptible of considerable variation in construction and arrangement of its component parts and the uses to which it may be adapted.

Having thus set forth the nature of my invention, what I claim herein is,—

1. In a machine tool, the combination with a work-engaging member, of a device for holding it in engagement with the work, and a member for yieldingly forcing the said work-engaging member into engagement with the work and which is provided with means for actuating the holding device.

2. In a machine tool, the combination with a work-engaging member, of a locking device for maintaining it in operative position, and a member for forcing said work-engaging member into engagement with the work and provided with means for regulating the pressure of said work-engaging member upon the work and with means for actuating said locking device.

3. In a machine tool, the combination with a reciprocating work-engaging member, of a locking device for holding the same in operative position, a friction member mounted slidably upon said work-engaging member and carrying means for positively actuating said locking device, and means for reciprocating said friction member to successively operate said work-engaging member and its locking device.

4. In a machine tool, the combination with a reciprocating work-engaging member, of a locking device for holding the same in operative position, a split collar carrying means for actuating said locking device, mounted slidably upon said work-engaging member and provided with means for varying its frictional hold upon said work-engaging member, and means for reciprocating said collar.

5. In a machine tool, the combination with a reciprocating work-engaging member provided with a stop to arrest its retractive movement, of a locking device for holding it in operative position, and a member for forcing said work-engaging member into engagement with the work and provided with means for regulating the pressure of said work-engaging member upon the work and with means for actuating said locking device.

6. In a machine tool, the combination with a reciprocating work-engaging member, of a locking device for holding it in operative position, a friction-member fitted slidably to said work-engaging member and carrying means for actuating said locking device, and stops operating respectively to positively arrest the relative movement of said friction member in respect of, and the actual movement of, the work-engaging member in the disengagement of the same from the work.

7. In a machine tool, the combination with a reciprocating work-engaging member, of a friction collar provided with a cam-projection and fitted slidably upon said work-engaging member, means for reciprocating said friction collar, and a clamp-lever pivotally mounted upon a fixed support with one end lying in the path of movement of said cam-projection and the other end adapted for applying lateral pressure to said work-engaging member.

8. In a machine tool, the combination with a reciprocat-

ing work-engaging member, of a friction collar provided with a cam-projection and fitted slidably upon said work-engaging member, means for reciprocating said friction collar, and a clamp-lever pivotally mounted upon a fixed support with one end lying in the path of movement of said cam-projection and the other end provided with an adjustable head for applying lateral pressure to said work-engaging member.

9. In a machine tool, the combination with a reciprocating work-engaging member, of a locking device for holding it in operative position, a friction-member fitted slidably to said work-engaging member and provided with means for actuating said locking device, means whereby said friction-member may be prevented from sliding upon the work-engaging member, and means for reciprocating said friction-member.

10. In a machine tool, the combination with the work-engaging member and means for locking it in position, of common operative means having a yielding connection with said work-engaging member for communicating thereto movements upon the work variable in extent and adapted for positively actuating said locking member to retain the work-engaging member in operative relation with said work.

11. In a machine tool, the combination with the work-engaging member and means for locking the same in position, of common operative means having a yielding connection with said work-engaging member for communicating thereto movements to and from the work variable in extent, and adapted for positively actuating said locking means to lock and unlock the said work-engaging member when in operative relation with the work.

12. In a machine tool, the combination with the work-engaging member and means for locking it in position, of common operative means constructed and arranged to act by a single continuous movement in successively moving said work-engaging member yieldingly upon the work and positively actuating said locking member to retain the work-engaging member in operative relation with said work.

13. In a machine tool, the combination with a work-engaging member, of operating means having a yieldable connection with the work-engaging member and arranged to be maintained against movement relative to said member by a measured resistance and adapted to force said work-engaging member into engagement with the work with a predetermined thrust, and a holding device with actuating means therefor operatively connected with said operating means whereby said engagement of the work-engaging member with the work is maintained.

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

FRIEDERICH MÜLLER.

Witnesses:

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H. C. KORNEMANN.