(No Model.) 3 Sheets—Sheet 1.

V. H. ERNST.

MACHINE FOR TURNING IRREGULAR FORMS.

No. 349,343. Patented Sept. 21, 1886.

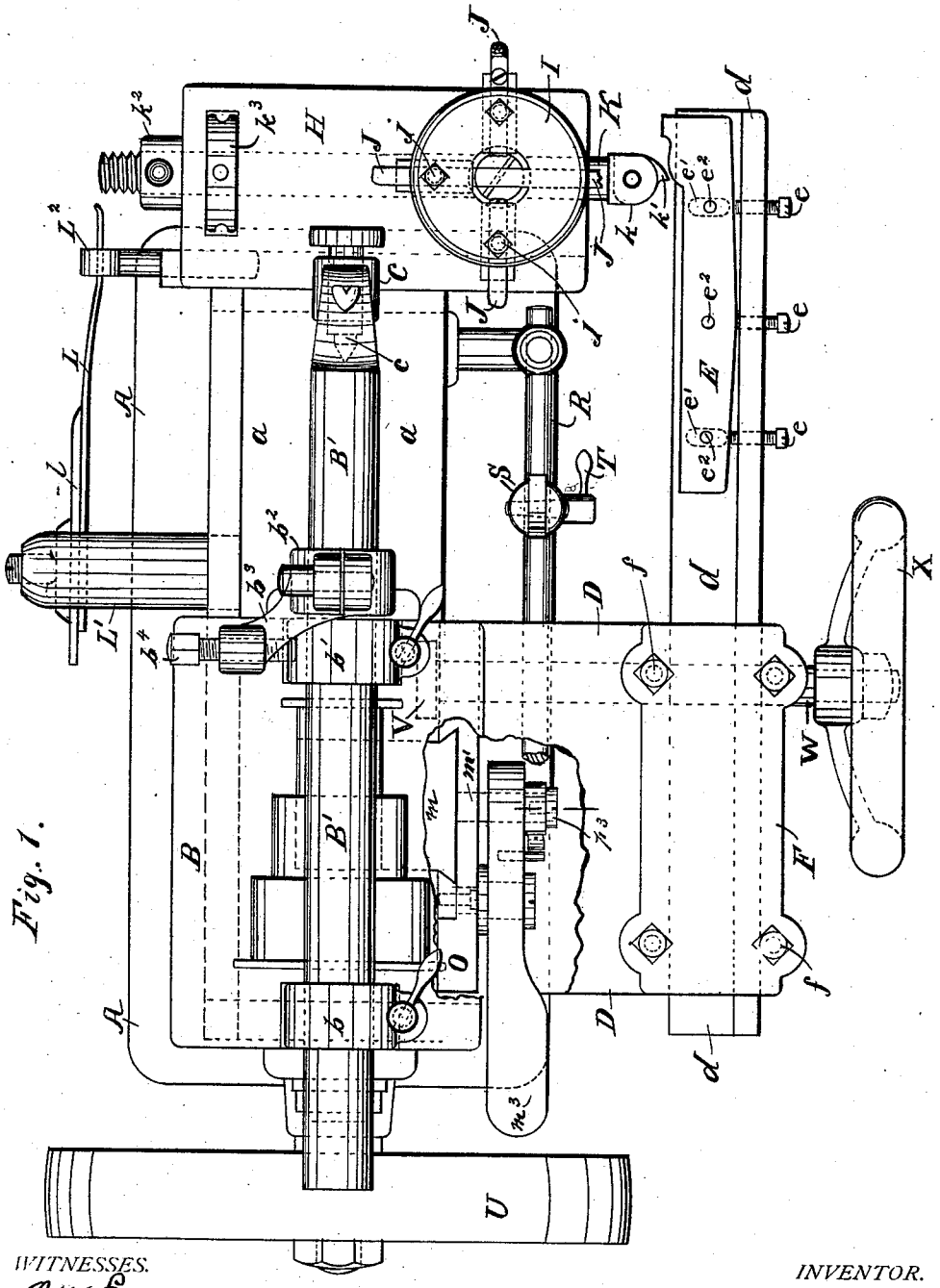


Fig. 1.

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3 Sheets—Sheet 2.

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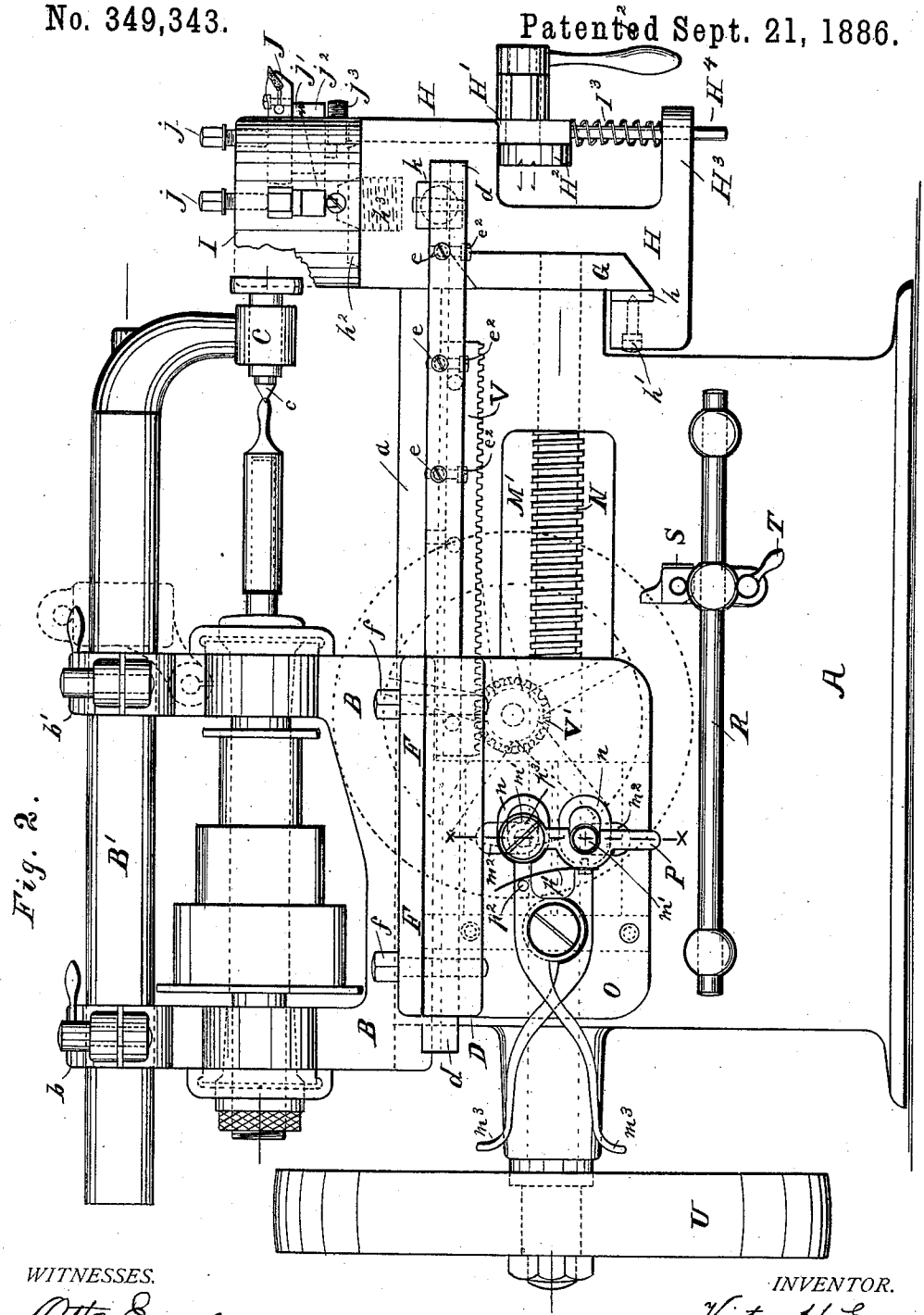


Fig. 2.

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3 Sheets—Sheet 3.

V. H. ERNST.

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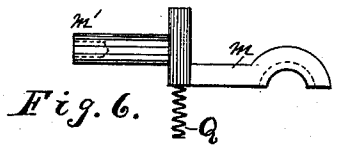


Fig. 6.

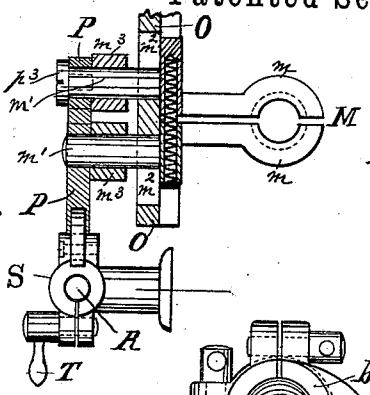


Fig. 4.

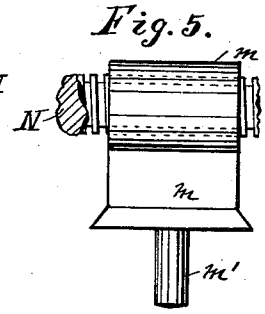


Fig. 5.

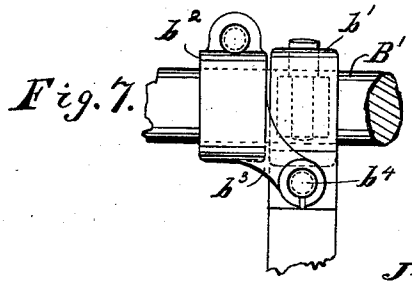


Fig. 7.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR TURNING IRREGULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 349,343, dated September 21, 1886.

Application filed January 29, 1886. Serial No. 190,248. (No model.)

To all whom it may concern:

Be it known that I, VICTOR H. ERNST, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Machines for Turning Irregular Forms, of which the following is a full, clear, and exact description.

The object of this invention is to provide an improved machine for turning irregular forms, which can be relied on to turn each and every one of any particular class of articles of a uniform size and finish, and which machine, while being specially adapted to turn articles of hard rubber, may also be used to turn metal articles.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of a machine embodying my invention, part being broken out to show the split nut. Fig. 2 is a front elevation of the same. Fig. 3 is an end elevation, parts being broken away to show the split nut. Figs. 4, 5, and 6 are detail views of the split nut and its operating mechanism, Fig. 4 being a section through the line *x x* in Fig. 2. Fig. 7 represents an attachment to the arm that carries the outer or tail center for adjusting the latter in line with the head-center.

A is the hollow frame of the machine, its upper surface forming the bed, on which is formed the slide *a*, rhomboidal in cross-section, on which the head B is mounted to slide, the bottom surface of the head B being grooved correspondingly to the said slide *a*.

To steady the movement of the sliding head B on its slide, I provide the block and screw $a' a^2$, as shown in dotted lines in Fig. 3. The head B is provided with a spindle and cone-pulleys, as in turning-machines of the ordinary construction, the position of the pulleys being the reverse of the usual way of mounting them, and above the usual spindle-bearings of the head are provided bearings *b b'*, in which is fitted the arm B', carrying on its downwardly-projecting forward end a bearing, C, for a short hollow spindle, and rear center, *c*, the arm B' thus answering the purpose of a tail-stock, and it can be turned to swing the bearing C, and with it the rear center, *c*, to remove the finished article and insert another blank to be turned.

On the arm B', and close to its bearing *b'*, is fitted a yoke, b^2, having a downwardly and rearwardly projecting arm, b^3, in which an adjusting-screw, b^4, works, and by means of which the arm B' can be adjusted, so that when swung down the rear center, *c*, will always come accurately into line with the head-center. The arm b^3, where it receives the screw b^4, it will be observed, is split to give it a spring action on the screw b^4.

D is an extension or bracket extending slightly downward and outward from the base of the head B, and along the extreme length of the outer end is formed a groove, in which is seated a bar, *d*, having a shoulder extending longitudinally along one of its upper edges, that is L-shaped in cross-section, and which bar *d* extends outward from the bracket D, and carries on its outer end the pattern or former-plate E, the face of which is of the same contour as the profile of the article to be turned by the machine. The back of the pattern E is preferably beveled from near its center toward each end, as shown in Fig. 1, thus allowing of an adjustment by means of the screws *e e e*. The former-plate E is pivoted near its center on a screw, e^2, and secured at each end from displacement by screws e^2 e^2, tapped into the former-plate and passed into slots *e' e'*, provided in the bar *d*. By this arrangement it will be seen that the pattern can be adjusted so the article being fashioned can be turned tapering larger or smaller at either end. A covering-plate, F, is fastened, by screws *f* or otherwise, on the arm or bracket D, over the bar *d*, to firmly hold the latter in the bracket D.

On a cross-slide, G, on the front end of the machine, similar in cross-section to the head-slide *a*, but lying transversely thereto, is placed and adjusted a saddle, H, the latter being steadied on the slide G by a block and screw, *h h'*, in the same manner as the sliding head B is steadied on its slide *a*.

On a slightly-tapering projection or a raised portion, h^2, on the upper surface of the saddle H, (shown in dotted lines, Figs. 2 and 3,) is mounted the revolving turret I, which is further secured on the saddle by an upwardly-

projecting tapering stud, h^3, screwed into the saddle H, and fitting in a recess in the under surface of the turret I, and having a screw, h^4, working in the top of said stud h^3. By reason of the stud being screwed into its socket in the saddle H, it can be readily raised to take up wear of the part of the turret bearing thereon. The turret I is constructed to receive several tools, J, preferably three in number, one of which is, by preference, a diamond or other like hard substance, as the "roughing out" of the article to be turned, when the latter is of hard rubber, is very severe on the tool. The tools are held in the desired position in the turret by screws j, working downward against the said tools in tapped holes in the upper surface of the turret-head, and by oppositely-placed beveled toothed blocks or wedges $j' j^2$, located in the turret beneath each tool J, and by screws j^3, working against lugs j^4, projecting downward from the under surface of each lower block or wedge, j^2, the screws j^3 thereby forcing the blocks j^2 inward and the blocks j' upward. The tools J are thus quickly adjusted and firmly held in place, as will be readily understood.

Passing lengthwise through the saddle H, from end to end below the turret I, is a tracer-bar, K, on which, on the end toward the pattern E, is fitted a tracer, k, its extreme point k' contacting with the surface of the said pattern, and on the opposite threaded end of the bar K is screwed the lever-nut k^2, to adjust the tracer k to or from the pattern E. Near the end of the threaded portion of the bar K, and in a slot formed for it in the saddle H, is placed a check-nut, k^3, which, with the lever-nut k^2, securely holds the tracer-bar K in the set position.

To lock the turret from turning on its base while the article is being turned, a locking mechanism is provided, consisting of a locking bar or plate, H', working in a vertical groove in the saddle H, and on its upper end the bar is formed with a projection, I', that fits into one of several corresponding niches in the bottom edge of the turret I.

Secured to the bar H' at its loose end are a cam and lever, H^2 I^2, with which to withdraw the projection I' from the niches in the turret by moving the lever I^2.

Projecting downward from the lower end and into an arm or bracket, H^3, of the saddle H, is a stem or rod, H^4, around which is wound a spring, I^3, which abuts against the said bracket H^3 and against the lower end of the sliding bar H'. This spring will force the latch-bar into one of the notches the moment one of the latter presents itself to the projection I' of the said bar.

In order that the saddle H and the tools in the turret shall be sensitive to the movement of the tracer K as the pattern E passes the said tracer, I provide a spring, L, (shown in Fig. 1,) one end of which is held firmly in a post, L', projecting horizontally from the rear wall of the frame A, and its other end held in the forked swiveled stud L^2 in the saddle H. The post L' is constructed similar to the ordinary post of a lathe, and receives the strengthening-leaf l of the spring L, as shown.

To bind the head on the feed-screw, and thus feed the head forward, and with it the arm B' and the article to be turned, I have devised an improved construction of split-nut locking mechanism, which I will now proceed to describe. The split nut M is inserted in the machine through an opening, M', in the frame A, its members m grasping the feed-screw N. Each of the members of the split nut is provided with a stud, m', as in split nuts of the ordinary construction. The studs m' project outward through the apron O, which projects downward from the head B, from where the arm or bracket D branches off, the said studs m' working in vertical slots m^2 in the said apron O.

To close the split nut to grasp the feed-screw, I have provided a device consisting of pliers or pivoted handles m^3 m^3, the ends of which are constructed with slotted projections n n, through which the studs m' of the split nut pass.

On the pliers or handles m^3, and against the projecting ends of the studs m' of the split nut, I place the latch or locking-plate P, formed with semi-annular recesses to receive and fit against the ends of the studs m'. Secured to the back of the latch or plate P is a spring, p', its free end working against a stud, p^2, on one of the handles.

Between the members of the split nut M, and projecting into the same, is vertically placed a coiled spring, Q, to force the nut apart to loose its grip on the feed-screw N. The screw p^3 in the end of the upper stud, m', holds the forward ends of the pliers and the tripping-latch P in place.

Along the front wall of the frame A is provided a bar, R, set out from the same by suitable posts, on which bar is adjustably fitted a trip, S, which will strike the lower end of the plate P as the head is fed forward, and thus release the hold of the split nut on the feed-screw. The lever T locks the trip S at any desired point on the bar R.

On the projecting end of the feed-screw N is mounted a belt-pulley, U, to actuate the said feed-screw. The head B may be moved forward or backward by hand by the rack and pinion V V', the latter being secured on the end of a shaft, W, on the outer end of which is mounted a hand-wheel, X.

The operation is as follows: The article to be turned is placed on the mandrel of the head B, and the arm B', carrying the tail-center c, is swung down, (having been previously adjusted by means of the screw b^4 in the yoke and arm b^2 b^3,) to bring the tail-center in line with the head-center. The turret is turned to bring the diamond or other hard "roughing-out" tool in position to operate on the article to be turned as the latter advances past the tool, rotating rapidly on its longitudinal axis while passing said tool. The handles m^3 are then

grasped by the operator, thereby locking the split nut M on the feed-screw N and starting the head B and the work forward. The pattern E moves forward with the sliding head B, its face contacting with the point *k'* of the tracer-bar K, and the latter is caused to trace the contour of the pattern as the latter glides past, and by the action of the spring L causes the tool to approach or recede from the longitudinal axis of the piece of work being operated upon. In other words, the spring L always keeps the point *k'* of the tracer in contact with the face of the pattern E, and as the latter advances past the tracer the tracer must necessarily cause the tool J to go nearer to or farther from the longitudinal axis of the piece of work, and thus the article is turned to correspond in profile to the configuration of the face of the pattern, because the tool's proximity to the longitudinal axis of the work being turned is regulated and controlled by the configuration of the pattern. As soon as the head B advances far enough for the lower end of the latch-bar P of the split nut to strike the trip S on the bar R, the split nut, being free to expand by means of the spring Q, releases its grasp on the feed-screw, and thus the head B is arrested in its forward movement. The head B is then returned by means of the hand-wheel X and its rack-and-pinion mechanism V V'. The moment the head B and its bracket D and the former or pattern E begin to move backward, no matter at what point on the pattern the tracer may be, the pattern trips the point *k'* of the tracer and moves the turret and tool clear of the turned article, so that the latter may recede with the sliding head, &c., without danger of injury from the tool, the turret having been previously unlocked by turning the cam and lever H^2 I^2 to withdraw the latch-bar H' from the niche in the bottom edge of said turret. The trip S and the pattern E, it will be understood, are, before starting the machine, to be adjusted to respectively trip the latch P and the tracer K at the proper times. After the first shave or roughing out of the piece of work the turret is turned to present a different tool to the work for the next cut.

By the machine above described an endless variety of articles may be turned, and be made more cheaply and of a uniformity of weight and size of which the hand-machines are not capable.

The work designed to be accomplished by my invention is usually done by hand—that is, by hand-tools and the ordinary hand-rest, and with a hand-lathe. The machine will therefore be a vast improvement on the usual method.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the sliding head having the usual pulleys and spindle, of a work-supporting arm fitted in bearings thereon, and having on one end a bearing for the rear or tail spindle, substantially as shown and described.

2. The combination, with the head, suitably mounted on a frame and bed, of a work-supporting arm held in bearings on the said head and carrying in a bearing on its downwardly-projecting forward end the tail-spindle and tail-center, substantially as shown and described.

3. The combination, with the frame of the machine, of the head B, the arm B', fitted in bearings *b b'* on the said head, the yoke b^2, having an arm, b^3, and an adjusting-screw, b^4, substantially as shown and described.

4. The combination, with the sliding head and stop or trip mechanism, of a transversely-sliding saddle carrying the tool-holding turret, and a spring-actuated latch-bar for locking the turret from turning, substantially as shown and described.

5. The combination of the head B, mounted to slide on the bed of the machine, and having a projecting arm or bracket carrying the pattern, and a tool-holding turret, substantially as shown and described.

6. The combination, with the sliding head and its outwardly-projecting bracket, of a pattern-carrying bar on the said bracket, a transversely-placed saddle, and a tool-holding turret on said saddle, substantially as shown and described.

7. The combination, with the sliding head, in a bracket of which is carried a longitudinally-adjustable bar carrying an adjustable former-plate or pattern, of a sliding saddle on which is mounted a turret provided with adjustable tool holders, substantially as shown and described.

8. The combination, with the sliding head having the projecting arm or bracket D, carrying the pattern-holding bar *d*, and the arm B', carrying the rear spindle and center, of the turret I, constructed to receive and carry several tools, J, substantially as shown and described.

9. The combination, with the sliding head having the projecting arm or bracket that carries the pattern-supporting bar, of the saddle having mounted thereon the tool-holding turret I and the tracer-bar K, and the spring L, substantially as herein shown and described.

10. The combination, with the frame A, of the slide G, rhomboidal in cross-section, the saddle H, fitted to work on the said slide, the tool-holding turret I, mounted to turn on the said saddle, the tracer-bar K, and the spring L, substantially as shown and described.

11. The head and saddle, mounted on rhomboidal slides and steadied thereon by blocks and screws, in combination with mechanism intermediate said head and saddle, substantially as described.

12. The combination, with the saddle H, of the turret I, provided with tools J, the screws *j*, working downward through the upper surface of the turret against the said tools, and

reversely-placed beveled blocks j' j^2, placed under said tools, their contacting surfaces being toothed, the lower blocks, j^2, having downwardly-projecting lugs j^4 on their under surfaces, against which work inwardly the screws j^3, to adjust the said tools J in the turret, substantially as shown and described.

13. The combination, with the head B, bracket D, bar d, and the pattern E, and the saddle H, provided with a tracer-bar, K, of the tool-carrying turret I, mounted on a beveled projection or raised portion of the saddle, the tapering stud h^2, fitting in a corresponding recess in the turret, and the spring L, substantially as shown and described.

14. The combination, with the saddle H, of the turret I, carrying one or more tools, J, the latch-bar H′, the cam and lever H^2 I^2, for forcing the projecting end of the bar H′ into niches in the bottom edge of the turret, and the stem H^4, having the spring I^3 thereon, said spring abutting against the latch-bar H′, and against the projecting shoulder H^3 of the saddle H, substantially as shown and described.

15. The combination, with saddle H, of the turret I, the latch-bar H′, and cam and lever H^2 I^2, and a spring, I^3, the spring I^3 being adapted to thrust the latch-bar H′ upward into one of several niches in the bottom edge of the turret to lock the latter on its seat on the saddle, and the cam and lever being adapted to withdraw the latch-bar to unlock the turret, substantially as shown and described.

16. The combination, with the head B, having the bracket D, carrying the bar d, of the sliding saddle H, the tracer-bar K, the tool-carrying turret I, the post L′, spring L, and the swiveled stud L^2, substantially as shown and described.

17. The combination, with the frame A, of the sliding head B, having the bracket D, carrying the pattern-supporting bar d, the transversely-sliding saddle H, the tracer-bar K therein, and the tracer k, having the point k' on one end, and the lever-nut k^2 on the opposite threaded end, and the check-nut k^3 near the said threaded end, substantially as shown and described.

18. The combination, with the sliding head B, provided with the bracket D, carrying the L-shaped pattern-supporting bar d, the vertically-projecting member of said bar d being provided with adjusting-screws to adjust the pattern E, of the turret I on the sliding saddle H, the tracer-bar K, and the spring L, one end taking in the forked swiveled stud L^2 in the saddle, and its other end secured in a post, L′, in the frame A, substantially as shown and described.

19. The combination, with the head and its feed-screw, of a split nut, the studs of which work in slots in the apron of the machine, pliers or handles for locking the nut on the feed-screw, and a latch-plate fitted against the projecting ends of its studs, and adapted to be tripped to release the grasp of the split nut by a trip in the line of travel of the said latch-plate, substantially as shown and described.

20. The combination, with the frame A, the sliding head B, having apron O, the feed-screw N, and the hand-wheel X, and rack and pinion V V′, of a split nut, M, having its studs m' m' working in vertical slots in the apron O, and passing into projections formed on the ends of a pair of pliers or handles, m^3, and a latch or locking plate, P, substantially as shown and described.

21. The combination, with the sliding head B and feed-screw N, of the nut M, provided with the studs m', projecting through and working in vertical slots m^2, the apron O, the handles m^3, constructed on their outer ends with slotted projections n, through which the studs m' also pass, the latch-plate P, fitting against the said projecting ends of the said studs, and adapted to be tripped by a trip, S, located in its line of travel, and a spring, p', for forcing the latch back to place, to hold the split nut locked when the latter is closed by the handle m^3, substantially as shown and described.

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Witnesses:
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LILLIE MONTFIRTH.