April 11, 1939. H. T. HONIG 2,153,890

TABULAR BROACHING MACHINE

Filed July 12, 1937 3 Sheets-Sheet 1

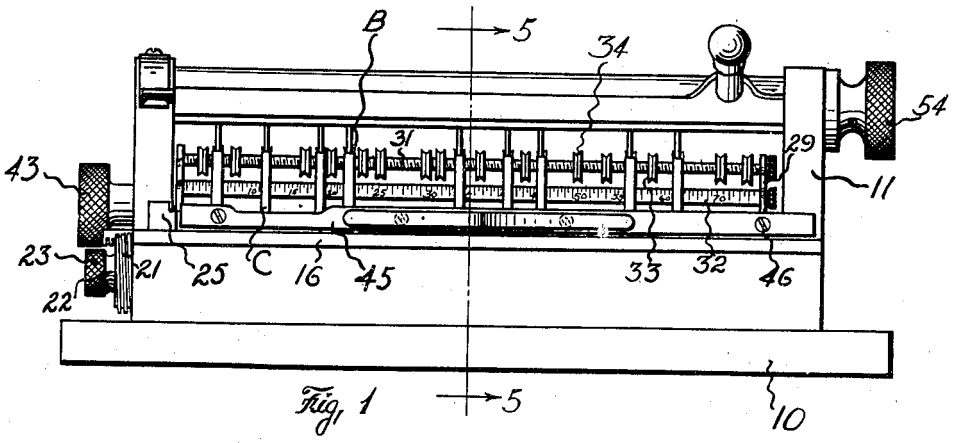

Fig. 1

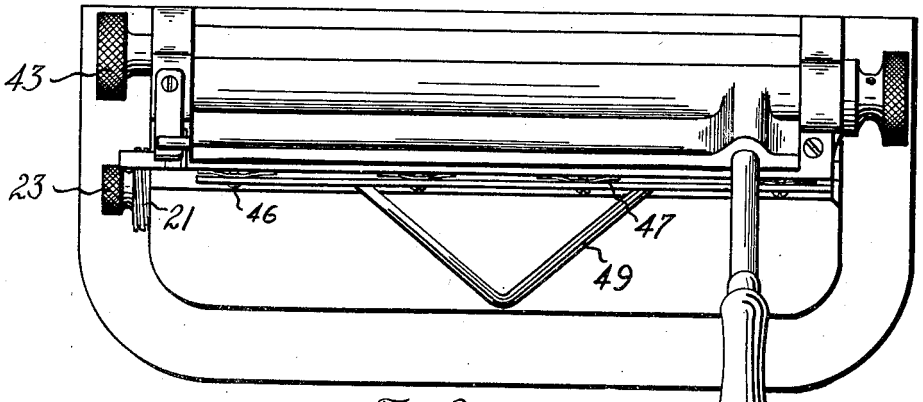

Fig. 2

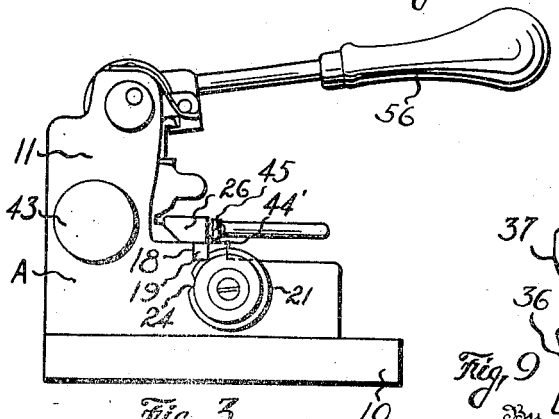

Fig. 3

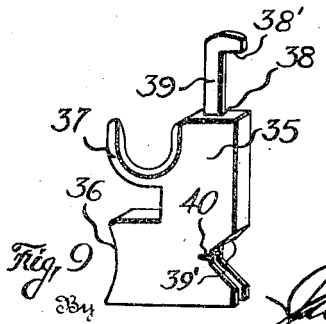

Fig. 9

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TABULAR BROACHING MACHINE

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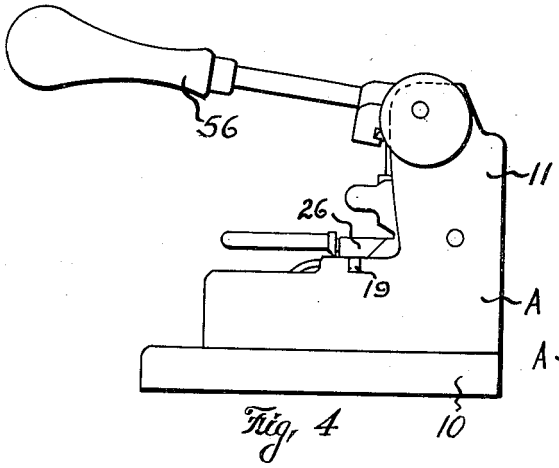

Fig. 4

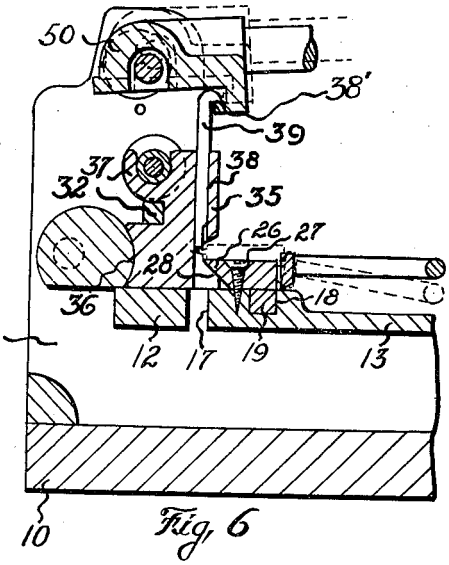

Fig. 6

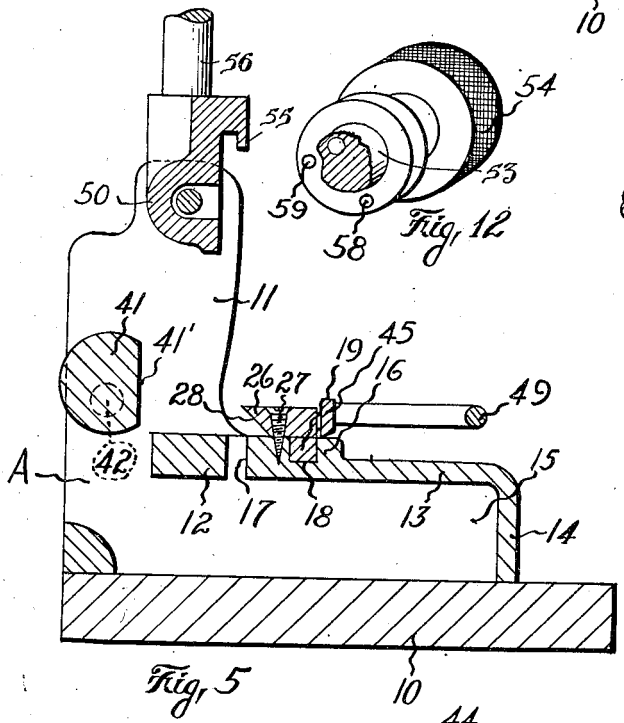

Fig. 12

Fig. 5

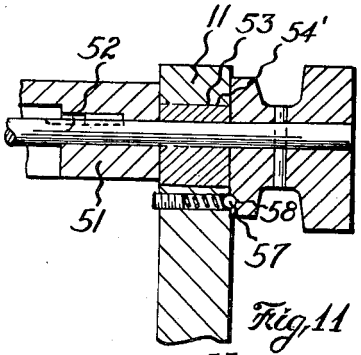

Fig. 11

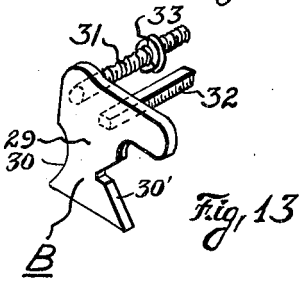

Fig. 13

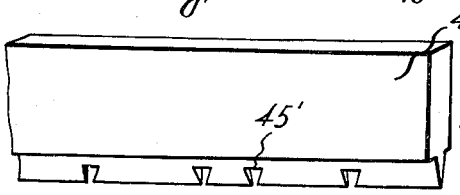

Fig. 14

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TABULAR BROACHING MACHINE

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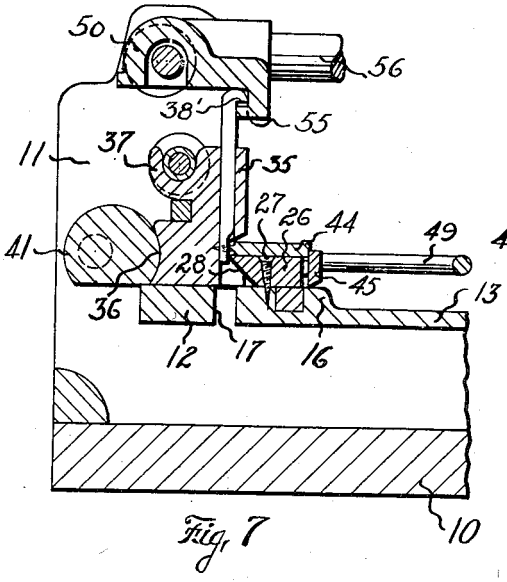

Fig. 7

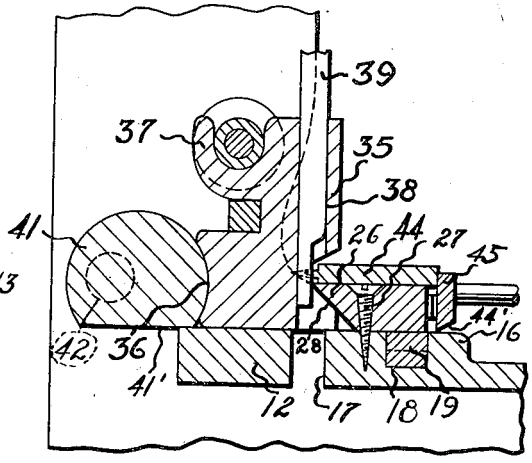

Fig. 8

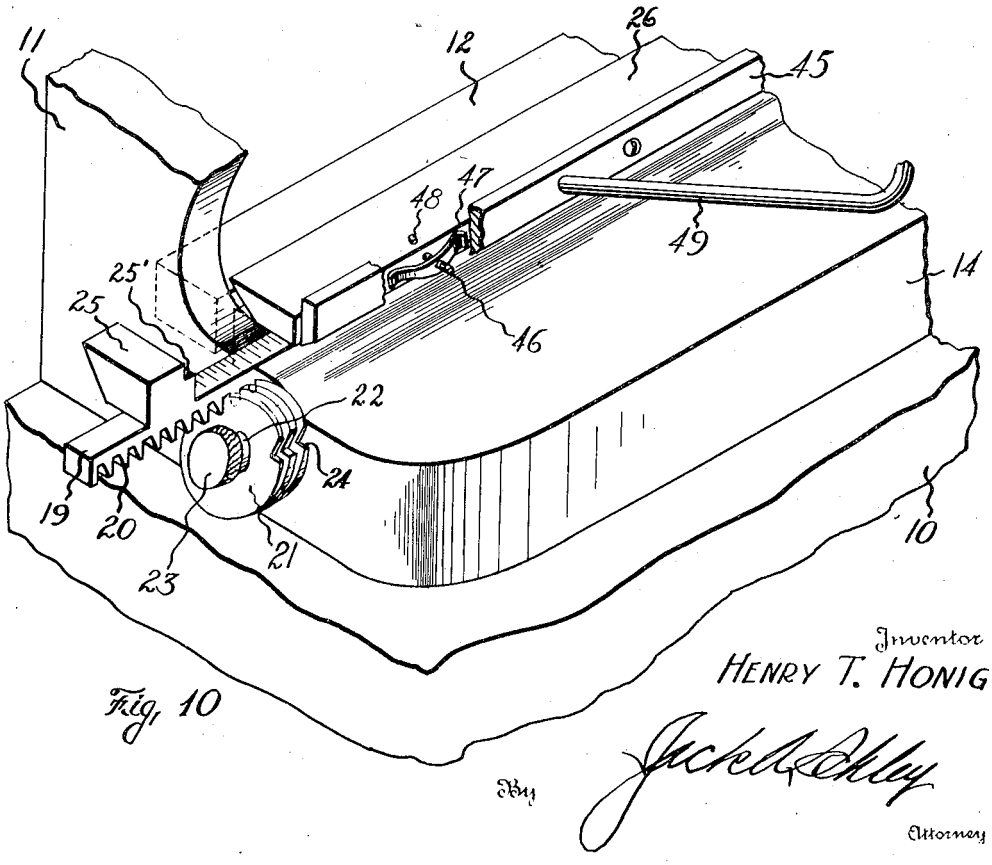

Fig. 10

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UNITED STATES PATENT OFFICE

2,153,890

TABULAR BROACHING MACHINE

Henry T. Honig, Dallas, Tex., assignor to Universal Monotabular Corporation, Dallas, Tex., a corporation of Delaware

Application July 12, 1937, Serial No. 153,240

17 Claims. (Cl. 164—91)

This invention relates to new and useful improvements in tabular broaching machines.

One object of the invention is to provide an improved machine for punching or notching type bars, slugs and rules, which are adapted to receive inserted column rules of the so-called "linotabler" form, said machine being constructed of a minimum number of parts which not only reduces the cost of manufacture but also facilitates its operation.

An important object of the invention is to provide an improved broaching machine wherein the supports on which the punches of the machine are mounted may be moved and adjusted to their proper positions without the use of spacing members or sleeves, whereby the time necessary to properly set the supports is minimized; said supports also being arranged to be moved or adjusted after the punch assembly is mounted in the machine, whereby removal of said assembly is not necessary to change the position of one or more of the punch supports in the event its misadjustment is discovered after said assembly is in position within the machine.

Another object of the invention is to provide improved means for quickly and positively locking the punches and their supports against movement within the broaching machine, so as to assure proper punching or notching of the type bar or rule.

An important object of the invention is to provide a punch unit which will not bend or injure the printing face of the rule.

A further object of the invention is to provide an improved means for operating the punches of the machine, said means being so constructed that a direct vertical or downward force parallel to the vertical axis of the punch is exerted against each punch, whereby the power necessary to operate the punches is greatly reduced and more efficient punching or notching of the rule is had.

Still another object of the invention is to provide an improved machine of the character described, having means for receiving type bars or rules of various widths and also having a receptacle for receiving the punchings or cuttings, whereby the latter do not accumulate on the working surface or board and interfere with the operation of the machine.

A particular object of the invention is to provide a movable gage bar on which the rule to be punched or broached is supported in the machine, with means for locking said bar in any desired position with relation to the punches, whereby the rule may be moved and punched any number of times without changing the setting of the punches.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown, and wherein:

Figure 1 is a front elevation of a broaching machine, constructed in accordance with the invention,

Figure 2 is a plan view,

Figure 3 is an end elevation,

Figure 4 is an elevation of the end opposite to that shown in Figure 3,

Figure 5 is a transverse, vertical, sectional view taken on the line 5—5 of Figure 1, with the punch assembly removed,

Figure 6 is a view, similar to Figure 5 with the punch assembly in position within the machine,

Figure 7 is a similar view, showing the punch in its lowered position and notching the rule,

Figure 8 is an enlarged view of the punch and its mounting as shown in Figure 7,

Figure 9 is an isometric view of one of the punches,

Figure 10 is a perspective view of one end of the machine, showing the gage bar and its locking means,

Figure 11 is an enlarged, sectional detail of the mounting of the actuating knob for the punch-operating member,

Figure 12 is a perspective view of the knob,

Figure 13 is a partial isometric view of the punch assembly, and

Figure 14 is a partial isometric view of the type bar or rule after it has been punched.

In the drawings, the numeral 10 designates a base plate which is substantially rectangular in shape. A supporting frame A is mounted on the base and includes upwardly extending standards 11 which are located one at each end of the frame. The standards are mounted at the rear portion of the base (Figures 5 and 6) and are connected together near their lower ends by a longitudinal connecting member 12. A horizontal platform or deck 13 is preferably made integral with the lower end of the standards and overlies the base 10, being spaced therefrom as shown in Figure 5. The platform or deck has a depending flange 14 around three sides thereof and the lower end of this flange engages the

base to support the platform and to form an enclosed chamber 15 below the platform. The inner end of the platform or deck 13 is upset at 16 so that its top lies in substantially the same plane as the top of the connecting member 12 and said member and platform have their edges spaced from each other to provide a longitudinal passage or space 17 therebetween.

A longitudinal groove 18 which is substantially square in cross-section is formed in the top of the upset portion of the deck or platform 16 and extends substantially throughout the length thereof. A longitudinal gage rod 19, which is square in cross-section, is slidable within the groove and has one end extending from said groove. The underside of the gage rod has teeth 20 thereon forming a gear rack which rack is adapted to engage a worm 21 (Figure 10). The worm is keyed or otherwise fastened on a stub shaft 22 journaled in one end flange 14 of the deck 13 and a knob 23 is secured on the outer end of the shaft to facilitate rotation of the shaft and worm. Manifestly, when the worm is rotated the gage rod 19 is moved within the groove 18. In some instances, it may be desirable to move the rod manually instead of by means of the worm and for this reason, the worm is formed with a notch 24 in its periphery. The notch is of sufficient width to permit the rod to slide therethrough, whereby when said notch is in registration with the gage rod, said rod may be freely moved in the groove 18. The top of the rod has graduations thereon to designate the movement of the same, while its extreme outer end is formed with an upwardly extending integral block or lug 25, the purpose of which will be hereinafter explained.

A longitudinal supporting bar 26 is fastened on the upset portion 16 of the deck by screws 27 which have their heads countersunk in said bar. The bar extends substantially throughout the length of the deck 13 and its outer end overlies the groove 18 to retain the gage rod 19 within said groove. The inner longitudinal edge of the bar is bevelled inwardly as shown at 28 in Figures 5 to 8, and the extreme edge of the same overhangs the space 17 between the connecting member 12 and deck 13.

A punch assembly B is adapted to be mounted within the frame A and includes a pair of end supports 29. The rear lower end of each support has an arcuate recess 30 therein, as is clearly shown in Figure 13, while the forward lower end thereof is bevelled outwardly at 30'. A longitudinal screw-threaded shaft 31 has its ends secured to the supports 29 and the length of the frame and deck, whereby when the assembly is in position within the frame, the end supports are located adjacent the inner sides of the standards 11. A square brace rod or bar 32 extends between the supports and is spaced below the shaft 30. A plurality of circular nuts 33 are threaded on the shaft 31 and obviously, by rotating said nuts, their position on the shaft may be varied. Each nut is formed with a peripheral groove and is arranged to support a punch C.

Each punch includes a body or housing 35 which is substantially rectangular in cross-section. The lower rear end of the housing is extended and this extension is formed with an arcuate recess 36 in its rear edge, said recess being exactly of the same curvature as the recesses 30 in the end supports 29. The upper portion of the housing is provided with an integral rearwardly extending curved arm 37 (Figure 9) which is adapted to engage within the groove 34 of one of the supporting nuts 33. A vertical bore 38 extends through the casing and a blade 39 is mounted to slide vertically through the bore. The lower end of the blade is substantially triangular in cross-section so that upon passing through a type slug or rule, a triangular opening or notch is formed.

The lower outer end of the casing is recessed as shown at 39', said recess having inclined walls and extending inwardly beyond the bore 37, whereby the punch blade 39 moves transversely of the inner portion of the same. A relatively small notch 40 is provided at the base of the recess 39' as is clearly shown in Figure 9.

The punch assembly B has the grooved nuts 33 adjusted to their proper position on the shaft 31 in accordance with the spacing between the notches to be punched. The end supports 29 which carry the shaft 31 are then placed on the longitudinal connecting member 12 of the frame so that the bevel 30' on the lower end of each support engages beneath the bevelled inner edge 28 of the bar 26 which is secured to the deck 13. The punches C are then placed in position, each punch having the bottom of its housing 35 resting on the member 12 with its curved arm 37 engaging within the peripheral groove 34 of one of the supporting nuts 33. As is clearly shown in Figures 6 to 8, the arm is confined between the nut and the longitudinal rod 32 whereby vertical displacement of the housing is impossible. When the arm 37 of the punch is engaging the grooved nut, the lower wall of the recess 39' in the housing engages the bevelled edge 28 of the bar 26, to further prevent upward displacement of the punch.

For locking the end supports 29 and the punch housings 35 in the positions above described, a longitudinal roller 41 is mounted within the standards 11. This roller is eccentrically mounted on studs 42 which are journaled in the standards, and has a portion thereof cut away to form a flat side 41'. A hand knob 43 is secured to one of the studs and is located on the outer side of one of the standards, whereby the roller may be manually rotated.

Normally the roller is in the position shown in Figure 5 so as to permit the insertion of the punch assembly A and punches C. When said assembly and punches are in position, the studs are rotated to impart rotation to the roller 41. Due to the eccentric mounting of said roller on the studs, the rounded portion of the roller is swung into engagement with the arcuate recesses 36 of the punch housings 35 and with the similar recesses 30 of the supports 29. Thus, the punches and supports are positively confined within the frame between the roller 41 and the bevelled edge 28 of the bar 26, as is clearly shown in Figures 6 to 8.

The metallic rule 44 (Figure 8) which is to be punched by the blades 38, is laid on the bar 26 and the inner longitudinal edge of the rule, which is reduced, is engaged in the notch 40 at the base of the recess 39 in the housing 35. The rule is firmly held in this position by a retaining bar 45 which engages the outer longitudinal edge of the rule. The retaining bar is secured to the outer longitudinal edge of the bar 26 by screws 46 which pass through the retaining bar and are threaded into the supporting bar 26. Flat arcuate springs 47 are interposed between the edge of the bar 26 and the retaining bar and exert their pressure to normally hold said retaining bar in

the position shown in Figures 5 to 8, with the retaining bar in a substantially vertical position. By loosening or tightening the screws 46, the space between the edge of the bar 26 and the retaining bar may be readily varied so that rules 44 of various widths may be inserted between the retaining bar and the punches C. Set screws 48 are provided for locking the screws 46 in any position. To permit swinging of the retaining bar 45 so as to allow the positioning of the rule 44, the bottom of the bar is bevelled at 44' and an outwardly extending handle 49 is secured to the outer side of the retaining bar. By depressing the handle the bar 45 is swung as shown by dotted lines in Figure 6 and the rule 44 may be readily placed in position on the bar 26, with its inner reduced end engaging the notches 40 in the base of the recesses 39 of the punches C. It is noted that when the rule is in position one end thereof rests on a shoulder 25' formed on the upwardly extending block 25 of the gage rule (Figures 2 and 10).

From the foregoing, it will be seen that the punch assembly B is first properly adjusted and then locked in position within the frame. The rule 44 which is to be punched or broached is then placed in position on the bar 26, with its inner longitudinal edge located within the recess 39 and notch 40 of each punch. Since the recess 39 in each punch housing 35 extends inwardly beyond the vertical bore 37 in said housing, it is manifest that the inner longitudinal edge is in alinement with said bore. Of course, at this time, the punch blade 38 is in its raised position as shown in Figure 6.

In order to broach or punch the rule 44, the blades 38 of the various punches C must be moved downwardly so that their lower ends pass through said rule. For simultaneously imparting vertical movement to the blades 38 of all of the punches C, a longitudinal actuating member 50 is mounted between the upper ends of the standards 11. This member has its inner end formed with ears 51 through which a longitudinal shaft 52 extends (Figures 5 and 11) and said ears are keyed on the shaft. Each end of the shaft extends through a cylindrical head 53 which is rotatable within an opening 54' provided in the standards 11. The shaft is mounted off center or eccentrically of the heads 53 and manifestly, when the heads are rotated, an eccentric motion is imparted to the shaft 52 and actuating member 50.

To facilitate rotation of the head 53, a hand knob 54, of greater diameter than the head, is preferably made integral with one of said heads. As is clearly shown in Figures 1 and 11, the knob is located on the outer side of the standard 11, with its inner surface engaging said standard.

A longitudinal, inwardly extending keeper or flange 55 is formed on the underside of the member 50 at its outer longitudinal edge portion and this keeper is adapted to engage beneath a shoulder 38' provided at the upper end of each punch blade 38, as will be explained. For swinging the member 50 to rotate the shaft 52 within the head 53, a handle 56 is secured to member 50 and extends outwardly therefrom.

While the punch assembly B and the rule 44 are being placed within the frame, the actuating member 50 is in the position shown in Figure 5, having been moved to this position by swinging the member upwardly and by rotating the knob 54 and heads 53. The member is held in this position by the engagement of a spring pressed ball 57, which is mounted in the standard 11, with a recess 58 formed in the inner surface of the knob 54.

After the punch assembly and rule are in place, the knob 54 is rotated so as to impart an eccentric motion to the actuating member 50, which motion moves the same upwardly and forwardly to the position shown in dotted lines in Figure 6. The member is then swung downwardly by means of the handle 56, the keeper or flange 55 clearing the shoulder 38' on the upper end of each punch blade 38. Continued rotation of the knob 54 and head 53 moves the keeper beneath said shoulder, as shown in Figure 6, and when in this position, a second recess 59 in the head 54 is engaged by the spring pressed ball 57 to frictionally lock the head 53.

Continued downward movement of the handle causes the member 50 to move downwardly with the shaft 52 rotating within the head, whereby the punch blades 38 engaged by the member are depressed to punch or broach the inner longitudinal edge of the rule 44, thereby forming notches 44' therein. It is pointed out that due to the engagement of the outer end of member with the top of the punch blades, a direct vertical downward thrust is exerted on the blades. This makes for easier operation of the blades during the broaching operation. As the member 50 is again swung upwardly the keeper 55 engaging beneath the shoulder 38' of each blade 38, raises the blades. To remove the punch assembly B, it is only necessary to return the member 50 to the position shown in Figure 5 and to rotate the roller 41 to disengage the same from the assembly.

The punch blades operate directly over the space 17 provided between the connecting member 12 and deck 13 and the punchings or material cut from the rule 44 fall into the chamber 15 between the deck and base 10. These punchings are thus prevented from falling on the deck and are efficiently disposed of so that they do not interfere with the placing of the rule upon the next operation.

As before pointed out, the rule 44 rests on the bar 26 and has its end resting on the shoulder 25' of the block 25, which block is a part of the gage rod 19. In many instances, it may be desirable to punch the rule 44 twice, with the notches 44' being spaced exactly the same distance upon the second punching as upon the first operation. In such case, the rod 19 may be moved outwardly a desired distance by means of the worm 21, the graduations on said rod assuring accurate movement. The movement of the rod and rule will thus change the position of the rule with relation to the punches and permit a second punching operation to be performed without changing the adjustment of the punches. The gage rod also facilitates the punching of a particularly long rule.

It is pointed out that the mounting of the punches C on the adjustable nuts is an important feature of the invention. The threads on the shaft 31 may be such that one complete revolution of the nut 33 will move the same longitudinally a predetermined distance, as for example six points. If desired, the periphery of each nut may have markings or graduations thereon (Figure 13), each mark representing a given number of points. With such arrangement, adjustment of the nuts 33 to their proper positions is facilitated. If the assembly B is mounted within the frame and one of the nuts 33 is found to be misalined, it may be readily adjusted to a proper

position without removing said assembly. The provision of said nuts threaded on the shaft entirely eliminates the use of spacing members, such as sleeves, slugs, collars and the like and greatly simplifies the adjustment and further minimizes the time necessary to obtain the proper adjustment.

What I claim and desire to secure by Letters Patent is:

1. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted within the frame, and means on the frame for actuating the perforating element to broach the rule.

2. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members on the shaft and having threaded engagement therewith so as to be movable longitudinally on said shaft to various positions thereon, a punch adapted to be mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted within the frame, and means on the frame for actuating the perforating element to broach the rule.

3. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted within the frame, means on the frame for actuating the perforating element to broach the rule, and a gage rod slidably mounted in the deck and adapted to be engaged by one end of the metallic rule whereby the rule may be properly positioned with relation to the punches.

4. A punch assembly for a broaching machine including, end supports, a non-rotatable screw-threaded shaft carried by the supports and extending therebetween, and a plurality of punch supporting members threaded on said shaft.

5. A punch assembly for a broaching machine including, end supports, a non-rotatable screw-threaded shaft carried by the supports and extending therebetween, a plurality of punch supporting members threaded on said shaft, and a punch mounted on each member, said punch having a vertically movable blade for broaching a metallic rule.

6. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a non-rotatable longitudinal shaft, a plurality of supporting members on the shaft and having threaded engagement therewith so as to be movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted in the frame, and means on the frame for actuating the perforating elements to broach the rule.

7. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly adapted to be removably mounted within the frame adjacent the deck, said assembly comprising a longitudinal shaft supported between end members, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted in the frame, a longitudinal rotatable eccentric mounted within the frame and adapted to engage the end members of the punch assembly to lock said assembly in the frame, and means on the frame for actuating the perforating element to broach the same.

8. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly adapted to be removably mounted within the frame adjacent the deck, said assembly comprising a longitudinal shaft supported between end members, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted in the frame, a longitudinal rotatable eccentric mounted within the frame and adapted to engage the end members of the punch assembly to lock said assembly in the frame, said eccentric also being adapted to engage the punches so as to prevent displacement thereof during the broaching operation, and means on the frame for actuating the perforating element to broach the same.

9. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly adapted to be removably mounted within the frame adjacent the deck, said assembly comprising a longitudinal shaft supported between end members, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted in the frame, each punch being readily removable from its supporting member, a longitudinal rotatable eccentric mounted within the frame and adapted to engage the end members of the punch assembly to lock said assembly in the frame, and means on the frame for actuating the perforating element to broach the same.

10. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is

mounted within the frame, yieldable means for holding the rule to be broached in a position adjacent the punches, and means on the frame for actuating the perforating element to broach the rule.

11. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which the rule is mounted, a punch assembly having end members arranged to be mounted in the frame, a plurality of punches removably mounted in the assembly, and adjustable to various positions therein, a longitudinal eccentric locking element within the frame adapted to engage the end members of the punch assembly for locking the same in position within the frame, and means on the frame for actuating the punches to broach said rule.

12. A broaching machine for broaching a metalic rule including, a frame having a work receiving deck on which the rule is mounted, a punch assembly adapted to be mounted within the frame adjacent the deck, a plurality of punches arranged to be mounted on and removed from the punch assembly without removing said assembly from the frame, and means on the frame for actuating the punches to broach the rule.

13. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which the rule is mounted, a punch assembly mounted within the frame, a plurality of punches mounted in the assembly and each having a vertically movable perforating element therein, each perforating element having an outwardly extending lug at its upper end, and an operating member above the elements and being eccentrically mounted in the frame, whereby when the member is swung it moves outwardly and then downwardly and inwardly to engage over the lugs so as to actuate the elements.

14. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted within the frame, yieldable means for holding the rule to be broached in a position adjacent the punches, means on the frame for actuating the perforating element to broach the rule, and a gauge rod slidably mounted in the deck and adapted to be engaged by one end of the metallic rule whereby the rule may be properly positioned with relation to the punches.

15. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted within the frame, means on the frame for actuating the perforating element to broach the rule, a gauge rod slidably mounted in the deck and adapted to be engaged by one end of the metallic rule whereby the rule may be properly positioned with relation to the punches, said rod having teeth thereon, and a rotatable worm engaging said teeth, whereby fine adjustments of the rod may be obtained and also whereby the rod may be locked in its adjusted positions.

16. A broaching machine for broaching a metallic rule including, a frame having a work receiving deck on which said rule is mounted, a punch assembly arranged to be locked within the frame adjacent the deck, said assembly comprising a longitudinal shaft, a plurality of supporting members movable longitudinally on said shaft to various positions thereon, a punch adapted to be removably mounted on each supporting member and having a perforating element overlying the rule to be broached when the assembly is mounted within the frame, and means on the frame for actuating the perforating element to broach the rule, the frame having a receiving chamber below the perforating elements of the punches, whereby the cuttings removed from the rule during the broaching operation fall into said chamber and do not accumulate on the work receiving deck.

17. As a sub-combination in a broaching machine, a punch including, a housing having a rearwardly extending arm and also having an arcuate recess at its base below said arm, and a perforating blade movable vertically within the housing.

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