Jan. 11, 1944. H. T. HONIG 2,338,940

BROACHING MACHINE

Filed March 10, 1941 3 Sheets-Sheet 1

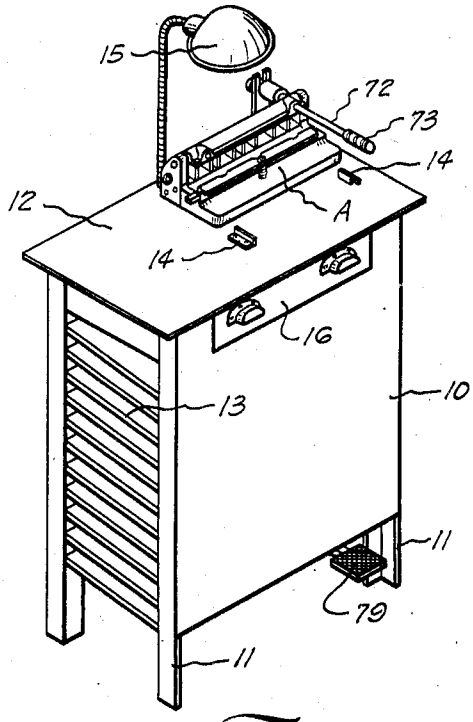


Fig. 1.

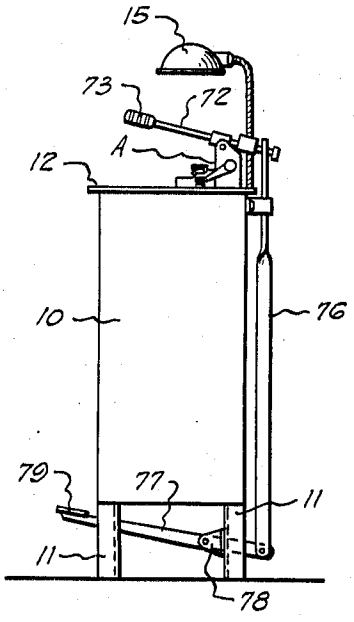


Fig. 2.

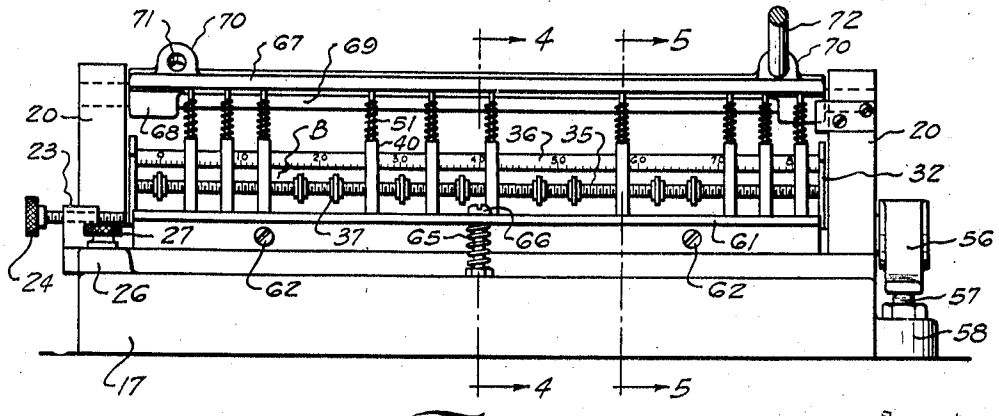


Fig. 3.

Inventor
Henry T. Honig
By Jack Ashley
Attorney

Jan. 11, 1944. H. T. HONIG 2,338,940

BROACHING MACHINE

Filed March 10, 1941 3 Sheets-Sheet 2

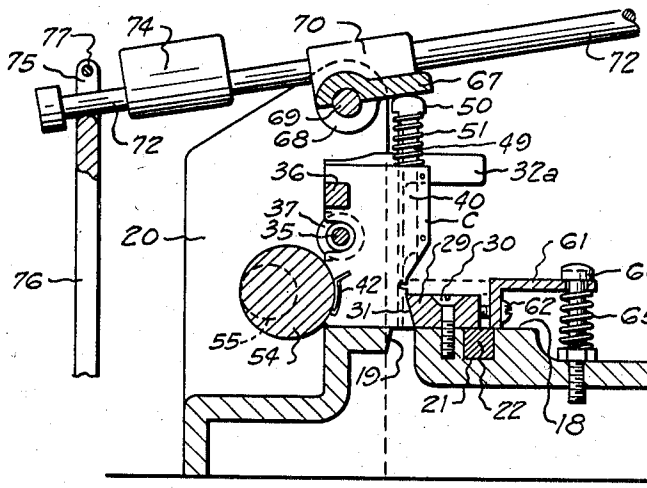


Fig. 4.

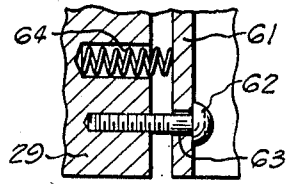


Fig. 9.

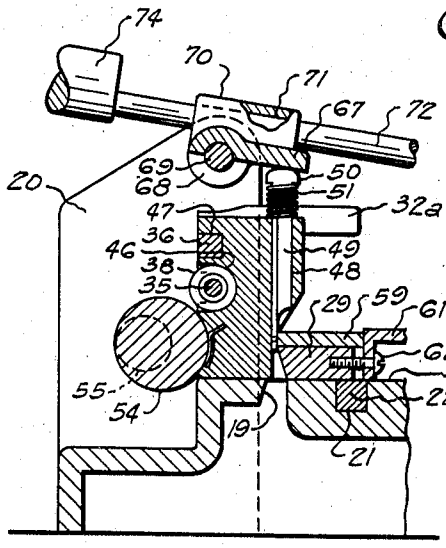


Fig. 5.

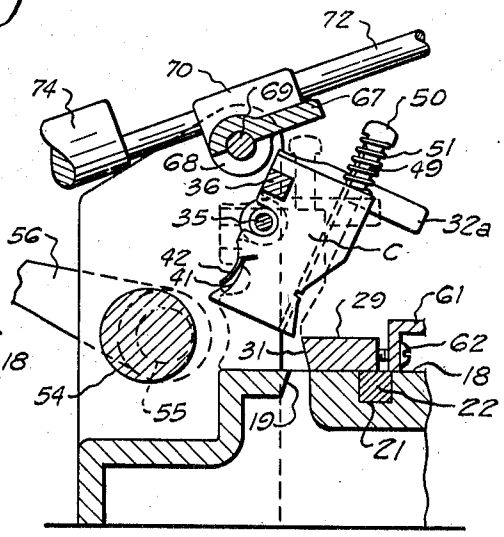


Fig. 6.

Inventor
Henry T. Honig

By Jack A. Ackley

Attorney

Jan. 11, 1944. H. T. HONIG 2,338,940

BROACHING MACHINE

Filed March 10, 1941 3 Sheets-Sheet 3

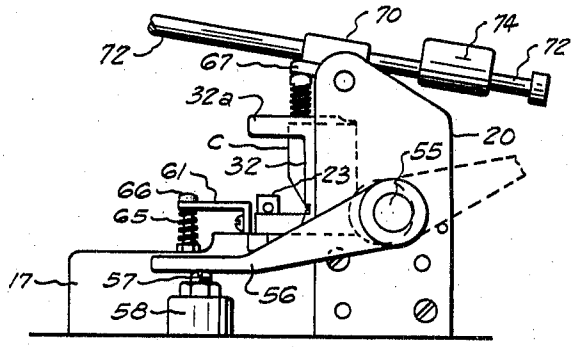


Fig. 7.

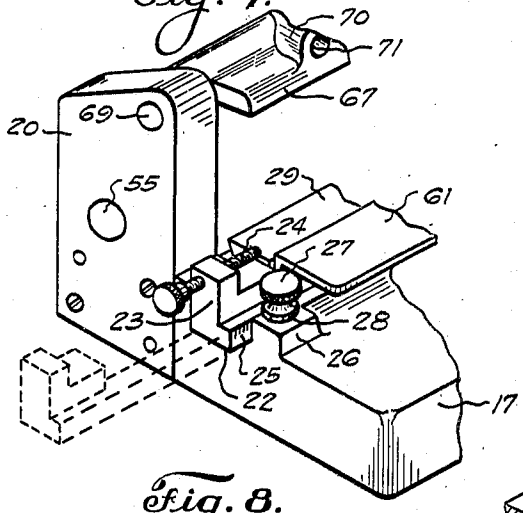


Fig. 8.

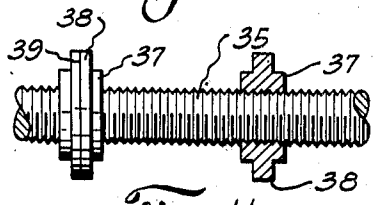


Fig. 11.

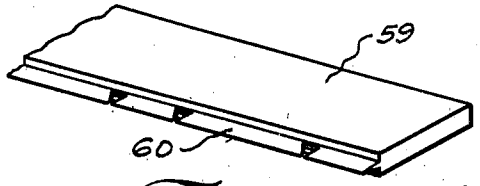


Fig. 14.

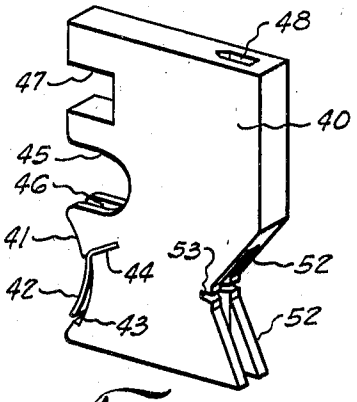


Fig. 12.

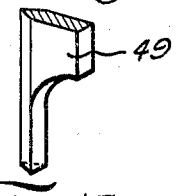


Fig. 13.

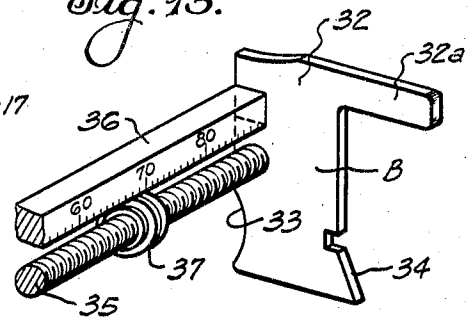


Fig. 10.

Inventor
Henry T. Honig
By
Jack A. Ashley
Attorney

Patented Jan. 11, 1944

2,338,940

UNITED STATES PATENT OFFICE

2,338,940

BROACHING MACHINE

Henry T. Honig, Dallas, Tex.

Application March 10, 1941, Serial No. 382,479

7 Claims. (Cl. 164—91)

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

One object of the invention is to provide a broaching machine which is an improvement on the machine disclosed in my prior Patent No. 2,153,890 issued April 11, 1939.

An important object of the invention is to provide a broaching machine for punching or notching type rules, slugs or bars, which are adapted to receive inserted column rules of the so-called "lino-tabler" form, said machine having an improved means for removably mounting and locking the punch assembly within the machine so as to assure accurate and proper punching of the type bar or rule.

A particular object of the invention is to provide an improved broaching means wherein spring-pressed punches are employed, together with a common operating member for engaging and depressing the punches to perform the punching operation, the return of the punches to a normal or raised position being effected by the springs, whereby the operating member is not depended to return said punches after completion of the punching operation, which makes for a simplified and more efficient construction.

Another object of the invention is to provide a machine, of the character described, having an improved means for receiving and supporting type bars or rules of various widths, together with an improved adjustment for accurately positioning the type bars or rules with respect to the punches, whereby the punching of the bars or rules is facilitated and the time required minimized.

A further object of the invention is to provide a broach, of the character described, having an improved support for the individual punches, whereby the mounting and removal of the punches on the support is facilitated; the support being constructed to permit mounting and positioning of the punches without the use of spacers and also allowing fine adjustment of each individual punch after the assembly is locked in the machine.

Still another object of the invention is to provide an improved broaching machine, of the character described, wherein the operating member for depressing the punches may be actuated either by the hand or by the foot of the operator.

Another object of the invention is to provide an improved broaching machine which may be readily combined with a cabinet or table on which the machine is more or less permanently mounted, said cabinet having upstanding clips or retainers adjacent the machine for receiving the punch assembly prior to its insertion in the machine, whereby said assembly may be rigidly held in position between said clips to permit accurate adjustment thereof, said cabinet also having a foot pedal thereon which is adapted to be connected to the operating member of the machine to permit said machine to be actuated either by the hand or by the foot of the operator.

The 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, as an example of the invention is shown and wherein:

Figure 1 is an isometric view of a broaching machine, constructed in accordance with the invention and mounted on the upper end or top of a cabinet or table,

Figure 2 is an end elevation of the parts shown in Figure 1,

Figure 3 is a front elevation of the broaching machine,

Figure 4 is an enlarged, transverse, vertical sectional view, taken on the line 4—4 of Figure 3,

Figure 5 is a partial, transverse, vertical sectional view, taken on the line 5—5 of Figure 3 and illustrating the punch depressed,

Figure 6 is a view similar to Figure 5 and illustrating the punch assembly being removed or inserted within the machine,

Figure 7 is an end elevation of the machine,

Figure 8 is an isometric view of one end of the machine, showing the gage bar and its locking means, and also showing a portion of the support for the type bar or rule,

Figure 9 is an enlarged sectional detail illustrating the mounting of the support for the type bar or rule,

Figure 10 is an isometric view of one end of the punch supporting assembly,

Figure 11 is an enlarged detail of the threaded supporting shaft or rod of the punch assembly,

Figure 12 is an enlarged isometric view of one of the punch housings,

Figure 13 is an enlarged isometric view of the lower end of one of the punch blades, and

Figure 14 is a partial isometric view of the type bar or rule after said bar or rule has been punched or notched by the machine.

In the drawings, the numeral 10 designates a cabinet or table which is supported by suitable legs 11 and which is provided with a flat top 12.

The cabinet is preferably substantially rectangular in cross-section and is provided with a plurality of horizontally disposed shelves 13 for receiving the type bars or rules, or other equipment relating to the broaching operation. The improved broaching machine A is mounted on the table top 12, preferably at one corner thereof and may be fastened thereto in any suitable manner. A pair of upstanding clips 14 are secured to the table top 12 adjacent the forward edge of the machine A and these clips are spaced apart from each other a distance which is substantially equal to the punch assembly which is insertable within the machine A.

One of the clips is preferably rigid, while the other clip is flexible so as to facilitate the insertion or positioning of the punch assembly therebetween, as will be hereinafter explained. If desired, a suitable lamp 15 may be mounted on the cabinet and disposed above the machine A. Also, the cabinet may be provided with a drawer or container 16 for receiving any suitable equipment which relates to the broaching operation.

The machine A includes a hollow base 17 which may be formed of metal or other suitable material. The top of the base is upset or raised at its intermediate portion to provide a longitudinally extending platform or deck 18, as is clearly shown in Figures 4 to 6. A longitudinal slot or opening 19 is formed in the deck 18, being located nearer the rear portion of said deck and this slot communicates with the interior of the base 17. A pair of upright standards 20 are located one at each end of the base 17 and these standards may be either formed integral with the base or may be made separately and suitably bolted or otherwise fastened thereto. The standards are mounted at the rear portion of the base (Figure 4) and have their forward vertical edges terminating substantially in alinement with the rear edge of the longitudinal slot or opening 19 in the horizontal deck 18. A longitudinal groove 21 which is substantially square in cross section is formed in the top of the deck or platform and extends substantially throughout the length thereof. An elongate gage rod 22, which is square in cross section, is slidable within the groove 21 and has one end extending or projecting from said groove, as is clearly shown in Figure 8. The projecting end of the gage rod is formed with an upwardly extending lug 23 which is off-set rearwardly with respect to said rod. An adjusting screw 24, the purpose of which will be hereinafter explained, is threaded through the upstanding portion of the lug 23 and is movable to various positions relative to said lug. The outer or forward face of the rod 22 is provided with suitable indications 25 forming a scale and this face is adapted to abut an upwardly projecting boss 26 which is formed integral with the base 17 and which is located adjacent the outer end of the groove 21. A set screw 27 which has an enlarged flange 28 below its head is threaded into the boss 26 and a portion of the flange 28 overlies the top of the gage rod 22. Manifestly, when the set screw 27 is tightened, the flange 28 frictionally engages the rod 22 to frictionally clamp said rod in various adjusted positions. Loosening of the set screw 27 will permit the rod 22 to be moved freely within its groove 21.

A longitudinal supporting bar 29 is fastened on the top of the horizontal deck 18 by screws 30 which have their heads countersunk in said bar. The bar extends substantially throughout the length of the deck 18 and its outer portion overlies the gage bar 22 within the groove 21 to retain said bar within said groove. The inner longitudinal edge of the bar 29 is bevelled at 31 (Figure 4) and this bevelled edge overhangs the slot or opening 19 which is formed in the deck.

A punch assembly B is adapted to be mounted within the machine and includes a pair of end supports 32. The rear lower end of each support has an arcuate recess 33 therein, as is clearly shown in Figure 10, while the forward lower end thereof is bevelled outwardly at 34. An elongate or longitudinal screw-threaded shaft 35 extends between the support with its ends fastened to said support 32 and the length of this shaft is slightly less than the space between the upright standards 20 of the machine, whereby when the punch assembly is within the machine, the end supports 32 of said assembly are located adjacent the inner side of the upright standards 20, as is clearly shown in Figure 3. A square brace and scale rod or bar 36 extends between the supports 32 and is spaced above the shaft 35. A plurality of circular nuts 37 are threaded on the shaft 35 and, obviously, by rotating said nuts, their position on the shaft may be varied. Each nut is provided with a central peripherial flange 38 which is provided with an indicating line 39 which extends therearound. Each nut, together with the square spacing rod 36, supports a punch C, as will be explained.

Each punch C includes a body or housing 40 which is substantially rectangular in cross-section. The lower rear end of the housing is provided with an arcuate recess 41 in its rear edge, said recess being of substantially the same curvature as the recesses 33 in the end supports 32. A curved flat spring 42 is mounted within a recess 43 of the curved portion 41, said spring having one end suitably fastened within a groove 44, as is clearly shown in Figure 12. The mounting of the flat spring is such that the lower end of the spring is constantly urged outwardly away from the housing or body 40. Above the arcuate portion 41, the rear edge of the housing 40 is formed with a semi-circular recess 45 and a groove or channel 46 is provided in the wall of this recess. The recess and groove or channel are such that when the housing is placed within the punch assembly, said groove or channel is engaged by the peripherial flange 38 of one of the nuts, while the edges of the recess engage the peripherial edge of said nuts, whereby the punch housing is supported by said nuts. Above the semi-circular recess 45, the rear edge of the punch housing 40 is formed with a recess 47, which is square in cross-section. The square recess is adapted to engage the square connecting or spacing rod 36 when the semi-circular recess 45 is engaged with one of the nuts 37 on the threaded shaft 35 (Figures 5 and 6).

A vertical bore 48 extends through the housing or body 40 and is located near the forward edge of said body. A punching blade 49 is mounted to slide vertically within the bore 48 and this blade has its upper end extending from the upper end of said bore. The extreme upper end of the blade is enlarged as shown at 50 and a coil spring 51 surrounds the projecting portion of the blade and is confined between the enlargement 50 at the upper end of the blade and the top of the housing. This spring exerts its pressure to constantly urge the blade 49 to a raised position within 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 will be formed in said rule.

The lower outer end of the housing or body **40** is recessed as shown at **52**, said recess having inclined walls and extending inwardly beyond the bore **48**, whereby the punch blade **49** moves transversely of the inner portion of the same. A relatively small notch **53** is provided at the base or inner portion of the recess **52**, as is clearly shown in Figure 12 and the bottom of this notch is inclined at a predetermined angle, as will be explained.

In mounting the punch assembly B within the machine, the end supports **32** are placed between the clips **14** on the table **12**, said clips being disposed so as to snugly receive the end supports. The supports are placed with their rear edges resting on the table, whereby the spacer rod **36** and the screw-threaded shaft **35** extends between the clips. The circular nuts **37** are then adjusted to their proper positions on the shaft **35**, such adjustment being facilitated by the provision of the scale on the square rod **36**. After the nuts have been properly adjusted, the various punches C are placed in position on said nuts and on the rod **36**. In placing each punch in position, the recess **45** is engaged over one of the nuts **37**, whereby the peripherial flange **38** of said nut engages the channel **46** in the recess **45**. The punch housing is then swung inwardly so as to engage the square recess **47** with the rod **36** of the punch assembly, as is clearly shown in Figure 6. In this manner, the various punches are properly positioned within the punch assembly while said assembly is out of the machine and in place on the table top **12**. Obviously, the engagement of the nuts **37** and the rod **36** with the respective recesses **45** and **47** prevent vertical displacement of the punches with respect to the supports **32** of the assembly.

After the punches have been properly positioned, the entire assembly is lifted from the table top **12**, such lifting being facilitated by outwardly projecting finger holds **32***a* which are formed on the end supports **32** of said assembly and the entire assembly is placed within the machine between the upright standards **20** thereof. As explained, the punch assembly is of a length substantially equal to the distance between the end supports, whereby the end supports **32** are disposed adjacent to the inner surfaces of the upright standards. The punches rest upon the top of the horizontal deck or platform **18** so as to be supported thereby and the lower inclined wall **52** of the forward recess in each punch housing engages the inclined or bevelled edge **31** of the elongate bar **29** which is secured to the top of the deck. The engagement of the inclined surface **52** with the bevel **31** of said bar further prevents upward displacement of the punches C.

For locking the end supports **32** and the punch housings **40** of the punch assembly in position within the machine, a longitudinal roller **54** is mounted within the machine and extends between the upright standards **20**. This roller is eccentrically mounted on studs **55** which are journaled in the standards and one of said studs projects outwardly through its standard, as shown in Figure 7. This stud has an operating arm **56** secured thereto and, manifestly, when the arm is swung, the roller **54** is rotated. A suitable stop **57**, which may be adjustable, is secured to an outwardly extending lug or boss **58** which is preferably made integral with one side of the base **17**.

Normally, the roller is in the position shown in Figure 6 so as to permit the insertion of the punch assembly A and the punches C. When said assembly and punches are in position, the lever or arm **56** is swung so as to impart a rotation to the roller **54**. Due to the eccentric mounting of said roller on the studs **55**, the roller is swung into engagement with the arcuate recesses **33** of the end supports **32** and also into engagement with the arcuate recesses **41** of each punch housing **40**. The engagement of the roller with these recesses forces the forward inclined surfaces **52** of the punch housings into engagement with the bevelled edge **31** of the bar **29**, whereby said housings are firmly clamped between the roller and the bar. The spring **42** which is disposed within each recess **41** engages the periphery of the roller (Figures 4 and 5) and serves to increase the clamping action to prevent displacement of the punches from their clamped position.

The metallic rule **59** which is to be punched by the punch blade **49** is formed of a flat bar having one longitudinal edge reduced, such edge being tapered or triangular in cross-section, as is clearly shown in Figure 14. The rule is adapted to be placed upon the fixed bar **29** so as to dispose its reduced longitudinal edge within the notches **53** of the punch housings **40**. It is noted that the lower end of each notch **53** is inclined complementary to the inclination of the reduced edge **60**, whereby said edge is supported within the notches. The rule is firmly held in position on the bar **29** by means of an angular retaining member **61** which engages the outer longitudinal edge of the rule, as is shown in Figure 5. The angular retaining element **61** is secured to the outer longitudinal edge of the fixed bar **29** by a plurality of screws **62** which pass through enlarged openings **63** in the element and are threaded into the bar **29** (Figure 9). Coiled springs **64** are interposed between the bar and the element and exert their pressure to normally hold the retaining member spaced from the fixed bar. In order to urge the upper portion of the retaining member **61** inwardly into engagement with the rule **59**, a coiled spring **65** is confined between the retaining element or member and the base **17**, said spring being supported on an elongate screw **66** which passes through the retaining member and is threaded downwardly into the base, as is clearly shown in Figure 4. The spring **65** urges the outer end of the retaining member upwardly, causing the upper inner edge of said element to move into a tight engagement with the rule **59** which is interposed between said retaining element and the housings **40** of the punch assembly. Obviously, the retaining member **61** may fulcrum within certain limits since the screws **62** pass through enlarged openings **63** in said member. Manifestly, this arrangement permits the retaining member **61** to be depressed so as to facilitate the insertion of the rule **59** in its proper place on the fixed bar **29**.

From the foregoing, it will be seen that the punch assembly B is first properly adjusted and then inserted and locked in position within the machine. The rule **59** which is to be punched or broached is then placed in position on the bar **29** and when in such position, one end thereof engages the adjusting screw **24** which is carried by the lug **23** of the gage bar **22**. By adjusting

the screw 24, the longitudinal position of the rule 59 may be varied with relation to the punch housings 40. The placement of the rule 59 on the bar 29 locates the inner reduced end or edge 60 of the rule within the notches 53 of the punch housings. Since the recess or notch 53 of each punch housing 40 extends inwardly beyond the vertical bore 43 within which the punch blade 49 is slidable, it is manifest that the inner longitudinal edge 60 of the rule is located in the path of the punch blade 49. Of course, at this time, the punch blade 49 is in a raised position, being held so by its coiled spring 51.

In order to broach or punch the rule 59, the blades 49 of the punches C must be moved downwardly so that their lower ends pass through said rule. For simultaneously imparting vertical movement to the blades 49 of all of the punches C, a longitudinal actuating member or bar 67 is mounted between the upper ends of the standards 20. The actuating member is formed with collars 68 at each end thereof and these collars are affixed or secured to a rotatable shaft 69 which has its ends journaled within the upper end of the standard 20. The free end of the actuating member or bar 67 overhangs the enlarged upper ends 50 of the punch blades 49 and, manifestly, when the actuating member is swung downwardly into engagement with the blades, said blades may be depressed or moved downwardly under tension of their respective springs 51. Such downward movement of the blades will result in a broaching or punching of the rule 59. When the actuating member 67 is released, the springs 51 will serve to raise said member, as shown in Figure 4.

The actuating member 67 is formed with a transversely extending boss 70 on its upper end and this boss is located adjacent one of the standards 20. The boss is provided with a bore 71 and an operating rod 72 extends through this bore, being suitably secured therein. One end of the rod extends forwardly and is provided with a suitable handle 73, whereby the operator may grasp said handle to swing the actuating member downwardly to perform the broaching operation. The rod 72 also extends rearwardly from the boss 70 and may have a suitable weight 74 mounted thereon, whereby the weight will constantly urge the actuating member 67 to a non-operating or raised position, as shown in Figure 4. Beyond the weight 74, the rod 72 extends through a yoke or clevis 75 which is formed in the upper end of a connecting bar 76. Displacement of the rod 72 from the yoke is prevented by a transverse pin 77 which extends across the upper end of said yoke. The connecting bar 76 extends downwardly along the rear of the cabinet 10, as is clearly shown in Figure 2 and has its lower end pivotally connected to one end of a foot lever 77, which lever is pivoted intermediate its ends on an ear 78 which is secured to one leg 11 of the cabinet. The lever 77 extends forwardly beyond the front of the cabinet and has a foot pedal 79 mounted thereon.

It will be evident that the operator may depress the foot pedal or lever 77 to impart an upward movement to the connecting bar 76 and, due to the engagement of the bar with the rear end of the rod 72, the actuating member 67 will be swung downwardly to move the punch blades 49 downwardly within their respective housings. If the operator so desires, he may actuate the member 67 by hand through the forwardly extending rod 72. In this manner, the machine may be operated either by the hand or by the foot of the operator as desired.

From the foregoing, it will be obvious that a simple and efficient broaching machine is provided. The punches B may be properly adjusted and positioned within the assembly prior to the insertion of said assembly into the machine, such position being accomplished while the assembly is disposed between the clips 14 on the table 12. After proper adjustment of the punches within the assembly, the entire assembly is placed within the machine and the roller 54 is rotated so as to clamp the various punches in their adjusted position. In the event that one of the punches is not properly adjusted, such adjustment may be carried out after the assembly is within the machine because it is merely necessary to impart a rotation to the particular nut 37 on which the punch is mounted.

At the time that the assembly is inserted and locked within the machine, the actuating member 67 is in the position shown in Figure 6, being held so by the weight 74. The rule 59 which is to be broached or punched is inserted between the punches C and the retaining element 61, as has been described, whereby the reduced edge 60 of said rule is located within the notches 53 of the punch housings 40. As explained, this locates the reduced edge 60 of the rule in the path of the various punch blades 49. After the punches are in position, it is only necessary to swing the actuating member 67 downwardly into engagement with the punches to depress the same, such swinging being accomplished either by hand through the forwardly extending rod 72 or by foot through the foot lever 77. Thus, the punches are simultaneously depressed under tension of the springs 51 to punch or broach the rule 59.

As before pointed out, the positioning of the rule on the stationary bar 29 is such that the end of the rule engages the adjusting screw 24 which is carried by the upwardly extending lug 23 of the gage bar. By properly adjusting the gage bar 22 through the medium of the set screw 27, it is possible to locate the rule in any desired position relative to the various punches. A further adjustment in addition to the adjustment of the gage bar 22 may be carried out by the adjusting screw 24 or by manipulating this screw, the longitudinal position of the rule 59 with relation to the punches may be readily varied.

It is noted that prior to the mounting of the punches on their respective adjustable nuts 37, it is preferable that said nuts be adjusted to their proper position. This adjustment is facilitated by properly alining the central indicating line 39 on the flange 38 of each nut with the desired indication on the scale which is provided on the spacer bar 36. The provision of the supporting nuts 37 which are threaded on the shaft not only makes for a quicker adjustment, but also eliminates the use of spacing members, such as sleeves, slugs, collars and the like. Further, since each punch blade 49 has an individual spring 51 associated therewith, it is only necessary to swing the actuating member 67 upwardly in order to permit retraction or elevation of the various punch blades.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

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

1. In the type of broaching machine for broaching a metallic rule wherein a frame is provided with deck for receiving the rule to be punched, and a punch assembly is locked in the frame and provided with punches for broaching the rule, the improvement which includes, an elongate gauge member freely slidable longitudinally of the deck, means for fastening the gauge member in adjusted positions, and means carried by the gauge member capable of fine adjustments after the gauge member is fastened in position for engaging one end of the rule to adjust it longitudinally and minutely of the punches.

2. As a sub-combination in a rule broaching machine, a punch housing having front and rear edges and a punch bore therein, the housing also having in its rear edge an angular recess directed inwardly and a horizontal substantially semicircular recess adapted to receive an adjusting nut, whereby the housing may be pushed downwardly directly onto a supporting bar and an adjusting nut without swinging the housing.

3. The sub-combination as set forth in claim 2 with a punch slidable in the bore of the housing having one end protruding therefrom and provided with a head, and a coiled spring surrounding the punch below the head for supporting said punch.

4. In a punch assembly for a rule broaching machine, the combination of a removable support including a stationary longitudinal scale bar and a stationary screw threaded shaft, a plurality of circular nuts mounted on said shaft, a plurality of punch members each having a punch movable therein and also having a rear edge provided with a recess for receiving said scale bar and a horizontal substantially semicircular recess directed inwardly from said edge for receiving one of said nuts, whereby each punch member may be pushed downwardly directly on the scale bar and the nut at the same time.

5. In combination in a rule broaching machine, a frame having a rule support, a removable punch assembly having a plurality of upstanding spring-supported punches, a punch depressing member pivoted to the frame and having no means of attachment to said punches, means for swinging the depressing member to cause it to engage and at the same time depress the punches, and means independent of the punches and their springs for returning the depressing member and swinging it from engagement with the punches.

6. In combination in a rule broaching machine, a frame having a rule-supporting deck and standards at its ends, a punch assembly detachably mounted in the frame adjacent the deck, said assembly including upstanding spring-supported punches having heads at their upper ends, an operating bar pivoted between the frame standards and overhanging the heads and unattachable thereto, a lever for swinging said bar downward to initially engage the punch heads and for depressing the punches, and means for swinging the bar upwardly and away from the punch heads to permit their springs to independently return them.

7. In combination in a rule broaching machine, a frame having a rule supporting deck and standards at the ends, a punch assembly detachably mounted in the frame adjacent the deck, said assembly including upstanding spring-supported punches having heads at their upper ends, an operating bar pivoted between the frame standards overhanging the punch heads and unattachable thereto, a lever for swinging the bar downwardly to impinge and depress said punch heads during a continuous downward swing of said bar and lever, and means independent of the punch springs for swinging the lever upwardly to swing said bar away from said punch heads and to permit their springs to independently return them.

HENRY T. HONIG.