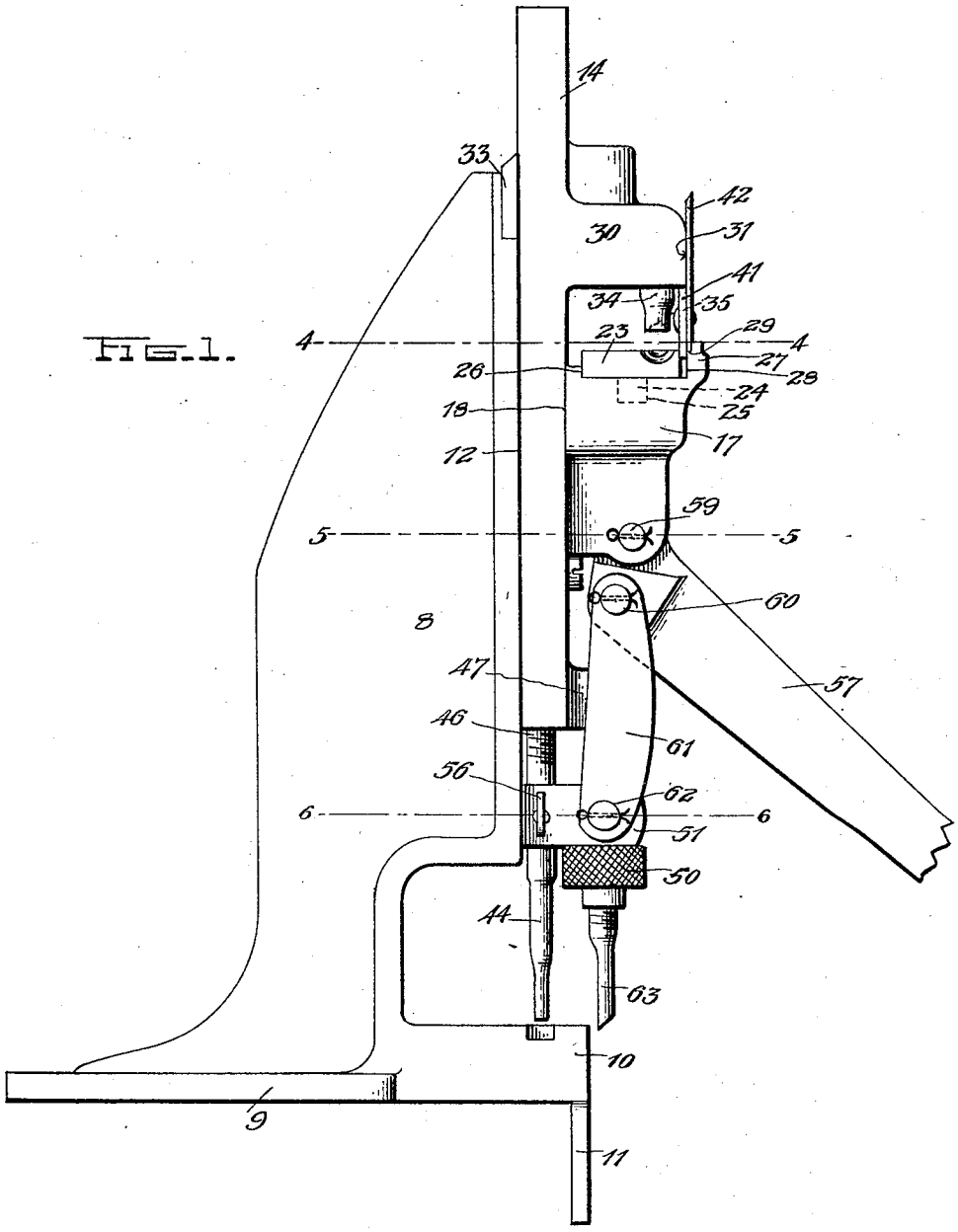
June 2, 1931. A. JOHNSON, JR., ET AL 1,808,041

SHEARING, PUNCHING, AND RIVETING MACHINE

Filed June 1, 1929 3 Sheets-Sheet 1

Fig. 1.



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SHEARING, PUNCHING, AND RIVETING MACHINE

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Fig. 2.

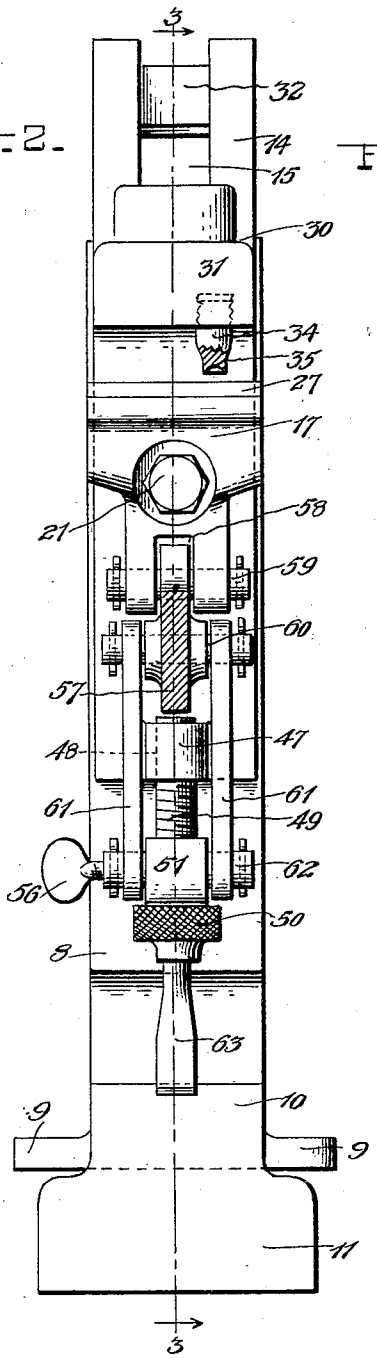


Fig. 4.

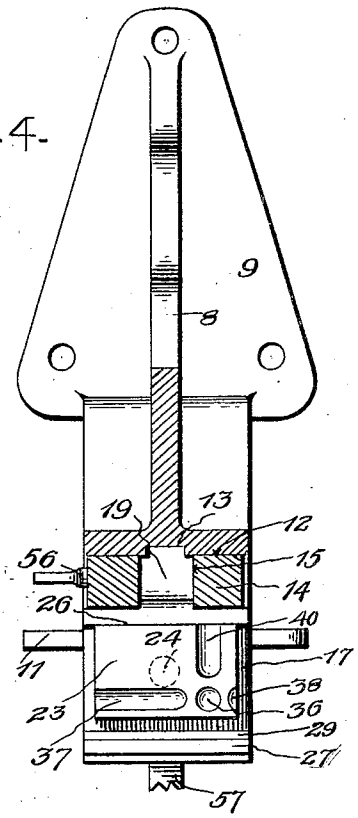
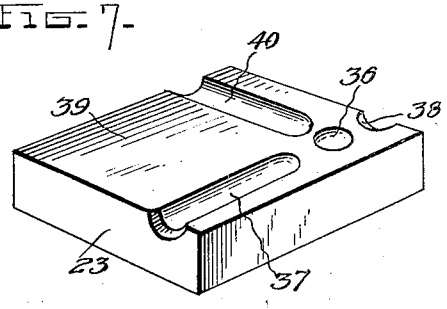


Fig. 7.



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SHEARING, PUNCHING, AND RIVETING MACHINE

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FIG. 3

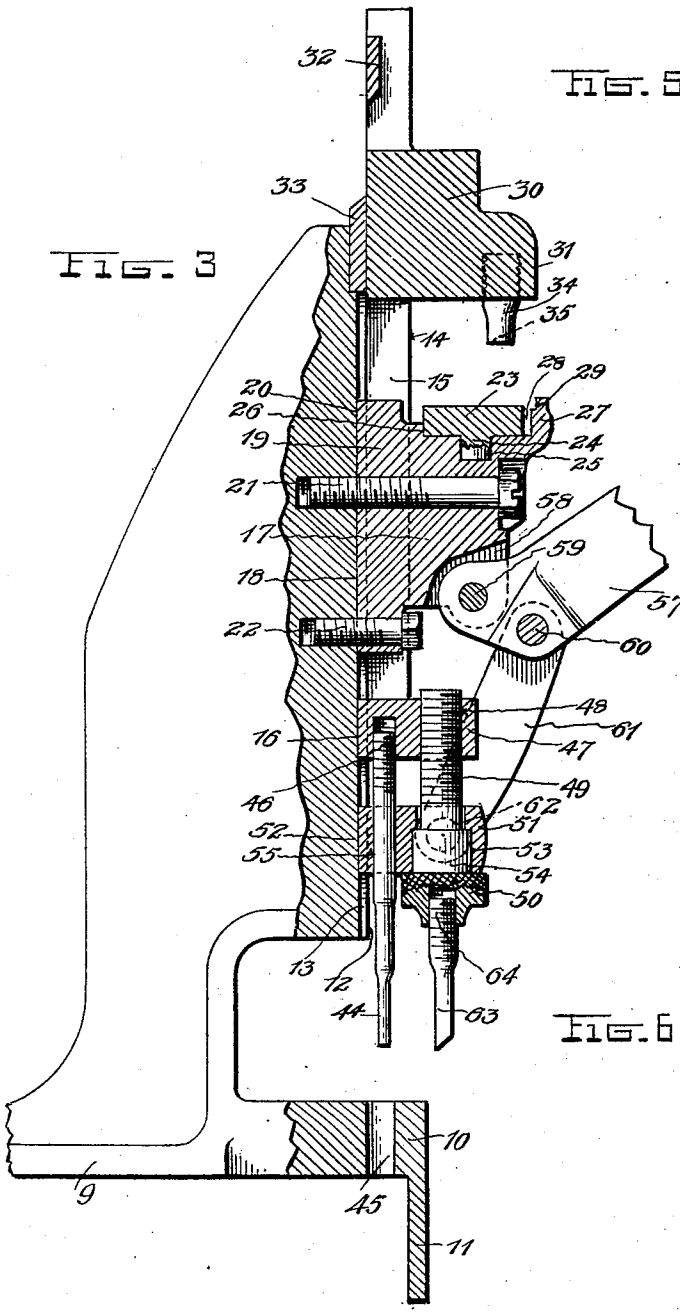


FIG. 5.

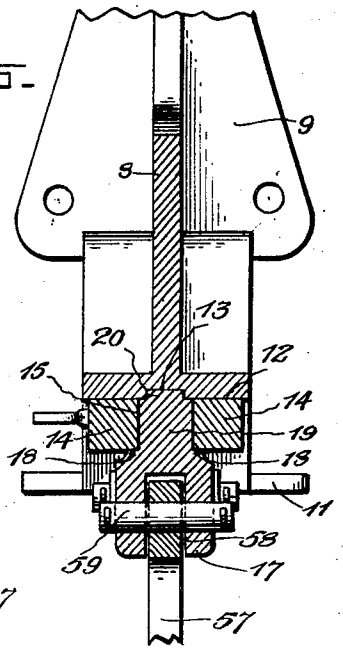
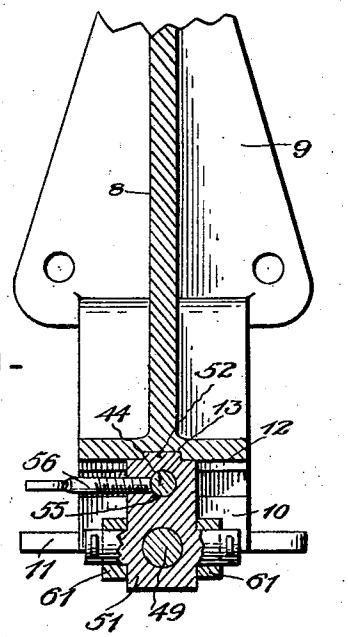


FIG. 6.



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Patented June 2, 1931 1,808,041

UNITED STATES PATENT OFFICE

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SHEARING, PUNCHING AND RIVETING MACHINE

Application filed June 1, 1929. Serial No. 367,815.

This invention relates broadly to machines in which a movable member is forcibly moved with respect to a stationary work support to perform work, for instance, a shearing, punching or riveting operation. The specific embodiment of the invention herein illustrated, is intended primarily for removing worn or damaged cutter sections from the sickle bars of mowers and harvesters, and riveting new sections in place. Such operations as these require a great deal of power and it is the principal object of our invention to make novel provisions whereby repeated strokes of a hand lever or other operating means serves to advance the work-performing member in a step-by-step manner. We are thus enabled to use power multiplying means in which relatively great movement of the hand lever or the like is reduced to very little movement of the work-performing member, with consequent great multiplication of force. By providing for the step-by-step advance of the work-performing member however, the necessary amount of movement may be imparted to it, to perform the required work, and each step is carried out with much more force than would be possible with less reduction between the operating lever or the like and the work-performing member to obtain greater travel of the latter.

It is a further aim of the invention to provide a unique construction whereby all rivets securing any cutter section to a sickle bar, may be simultaneously and easily sheared for removal, and the present machine embodies not only a punch for removing the sheared rivets, but means for upsetting new section securing rivets with ease and rapidity.

A great deal of difficulty has heretofore been encountered in removing the rivets which secure the sickle bar head in place, but another aim of our invention is to provide for forcibly punching these rivets out.

A still further object is to provide a machine of rather simple and inexpensive construction, yet one which will be highly efficient and in every way desirable.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a side elevation.

Fig. 2 is a front elevation.

Fig. 3 is a central vertical longitudinal sectional view as indicated by line 3—3 of Fig. 2.

Figs. 4, 5 and 6 are horizontal sectional views on lines 4—4, 5—5 and 6—6 of Fig. 1.

Fig. 7 is a perspective view of a die plate hereinafter described.

The general construction herein disclosed may be considered as preferred and while this construction will be herein specifically explained, it is to be understood that within the scope of the invention as claimed, variations may be made.

The numeral 8 denotes a rigidly constructed standard having a base 9 adapted to be secured upon a horizontal support such as a work bench. At the front end of the base 9 is a forwardly projecting stationary jaw or work support 10 from which a flange 11 preferably projects downwardly to lie against the edge of the support. The standard 8 is provided with a straight front side 12 formed with a central longitudinal groove 13, and lying against said side 12, is a vertically elongated slide 14 which is formed between its ends with a central longitudinal slot 15. At the lower end of this slot, slide 14 is provided with a rib 16 slidable in the groove 13. A suitably shaped block 17 constituting a fixed jaw, is disposed for the most part in front of the slide 14, being provided with flat rear faces 18 lying slidably against the flat front side of said slide. This block is also provided with a rearwardly projecting rib 19 which is slidably received in the slot 15, the rear side 20 of said rib 19 being reduced and snugly received in the groove 13. Two studs 21 and 22 are passed rearwardly through appropriate openings in the block 17 and are threaded into sockets in the standard 8 for rigidly securing said block to said standard so that in addition to constituting a stationary jaw, said block co-

operates with said standard in slidably mounting the slide 14.

Resting removably upon the upper end of the block 17, is a rectangular die plate 23 having a cylindrical stud 24 received in a socket 25 in said block. One edge of the plate 23 abuts a shoulder 26 on the block 17 to hold said plate against turning about the stud 24 as a pivot. The opposite edge of block 23 is inwardly spaced from an upstanding flange 27 with which the front portion of the block 17 is provided, the space between plate 23 and flange 27 constituting a channel 28 for a purpose to appear. At its inner side, the flange 27 is provided with an upwardly facing ledge 29 near the open upper side of the channel 28, and the function of this ledge will also be explained hereinafter.

Over the block 17, the slide 14 is provided with a forwardly projecting jaw 30 which is integral with or otherwise rigidly joined to said slide. Jaw 30 is provided with a flat front side 31 vertically alined with the outer side wall of the channel 28, for a purpose to appear. Above the jaw 30, the slide 14 is preferably provided with a transverse cutting blade 32 co-operable with a stationary blade 33 secured to the upper end of the standard 8. These blades may be used for cutting metal, upon insertion of such metal between them and depression of the slide 14. Preferably near one of its corners, the jaw 31 is provided with a downwardly projecting riveting stud 34 having a rivet head receiving cavity 35 in its lower end. This stud is removable, being preferably threaded into the jaw 30. Plate 23, beneath the stud 34, is provided with a rivet upsetting cavity 36 and the formations 37—38 in the upper side of said plate are for the purpose of receiving the previously upset ends of rivets while the end of one rivet is being upset. If the rivets be such that they require forcing against a flat surface to upset them, instead of forcing into a recess such as 36, the plate 23 is lifted and turned to dispose the flat face 39 under the stud 34. When this is done, the formation 40 will receive a previously upset rivet end while the end of another rivet is being similarly upset.

The channel 28 above described is adapted to receive the rear edge of a sickle bar 41 as shown in Fig. 1. The rear end of any of the usual cutter sections 42 secured to the bar 41, is then disposed against the ledge 29 as shown, with one side of the section 42 lying against the flat front end 31 of the jaw 30. With the parts so positioned, forcible depression of the slide 14 will cause jaw 30 to force the sickle bar 41 further into the channel 28 while the section 42 is held against descent by the ledge 29. Consequently, all of the rivets 43 securing the section 42 to the sickle bar 41 will be sheared.

For then removing the sheared rivet portions from the openings in the sickle bar 41, a punch 44 is carried by and projects downwardly from the slide 14. The sickle bar is placed upon the jaw or support 10 with a rivet portion to be removed disposed in alinement with the opening 45 in said jaw or support. Then, upon depression of the slide 14, the punch 44 will remove said rivet portion. Preferably the upper end of punch 44 is adjustably threaded at 46 into the lower end of the slide 14. This punch is also of advantage in punching out the rivets which attach the usual head to the sickle bar, the operating means for the slide 14 being of such nature as to readily depress said slide with the necessary force for performing this operation or for shearing the sections 42 from the sickle bar 41 as above described.

In the present showing, the lower end of slide 14 is provided with a forwardly projecting integral lug 47 having a vertical opening 48 into which the upper end of a vertical screw 49 is adjustably threaded. The lower end of this screw is provided with a knurled head 50 whose upper side constitutes a thrust shoulder for the slide 14. A thrust member or second slide 51 is disposed below the slide 14 and is provided with a rib 52 slidably received in the groove 13 of the standard 8. This thrust member or slide 51 is formed with an opening 53 alined with the opening 48, said opening 53 slidably and rotatably receiving a smooth portion 54 of the screw 49. The member 51 is formed with an additional opening 55 through which the punch 44 passes, and a set screw 56 is provided for securing said member 51 to said punch when it is desired that the two slides 14—51 shall move upwardly as a unit. When the slide 14 is being depressed to perform work however, this set screw is loosened.

A long-handled operating lever 57 is fulcrumed at its front end in a kerf 58 in the lower end of the blocks 17, the fulcrum being denoted at 59. Near this fulcrum, lever 57 is pivoted at 60 to the upper ends of two strong links 61, the lower ends of these links being pivoted at 62 to the lower slide or thrust member 51. When the parts stand about as shown in Figs. 1 and 3 and slide 14 is supported in such position by the work to be acted upon, depression of lever 57 causes links 61 to thrust downwardly upon the lower slide or thrust member 51. This member 51 in turn thrusts against the thrust shoulder or head 50 of the screw 49 thus exerting downward force upon the slide 14 to perform the desired work. The screw 49 may be adjusted to vary the space between the two slides 14—51 and hence pivot 60 may be allowed to have any desired relation with a vertical line passing through the fulcrum 59, when the actual work of depressing the

slide 14 is started. When work is being accomplished requiring unusually strong downward pressure upon the slide 14, screw 49 is adjusted so that pivot 60 is only slightly in front of a vertical line passing through the pivot 59, when the work is started. Consequently, upon depression of lever 57 further, pivot 60 moves downwardly a very small amount, correspondingly moving the thrust member 51, the screw 49 and the slide 14. Great power however is produced by this operation. When the machine is used for a purpose not requiring so much power, screw 49 may be adjusted so that pin 60 will be further in advance of a line passing through the fulcrum 59, when the actual work of depressing the slide 14 starts. Hence, upon depression of lever 57, slide 14 will be downwardly moved a greater distance than with the adjustment previously described. If the work be such that more than one depression of lever 57 is necessary to move slide 14 downwardly the required amount, said lever is depressed once after making the proper adjustment of the screw 49 and is then raised, during which movement the links 61 raise the thrust member 51 from the head 50. The screw 49 is then turned upwardly, for instance a half revolution, and lever 57 is again depressed, with the result that the thrust member 51 engages the head 50, pulls downwardly upon the screw 49 and again lowers the slide 14. This sequence of operations may be repeated as many times as necessary to depress the slide 14 to the required extent and it will be seen that by advancing or depressing this slide in the step-by-step manner explained, the maximum leverage of the operating means 57—59—60—61 may be utilized in effecting each step of depression. Consequently, work can be accomplished which could not be done with a machine in which there was less reduction between the operating lever or the like and the work-performing member. Whenever slide 14 has been finally lowered to the required extent to complete an operation, the set screw 56 is tightened. Hence, upon the next raising of the lever 57, the corresponding raising of the member 51 will cause upward forcing upon the punch 44 and upward return of the slide 14.

Preferably employed in connection with the features above described, is an additional shearing tool 63 having an adjustable threaded connection 64 with the lower end of the screw 49. This tool may be used for rivet cutting or any other desired purpose.

If desired, the upper portion of the machine may be used as a vise. When this is to be done, the stud 34 is removed and if desired, the die plate 23 is also detached. Any work to be held, may then be positioned between the jaws 17—30 to be tightly held thereby. By means of the screw 49, proper adjustment may be made so that the pivot pin 60 will snap past dead center when lever 57 is completely depressed, thereby locking the slide 14 in the position at which the work is tightly held between the jaws 17—30.

To remove an inferior cutter section 42 from the sickle bar 41, these parts are positioned as shown in Fig. 1 and the lever 57 is operated to depress the jaw 30. If desired, several depressions of this lever and adjustments of the screw 49 may be employed to depress jaw 30 in a step-by-step manner with great power. Bar 41 is forced downwardly into the channel 28 by depression of the jaw 30, thereby shearing the rivets 43. The sheared rivet portions still remaining in the openings of the bar 41 may then be removed by the punch 44. When a new cutter section is substituted for that removed, its rivets may be upset quickly and easily by co-action of the riveting stud 34 with the proper portion of the die plate 23. Whenever the head is to be removed from the sickle bar, the punch 44 may be used for performing the entire operation of punching out the rivets, including the operation of punching entirely through the rivet heads. This operation is permitted due to the tremendous force obtainable from the machine by successive operations of the hand lever 57 and adjustments of the screw 49 after the downward movements of said lever.

While, as above stated, the construction shown may be considered as preferred, attention is again invited to the fact that within the scope of the invention as claimed, variations may be made.

We claim:—

1. A machine of the class described comprising a stationary work support, a work-performing member adapted to be advanced step-by-step toward said support, said work-performing member having a thrust shoulder transverse to its line of movement, a thrust member co-operable with said shoulder, means for first moving said thrust member to thrust against said shoulder and advance said work-performing member one step and for then withdrawing said thrust member from said shoulder, and means whereby said shoulder and said thrust member may then be relatively adjusted again into contact with each other in readiness for advancing said work-performing member a second step in the same direction.

2. A machine of the class described comprising a stationary work support, a work-performing member adapted to be advanced step-by-step toward said support, a screw connected with said work-performing member for adjustment in the direction of movement thereof, said screw having a thrust shoulder, a thrust member co-operable with

said shoulder, and means for first moving said thrust member to thrust against said shoulder and advance said work-performing member one step and for then withdrawing said thrust member from said shoulder, whereby said screw may be adjusted to dispose its shoulder again in contact with said thrust member in readiness for advancing said work-performing member a second step in the same direction.

3. A machine of the class described comprising a standard, a jaw-carrying slide lying against one vertical side of said standard, a stationary block constituting a stationary jaw, said block being secured to said standard and having portions engaging the slide and co-operating with said standard in mounting said slide, a second slide engaging the standard in spaced relation with said jaw-carrying slide, a lever fulcrumed to said block, a link connecting said lever with said second slide for operating the latter, and an adjustable operating connection between the two slides for vertically adjusting them toward and from each other.

4. A machine of the class described comprising a standard, a vertically elongated jaw-carrying slide lying against one side of said standard and having a longitudinal slot, a block constituting a rigid jaw, said block lying against the outer side of said slide and having a vertical rib received in said slot and secured to said standard, a second slide engaging the standard in spaced relation with said jaw-carrying slide, a lever fulcrumed to said block, a link connecting said lever with said second slide for operating the latter, and an adjustable operating connection between the two slides for vertically adjusting them toward and from each other.

5. A machine of the class described comprising a standard having a rigid jaw, a slide mounted for vertical movement on said standard and having a jaw co-operable with said rigid jaw, a second slide engageing said standard for vertical movement, the two slides being provided with vertically alined openings, and a vertical screw swiveled in one of said openings and threaded into the other of said openings for vertically adjusting the slides toward and from each other.

6. A machine of the class described comprising a standard, a jaw-carrying slide lying against one vertical side of said standard, a stationary block constituting a stationary jaw, said block being secured to said standard and having portions engaging the slide and co-operating with said standard in mounting said slide, a lever fulcrumed to said block, and operating connections between said lever and said slide.

7. A machine of the class described comprising a standard, a vertically elongated jaw-carrying slide lying against one side of said standard and having a longitudinal slot, a block constituting a rigid jaw, said block lying against the outer side of said slide and having a vertical rib received in said slot and secured to said standard, a lever fulcrumed to said block, and operating connections between said lever and said slide.

8. A machine of the class described comprising a standard having an upper rigid jaw and a lower rigid jaw, an upper and a lower slide mounted on said standard, said upper slide having portions co-operable with said upper and lower jaws respectively, means for depressing said lower slide, and an adjustable operating connection between the two slides for vertically adjusting them toward and from each other.

9. A structure as specified in claim 8; said adjustable connection consisting of a vertical screw swiveled in the lower slide and adjustably threaded into the upper slide, and a vertical tool adjustably threaded into the lower end of said screw for co-action with said lower jaw.

10. A structure as specified in claim 8; the portion of said upper slide co-operable with said lower jaw consisting of a vertical tool having a threaded vertically adjustable connection with said upper slide, said lower slide having an opening through which said tool passes slidably.

11. A machine for shearing the conventional sections from a sickle bar, comprising a jaw having a channel to receive the rear edge of the sickle bar, said jaw having a ledge at one side of said channel to abut the rear end of one of the sections, a second jaw opposite said channel, said second jaw having one face to abut the front edge of the sickle bar and another face to lie against the inner side of one of the sections, and means for relatively moving said jaws to cause further forcing of the sickle bar into said channel while the section is held by said ledge, thereby shearing the rivets connecting the section and sickle bar.

In testimony whereof we have hereunto affixed our signatures.

ANDREW JOHNSON, JR.
GEORGE F. WORTHINGTON, SR.