

D. S. STOVER.
CUTTING AND PUNCHING MACHINE.
APPLICATION FILED NOV. 22, 1905.

930,433.

Patented Aug. 10, 1909.
4 SHEETS—SHEET 1.

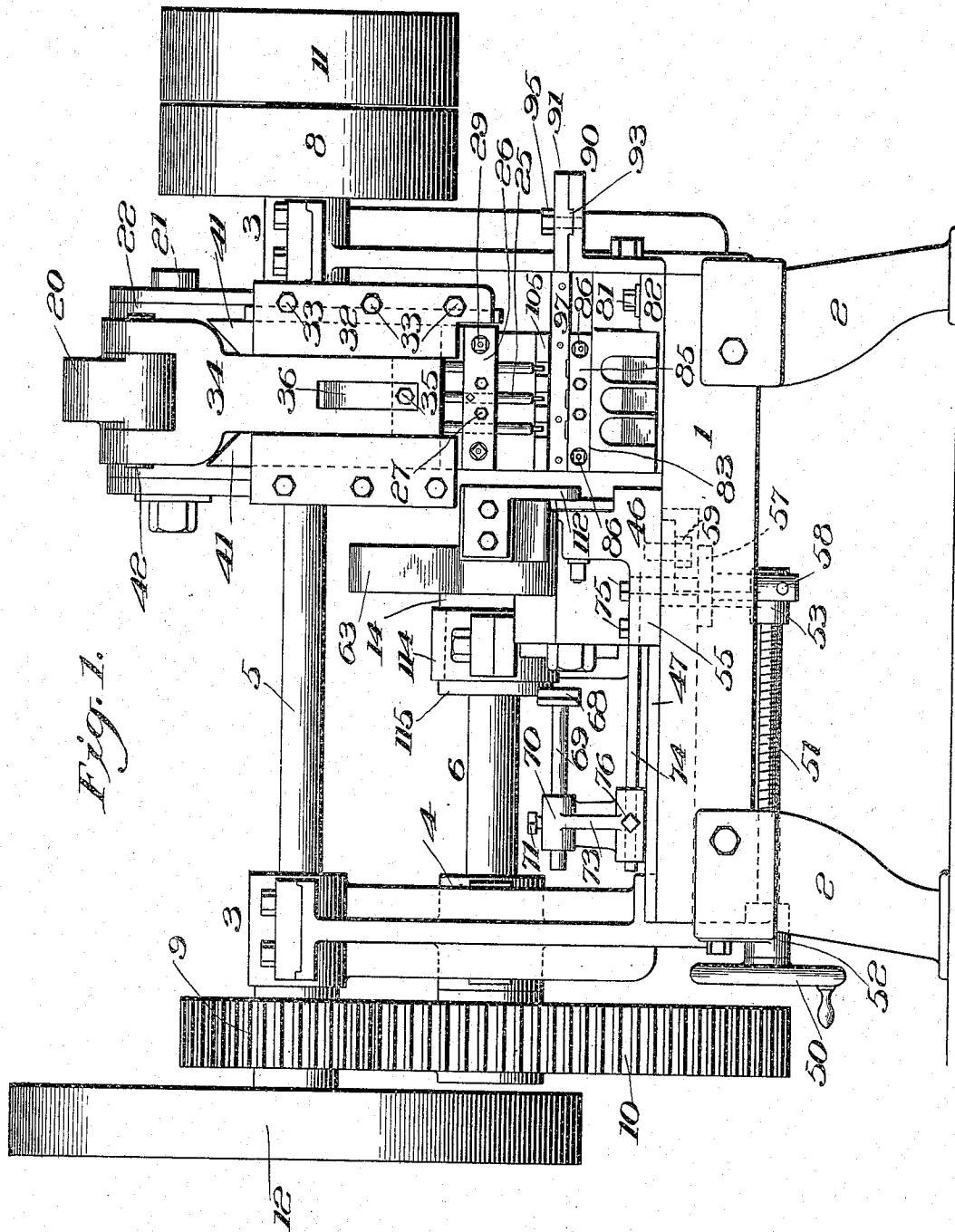


Fig. 1.

WITNESSES:

Allan H. Frost.
J. Rose Millward

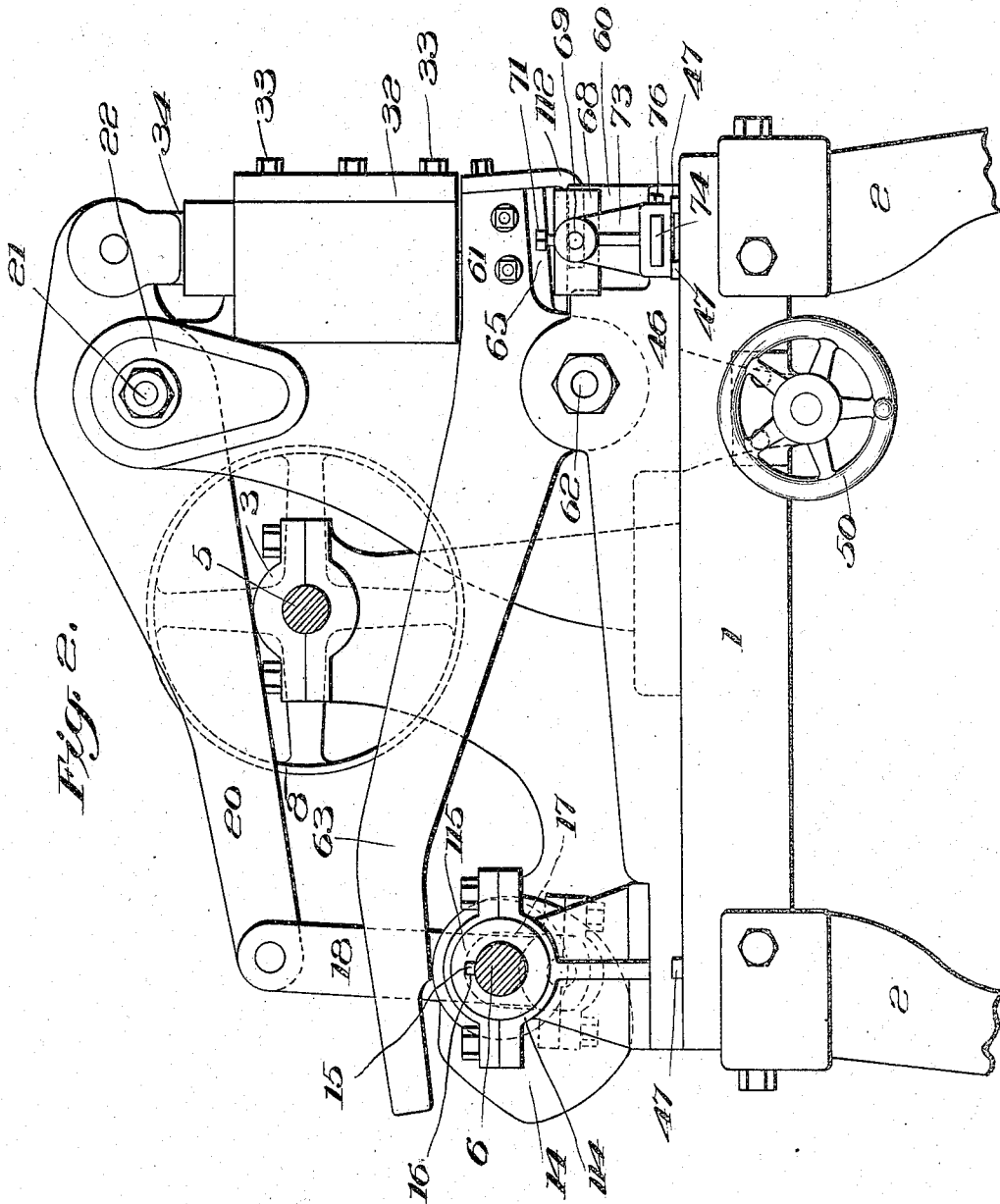
Lewis S. Stover INVENTOR
BY *Alfred Wilkinson* ATTORNEY

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WITNESSES:

Alfred J. Pross.
Rose Millward.

Dwight S. Stover INVENTOR

BY HIS ATTORNEY

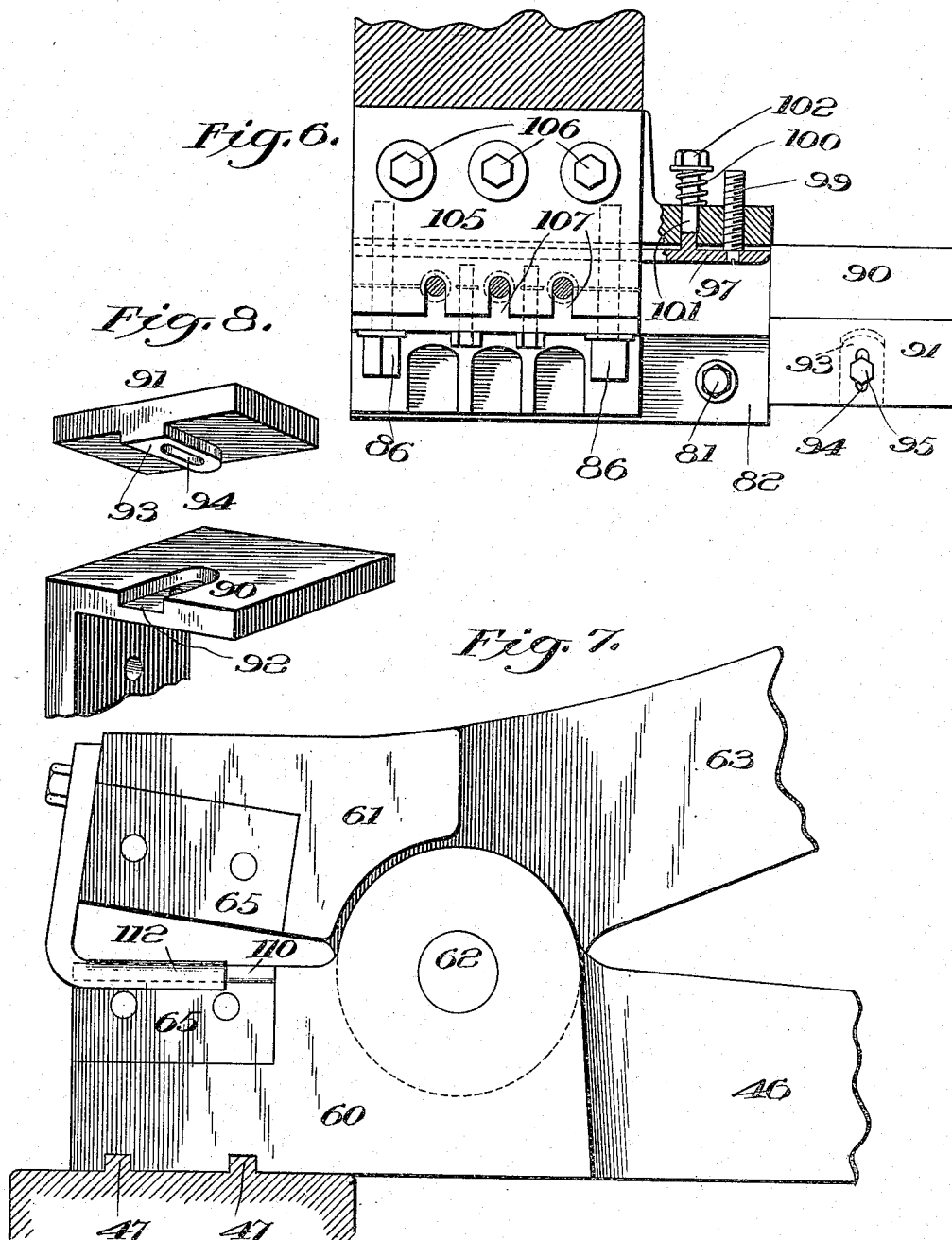
Alfred Wilkinson

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4 SHEETS—SHEET 4.



WITNESSES:

Allan H. Foose.
J. Ross Millward.

Davis S. Stover INVENTOR

BY *His* ATTORNEY *Alfred Wilkinson*

UNITED STATES PATENT OFFICE.

DAVIS SHULER STOVER, OF AMSTERDAM, NEW YORK.

CUTTING AND PUNCHING MACHINE.

No. 930,433.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed November 22, 1905. Serial No. 288,576.

To all whom it may concern:

Be it known that I, DAVIS SHULER STOVER, citizen of the United States, residing at Amsterdam, in the county of Montgomery and State of New York, have invented a new and useful Cutting and Punching Machine, of which the following is a specification.

My invention relates to a new and improved machine for simultaneously cutting and punching flat steel bars used in springs for wagons and for other purposes. Heretofore such bars have been cut to length in one machine and punched in another, but by my invention I have produced a machine in which both operations are performed continuously and rapidly on a large number of parts, with a gain in speed and in accuracy, and with a great saving in labor.

My new machine consists essentially of suitable shears and one or more punches, means for operating the shears and punches so that the bar is preferably cut immediately before it is punched, a supporting frame for the shears, means for adjusting said frame and shears with relation to the punches, a gage on the shear-frame and means for adjusting the gage with reference to the shears, a lifter for freeing the cut end of the leaf which sometimes binds on the lower shear blade owing to expansion under the punches, and adjustable guides and gages for guiding and centering the bar in proper position to be punched.

A desirable embodiment of my invention is shown in the drawings herewith, in which the reference numerals of the specification indicate the corresponding parts in all the figures.

Figure 1 is a front elevation of my machine. Fig. 2 is an end elevation taken from the left. Fig. 3 is a partial, vertical, longitudinal section. Fig. 4 is a vertical, cross section at right angles to Fig. 3. Fig. 5 is a portion of Fig. 3 enlarged. Fig. 6 is a partial, horizontal, cross section showing the punches and adjacent parts. Fig. 7 is an enlarged side elevation of a portion of the shears and the lifter. Fig. 8 is a perspective view of the table and front edge gage separated.

In the figures, 1 indicates the bed-plate carried on legs 2, 2, or otherwise suitably supported.

3 and 4 are bearings on the frame respectively for the driving shaft 5 and the main shaft 6, operated by any suitable power applied to the driving shaft through usual pul-

ley 8 and communicated therefrom to the main shaft through pinion and gear 9, 10.

11 and 12 are respectively the usual loose pulley and fly-wheel.

On the main shaft 6 is arranged the shear-cam 14 turning therewith, but arranged to slide thereon by means of feather and spline 15 and 16.

17 is a crank on the main shaft connected by rear connecting rod 18 to punch lever 20, journaled on shaft 21, or otherwise suitably journaled, between the upper ends of punch-heads 22, suitably bolted to the bed-plate.

The punches 25, of which three are here shown, are first clamped between punch-holders 26 by suitable bolts as 27, and these assembled parts are secured in position by bolts 29 in lower rabbeted end of the plunger 31, with the ends of the dies engaging with the plunger as best shown in Fig. 4. Sometimes a set-screw 31 is arranged in the outer punch-holder to engage with the middle punch, where three are used.

The plunger moves in guide-ways formed on the front of the head by means of guide-plates 32, secured in position by bolts 33, and is connected to the lower end of the front connecting rod 34 by means of cross-pin 35 and strap 36, passing through opening 37 in said rod, formed to receive the strap. As best shown in Fig. 4, said rod fits snugly in the upper end of the plunger with a knuckle joint, permitting the rod to swing slightly, while the plunger and punches move vertically. This rod 34 fits between the upwardly extending ends 41 of the plunger and is hinged to the front end of lever 20, as by pin 42.

The shear-frame 46 is fitted to guide-ways 47 in the bed-plate, and is laterally adjustable therein to vary the relation of the shears to the punches, by means of the hand-wheel 50 and the screw threaded rod 51 fitting bearing 52 on the bottom of the main frame and having its threaded end engaging with a threaded lug 53 downwardly depending from the shear-frame and secured thereto as by bolt 59. When the shears have thus been adjusted at the proper distance from the punches for the length of bar to be cut, the shear-frame is locked against accidental displacement by vibration, etc., by means of a locking bolt 54, engaging by its threaded upper end in flange 55 on the shear-frame and downwardly depending through a laterally extending slot 56 in the bed-plate against which it bears, on

the underside by means of an integral shoulder 57 on said bolt and is adjusted by means of a handle 58, conveniently reached on the under side of the bed-plate. The screw may be loosened, permitting the desired adjustment, and then may be tightened, securely clamping the shear-frame and the shears in the desired position.

The shears consist of two blades supported on the shear-frame, the fixed lower blade 60 and the upper blade 61, journaled on fulcrum 62 and having a rearwardly extending lever 63 with which engages the shear cam 14 to operate the shears. To both the upper and lower blades are bolted the detachable cutters 65 65.

On the shear-frame is carried at the left of the shears the adjustable gage 68 to fix the length at which the bar shall be cut after it has been punched. This gage is carried on a rod 69 adjustably fitted to bearing 70 provided with clamping screw 71. The bearing is on a suitable standard 73 fitted to be moved laterally, if desired, on a supporting bar 74 bolted on the shear-frame as by bolts 75 and clamped on said bar by a suitable clamping bolt 76. The set-screw may be omitted and the gage fixed solid on its said standard.

Below the punches is arranged the die-block 80, secured in position on the bed-plate as by suitable bolt 81 through flange 82, and adapted to carry on its front shelf 83 in alinement with the respective punches, the dies 84 clamped in position between die-holders 85 and then bolted in place as one part by bolts 86, so that they can be removed and changed like the punches. The perforations 87 through the dies are made continuous through the shelf to carry off the waste punchings onto incline 88, thence to the floor or suitable receptacle as best shown in Fig. 4. It will be noticed that said perforations gradually increase downwardly, that the punchings may drop out easily.

Level with the upper surface of the dies is bolted on the right of the machine the table 90 carrying the front edge-gage 91 for the bar, which may be desirably constructed as best shown in Fig. 8. The front edge of this table is provided with an inwardly extending groove 92. The edge-gage 91, resting on the table, is provided with a tongue 93 fitting said groove, and with a lateral slot 94 through the tongue. By means of bolt 95 the edge-gage may be secured in any position in which it may be adjusted, outwardly or inwardly, to guide bars of varying widths.

Generally the bolt holes must be formed in the longitudinal axis of the plate, and, to guide the bar 96 correctly in the machine, there should be also a rear gage-plate to center the bar, which is best shown in Figs. 4 and 6. Supported on the die-block and behind the punches is a suitable rear gage-plate

97, which may be a narrow plate set on edge, or a bar, outwardly adjustable by means of the screws 99, and held back in position by means of a suitable spring which may be desirably arranged as shown in Fig. 6, that is a spiral spring 100 threaded on spindle 101; said spindle is connected in front to the gage-plate and extends rearwardly through the rear upper wall of the die-block. A nut 102 is threaded to the rear end of the spindle to confine the spring and to afford a shoulder for its engagement.

On the upper surface of the die-block is arranged the stripper 105 bolted in position by bolts 106 and provided in its front edge with suitable recesses 107 for the passage of the punches. The function of this stripper is to free the bar from the punches, after punching.

The right face of the lower cutter is provided with a recess 110, having a straight upper portion and a curved lower portion, that is gradually diminishing in depth at its lower portion, whereby it results that, when the leaf is cut, it is forced downwardly and, by means of the curve, slightly toward the punches, it being understood that the shears operate immediately before the punches. This is necessary because the effect of the punches is slightly to expand the metal and to elongate the bar, whereby if its cut edge were set against an absolutely straight surface it would bind, and break one or more punches when being withdrawn. But as it is forced downwardly against a curved surface, it is afforded sufficient room to expand and to be freed by the lifter 112, bolted to the upper blade, as shown in Figs. 1 and 7. When the upper blade is raised by the weight of its lever, the lifter is also raised to strike against the cut end of the bar. The cam may desirably be so formed that the drop of the lever and the rise of the lifter will at first be quick to give a sharp but light releasing blow to the bar end, but then to move more slowly corresponding with the movement of the punches, until at, or about, the highest point of the movement, the bar is raised clear of the lower blade and in position to be moved in against the gage, when, at the next movement of the parts, the length first punched is cut from the main bar, and the second length is punched. The upper right edge of the lifter is preferably curved as shown in Figs. 3 and 7, the better to guide a bar over the lower blade and cutter. It will be understood that said recess in the lower blade (or in its detachable cutter) is of trifling depth, but its function, to permit freeing of the bar end and to prevent breaking of the punches, is important.

The cam may be moved along the main shaft, to maintain its operative position under the upper blade lever by any suitable means, for instance it may be arranged in a

bearing 114 on the shear-frame, made in two parts to receive it, and maintained in position therein by shoulder 115.

It will be understood that the bed-plate, legs, shaft bearings, and head make up the main frame, which may be of any suitable form, but preferably arranged as here shown, with the punches and cutters in front, and the shafts, crank, cam etc. toward the rear.

The construction of machine and arrangement of parts here shown may be varied without departing from the spirit of my invention, and it will be understood, that various parts of the machine may be used for similar purposes in other connections.

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

1. In a cutting and punching machine for bars for springs, the combination with a suitable supporting main frame, of vertically operating punches arranged thereon, a shear-frame arranged on the main frame at one side of the punches, means to adjust said shear-frame toward and from the punches, shears on the shear-frame, a gage on the shear-frame at the opposite side of the shears from the punches, means to adjust said gage toward and from the shears, and means to operate the shears and punches, whereby the bar is cut immediately before it is punched.

2. In a machine for cutting and punching bars, the combination with a suitable main frame for supporting the parts, of a vertically operating plunger arranged on the front of the machine, a punch or punches on the plunger, shears arranged on the frame at one side of the plunger, a driving shaft journaled at the back of the machine, a crank on the shaft, connections between the crank and the plunger to operate the plunger and the punch, a cam on the shaft to operate the shears, and means to operate the shaft.

3. In a cutting and punching machine for bars, the combination with a suitable main frame, of a vertically operating plunger on the front of the frame, punches on the plunger, a fixed shear blade on the frame at one side of the punches, a movable shear blade arranged to cooperate with the fixed blade, a rearwardly extending lever on the movable blade, detachable cutters on the two blades, said cutters being arranged in alinement with the punches, parallel main and driving shafts journaled on the frame toward the rear, means to operate the driving shaft, connections between the shafts, a crank on the main shaft, connections between the crank and the plunger to operate the plunger and the punches, and a cam on the main shaft to engage with said lever to operate the shears.

4. In a cutting and punching machine for bars, the combination with a main frame, of punches on the frame, an adjustable shear-frame on the main frame at one side of the

punches, means to adjust the shear-frame toward and from the punches, a fixed shear blade on the shear-frame, a swinging blade journaled on the shear-frame and having a rearwardly extending lever, a driving-shaft journaled on the frame, a crank on said shaft, operative connections between the crank and the plungers, a cam bearing on the shear-frame fitted to receive said shaft, and a cam fitted to turn with and slide on said shaft by means of a feather and spline, said cam being fitted to said cam bearing and connected to move therewith by means of a shoulder, to be maintained in operative relation to said blade lever.

5. In a cutting and punching machine, the combination with a main frame, of punches vertically operating thereon, a support below the punches for the bar to be cut and punched, a fixed shear-blade arranged at one side of the punches, an upper shear blade suitably journaled to cooperate with the fixed blade, a lifter connected to the upper blade and adapted to engage with the end of the cut bar to free it from engagement with the lower blade, and means to operate the punches and the shears.

6. In a cutting and punching machine, the combination with a main frame, of punches thereon, a support below the punches for the bar to be cut and punched, a lower fixed shear-blade arranged at one side of the punches, an upper shear-blade journaled on the lower blade, and means to operate the punches and the shears, said lower blade having a recess in its cutting edge to receive the cut end of the bar and the cutting edge of the upper blade.

7. In a cutting and punching machine, the combination with a main frame, of punches thereon, a support below the punches for the bar to be cut and punched, a fixed shear-blade at one side of the punches, a movable shear blade journaled to the fixed blade, and means to operate the punches and the movable blade, the cutting edge of the fixed blade being provided with a shallow recess to receive the cut end of the bar and the movable blade, said recess having its upper or first portion straight and its lower portion of gradually diminishing depth.

8. In a cutting and punching machine, for metallic bars, the combination with a main frame, of punches thereon to be operated to punch the bar, shears on the frame to cut the bar, said shears being composed of a fixed lower blade provided with a recess in its edge and of a suitably journaled upper blade, means to operate the punches and the upper blade, and means to engage with the cut end of the blade and free it from the lower blade.

9. In a cutting and punching machine for steel bars, the combination with a main

frame having a bed-plate, of vertically operating punches arranged thereon, a shear-frame arranged at one side of the punches and arranged to be adjusted laterally on 5 guide-ways on the main frame, a screw-threaded lug downwardly depending from the shear-frame below the bed-plate, a bearing on the main frame, a rod fitted to said bearing and having a threaded end fitted to 10 said threaded lug, a hand wheel on the outer end of the rod, means to lock the shear-frame in position consisting of a locking-bolt extending downwardly through a slot in the bed-plate and having a screw threaded end 15 to engage with the shear-frame, a shoulder to engage with the under surface of the bed-plate and a handle on its lower end, shears on the shear-frame and means to operate the shears and the punches.

20 10. In a cutting and punching machine, the combination with a main frame, of a die-block on the frame having a front recess and a rear upper wall, die-holders and dies arranged in the recess, vertically operating 25 punches arranged on the frame above the dies, means to operate the punches in co-operation with the dies, a table on the right of the frame arranged substantially level with the dies and die-holders and having a 30 groove inwardly extending from its front edge, an edge-gage arranged on the table in front of the line of punches and having a slotted tongue fitting the groove, a bolt arranged in said slot and a hole in the table, a 35 rear gage-plate arranged on the die-holder behind the punches, screws to adjust said rear gage-plate forwardly toward the punches, a spindle on the gage-plate extending through the rear upper wall of the die- 40 holder and a spring on said spindle to draw the gage-plate rearwardly and maintain it in position, substantially as shown.

11. In a cutting and punching machine, 45 the combination with a suitable supporting frame, of vertically operating punches arranged thereon, a die-block arranged below the punches, dies on the die-block corresponding to the punches, a shear-frame on the supporting frame at one side of the 50 punches, means to adjust the shear-frame toward and from the punches, shears on the shear-frame, a gage on the shear-frame at the opposite side of the shears from the punches, means to adjust the gage toward and from 55 the shears, means to operate the shears and the punches, a table on the opposite side of the supporting frame from the shears having its surface substantially level with the surface of the die-block, an edge-gage adjustably 60 arranged on the table in front of the line of the punches, means to adjust said edge-gage toward and from the line of the punches and to secure it in position, a gage-plate arranged on the die-block rearwardly of the punches, 65 and means to adjust said gage-plate toward

and from the punches and to secure it in position.

12. In a machine of the character described, the combination with a main frame for supporting the parts, of a vertically 70 operating plunger thereon, punches on the plunger, a die-block arranged below the plunger and adapted to support the bar to be punched, perforated dies arranged on the die-block in alinement with the punches, a 75 table arranged on one side of the machine having its surface level with the surface of the die-block, an edge-gage adjustably arranged on the table in front of the line of the punches, means to adjust said edge-gage and 80 to clamp it in position, a rear gage-plate arranged on the die-block behind the dies, means to adjust said gage-plate and to secure it in position and means to operate the punches.

13. In a machine of the character described, means for cutting the bars consisting of a suitable support for the parts, a lower blade fixed thereon, an upper blade suitably 90 journaled to cooperate with the lower blade, a lifter on the upper blade adapted to extend under, and engage with the bar being cut to free it from the lower blade, and means to operate the upper blade and the lifter.

14. In a cutting machine, having in combination a main frame, shears on the frame 95 to cut the bar, said shears being composed of a fixed, lower blade having a recess parallel to its cutting edge to receive the cut end of the bar and the upper blade, and of said upper 100 blade journaled to the lower blade, and means to reciprocate the upper blade.

15. In a cutting and punching machine, the combination with a main frame, of punches on the frame, on adjustable shear 105 frame arranged on the main frame, adjusting means for said frame, a fixed shear blade on the shear frame, a swinging blade to cooperate therewith and having a rearwardly extending lever, a cam shaft on the 110 main frame, a cam adjustably mounted on said shaft to engage with the rear extension of said lever, a lifter connected to the swinging blade adapted to free the cut bar from engagement with the lower blade, said 115 cam being formed and arranged to operate the lifter to loosen the bar from the lower blade with a blow and then to rise gradually, and means to operate the parts.

16. In a machine for cutting and punching 120 bars, the combination of a supporting frame, punches arranged on the frame, means to operate the punches to punch the bars, an end gage, shears arranged to sever each punched portion from the succeeding portion 125 when the latter is in position to be punched, and means to adjust both the gage and the shears in relation to the punches to accommodate bars of different lengths.

17. In a machine for cutting and punching 130

bars, the combination of a supporting frame, punches arranged on the frame, means to operate the punches to punch the bars, shears arranged to sever each punched portion from the box when said punched portion has been moved forward clear of the punches and the succeeding portion is in position to be punched, an end gage, adjusting and securing means for said gage and for the shears, means for operating the punches and the shears to sever the punched portion immediately before the succeeding portion is punched.

18. In a machine for cutting and punching bars, a supporting frame, punches arranged on the frame, a support below the punches, dies on the support to coöperate with the punches to punch the bar, a shear support arranged to slide on the main frame, a fixed shear blade carried on the shear support, an operative shear-blade journaled on the fixed blade, said shears being arranged to sever each punched portion from the bar when said

punched portion has been moved forward clear of the punches and the succeeding portion is in position to be punched, an end-gage to engage the bar end when in that position, adjusting and securing means for the end-gage and shear-frame to adjust them in relation to the punches, a recess in the fixed shear-blade, said recess being toward the punches and having its edge portion straight and its inner portion of gradually diminishing depth, a lifter on the movable blade to release the bar from binding by engagement therewith on its up stroke, means for operating the shears, and means for operating the punches.

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

DAVIS SHULER STOVER.

Witnesses:

EDWARD A. McCAFFREY,
THOS. F. McCAFFREY.