C. BYRNE.

FEED SPACER.

APPLICATION FILED APR. 8, 1920.

1,382,623.

Patented June 28, 1921.

3 SHEETS—SHEET 1.

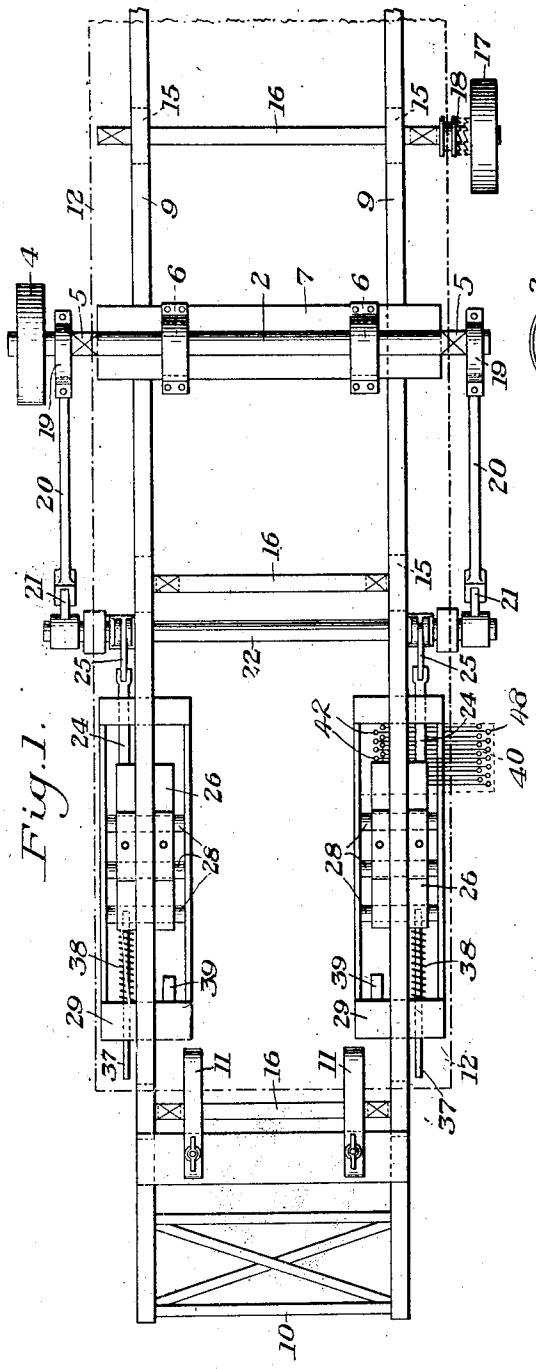


Fig. 1.

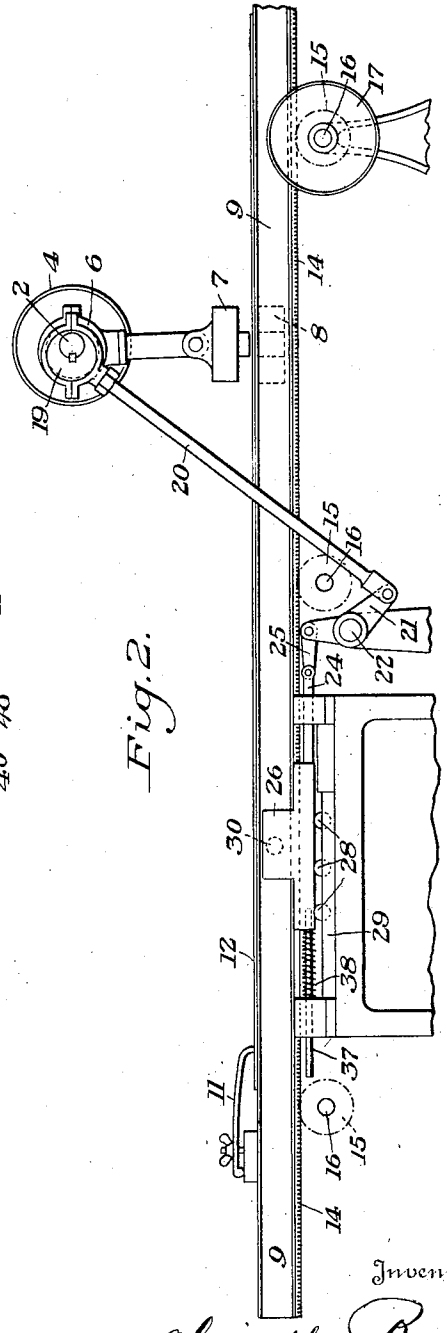


Fig. 2.

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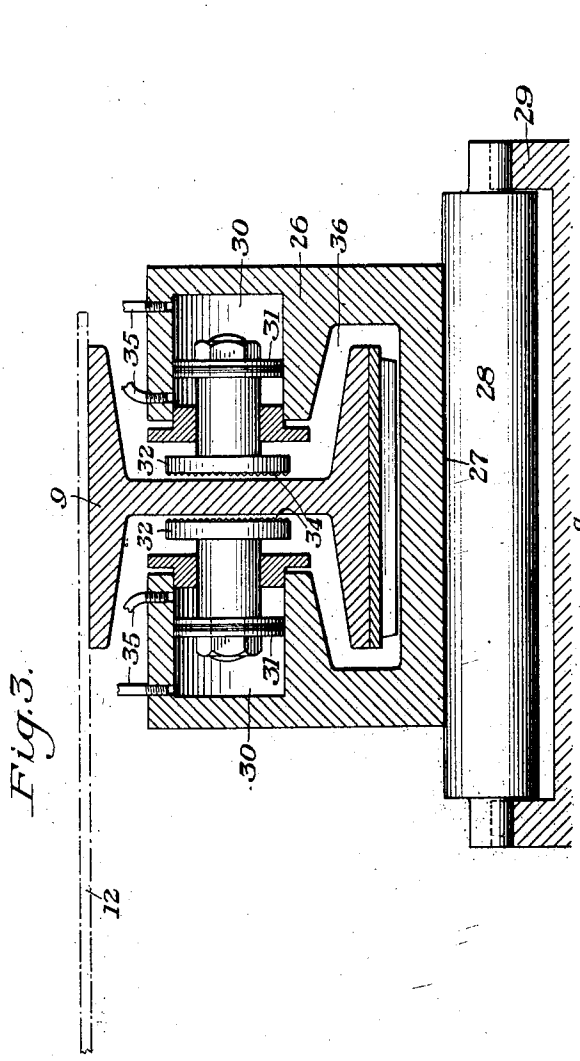


Fig. 3.

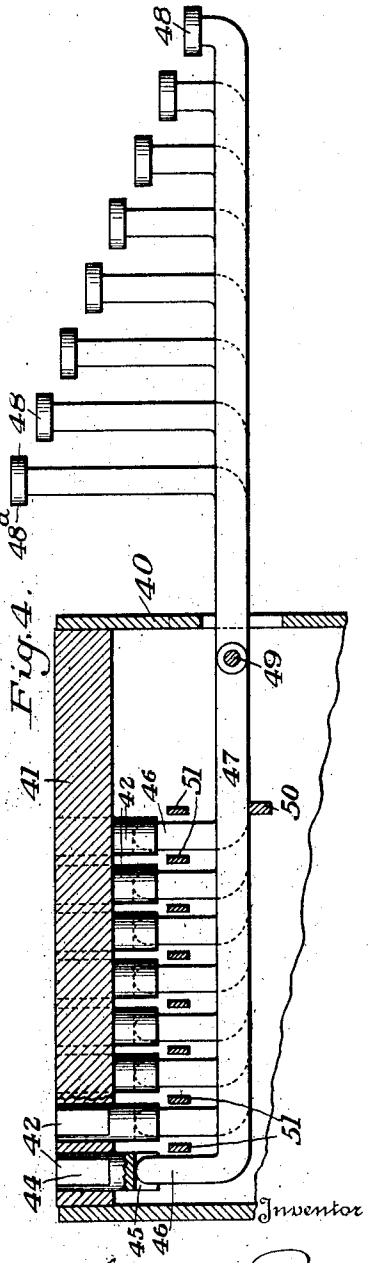


Fig. 4.

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3 SHEETS—SHEET 3.

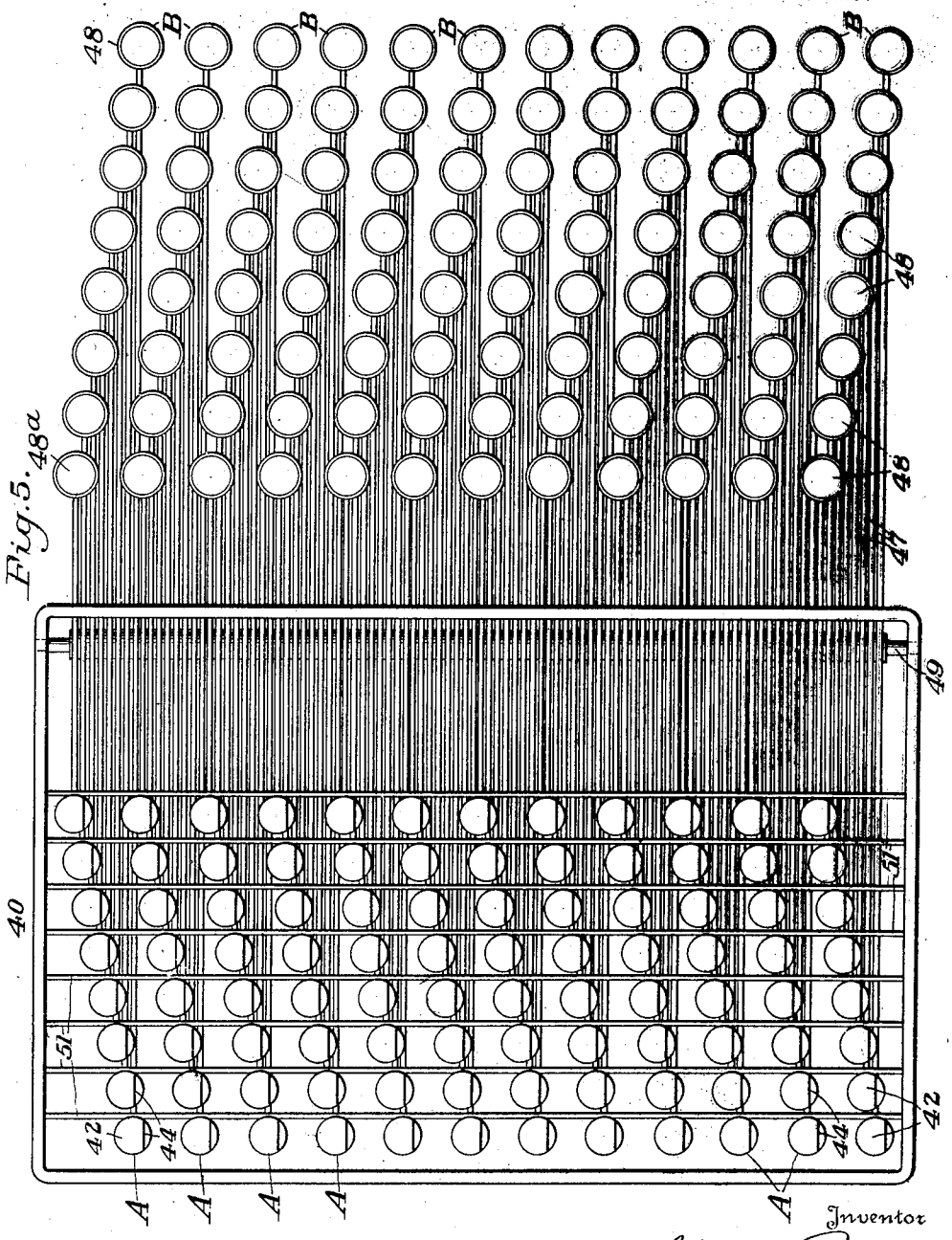


Fig. 5.

48a

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UNITED STATES PATENT OFFICE.

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FEED-SPACER.

1,382,623. Specification of Letters Patent. Patented June 28, 1921.

Application filed April 8, 1920. Serial No. 372,149.

To all whom it may concern:

Be it known that I, CHRISTOPHER BYRNE, a citizen of the United States, residing at Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Feed-Spacers, of which the following is a full, clear, and exact description.

The present invention relates broadly to feeding devices for metal working machine, and more particularly to a feed spacer adapted for use in connection with punching machines or presses.

The principal object of the present invention is to provide means for feeding the material being operated upon a predetermined distance for each operation of the punch.

Another object of the invention is to provide means for varying this amount of feed as may be desired, whereby the distance between successive holes, or rows of holes, produced by the punch may be varied to meet requirements.

Still another object of the invention is to provide means for moving the feed table step by step in one direction, with means for controlling the length of each of the step movements, and means for returning the same to its original position.

A further object of the invention is to provide means for positively moving the feed table in one direction, and independent means for producing a return movement of said positive acting means.

The foregoing and other objects, together with their attendant advantages, will be apparent as the invention becomes better understood, by reference to the accompanying specification and drawings forming a part thereof, it being premised that changes may be made in the various details and the manner of operation, within the scope of the appended claims, without departing from the spirit of the invention.

Figure 1 is a plan view, largely diagrammatic, illustrating my invention.

Fig. 2 is a side view of the mechanism illustrated in Fig. 1.

Fig. 3 is an enlarged sectional view through the table mover.

Fig. 4 is a side elevation, partly in section, of the mechanism for determining the length of each step movement of the feed table, and

Fig. 5 is a plan view of the construction illustrated in Fig. 4, the top plate being removed.

It is desirable, more particularly in connection with machines such as punches, to provide means for feeding the table which carries the material being operated upon, a predetermined distance for each operation of the punch. By means of the present invention a feed spacer or feed table moving device is provided, which may be adjusted at will to vary the amount of feed for each operation of the punch.

Referring more particularly to the drawings, there is illustrated, largely diagrammatically, a punching machine comprising a shaft 2 adapted to be driven by a pulley or the like 4 connected in any desired manner to a suitable source of power, not shown. The shaft 2 is journaled in bearings at 5 as is customary in constructions of this nature, and carries cams 6 for reciprocating the punches or punch holders 7. The frame of the machine which carries the bearings 5 also supports, in any well known manner, the die 8 coöperating with the punches.

The feed table employed in connection with the present punch is illustrated as comprising a main frame formed of longitudinally extending I-beams 9 connected by cross-braces 10 for imparting the necessary rigidity thereto. The table may be provided with clamps 11 adapted to coöperate with the sheet of material 12 being operated upon to clamp the same securely to the table.

In the preferred embodiment of my invention, each of the I-beams 9 has suitably formed thereon a rack 14, which racks cooperate with a series of pinions 15 carried by transverse shafts 16, by means of which the table is supported in its proper position. One of the shafts 16 may be provided with a pulley 17 and clutch 18, by means of which the shaft may be positively driven to reciprocate the feed table in either desired direction.

In addition to the cams or eccentrics 6, heretofore described, the shaft 2 is also provided with similar eccentrics 19 for reciprocating, during the operation of the punch, the links 20 which are connected to the bell crank levers 21 carried by the shaft 22 journaled in the frame of the machine The opposite end of each of the bell crank levers 21 is adapted to reciprocate one of the rods 24,

which rods are connected by links 25 to the bell cranks. These rods 24 provide means for positively moving the feed table in one direction through mechanism more particularly described hereinafter.

Coöperating with either one or both of the I-beams 9 of the feed table is a table mover. Each of the table movers, in case more than one is provided, may comprise a suitable casting 26 having a flat lower surface 27 adapted to be supported on antifriction bearings 28 journaled in the frame 29, as clearly shown in Fig. 3. Each of the castings 26 may have secured thereto, or formed therein, coaxially, oppositely disposed cylinders 30 adapted to receive the pistons 31 carried by the gripping members 32, which members may be formed with serrated or roughened faces 34 to securely grip the opposite sides of the I-beams 9 when forced into engagement therewith. Movement of the gripping members into and out of engagement with the I-beams may be produced by providing pressure inlets 35 for each of the cylinders, these pressure inlets communicating with each of the cylinders adjacent the opposite ends and on opposite sides of the pistons 31 as will be readily understood. Each of the castings 26 may also have formed therein openings 36 of sufficient size to permit the lower portion of the I-beams to easily pass therethrough out of contact with the casting, whereby the castings may be easily moved independently of the I-beams. By reference more particularly to Fig. 1 of the drawings, it will be seen that I have provided the castings with guide rods 37, each having one end secured in one of the castings, and the opposite end sliding through the frame 29. Intermediate the frame and the castings the rods may be provided with compression springs 38 constituting means for moving the table movers or castings in one direction. The frame 29 may also have formed thereon stops 39 effective for limiting the movement of each of the table movers.

From the foregoing, it is believed that the operation of my improved feed spacer will be obvious. During the operation of the punch, the cams 6 will reciprocate the punches while the cams 19 will reciprocate the rods 24 through the mechanism described. These rods 24, sliding freely in the frame 29, engage the table movers or castings 26, so that these table movers are positively operated in one direction. Assuming the eccentricity of the cams 19 to be such that the rods 24 have a reciprocation of six inches, the stops 39 will be positioned to prevent overthrow or overtravel of each of the table movers. Prior to the time that the castings 26 are engaged by the rods 24, fluid under pressure may be admitted through the outer inlets 35 of each of the cylinders 30 for forcing the gripping members into engagement with the sides of the feed table I-beams. Due to this construction, the table will be fed forwardly a distance corresponding to the movement of each of the table movers. At the end of the travel of the table movers, fluid pressure may be introduced into the opposite end of each of the cylinders 30 for withdrawing the gripping members out of engagement with the I-beams so that the compression springs 38 may operate to return the table movers to their original positions.

In order to vary the length of each feeding, or step-by-step movement, of each of the table movers, it is desirable to provide means for limiting the extent to which the movers are returned by the compression springs 38. For this purpose I have provided a comparatively simple device, illustrated more particularly in detail in Figs. 4 and 5. This stop mechanism may comprise a main frame 40 carrying a top plate 41 provided with a series of openings for the stops 42 slidable vertically therein. Each of the stops may have formed thereon a flat portion 44 adapted to contact with the end of the table mover engaged by the rod 24 when the device is placed in the position indicated in Fig. 1. The lower ends of the stops may be provided with transversely extending openings 45 adapted to receive the upturned ends 46 of the key bars 47, which key bars are provided with operating keys 48 at their opposite ends. All of the key bars may be journaled on a key shaft 49 in the frame 40, and may coöperate with a rest 50 also carried by said frame. The upward movement of the key bars may be limited by providing a series of stops 51 above the same. For the purposes of illustration, I have shown a stop mechanism adapted for use in a feed spacer having a maximum stroke of six inches, as before described. This mechanism may, however, be easily modified by increasing, diminishing or changing the location of the stops 42 so as to make the same adaptable for use with a feed spacer having any desired stroke. The present mechanism comprises ninety-six stops 42, so arranged that the flat faces 44 thereof of successive stops are spaced exactly one-sixteenth of an inch. By reason of this arrangement any desired return movement of the table movers from six inches to one-sixteenth of an inch may be produced.

A satisfactory arrangement of the stops 42 is illustrated more particularly in Fig. 5 of the drawings, as comprising twelve rows A, each containing eight stops. In such a construction each of the rows contains stops capable of controlling the return movement of the table within one-half inch, the first stop of each row being effective at $\frac{1}{16}$, $\frac{2}{16}$, $1\frac{1}{16}$ inches, etc., respectively, and the last stop of each row being effective at $\frac{1}{2}$, 1, $1\frac{1}{2}$

inches, etc., respectively. In order to equalize the amount of extension of each of the key-bars 47 on opposite sides of the key-shaft 49 I have connected the first stop of each row to the outside key 48 of each of the rows of keys B, and the last stop of each row with the inside key 48^a of each of the rows B, the intermediate stops being connected to the intermediate keys, as will be readily apparent.

During the operation of the machine, if it is desired to punch rows of holes every ½ inch, the inside key of the first row B of keys will be depressed so that the compression springs 38 are effective for returning the table movers only ½ inch. Under these conditions, the rods 24 for the maximum portion of their stroke will be out of engagement with the table movers, engaging the same only after they have traveled 5½ inches, as will be apparent. In like manner, any desired amount of travel may be imparted to the feed table by operating the proper key 48.

The advantages of the present invention arise from a construction in which means is provided for positively feeding the table in one direction and independent means is provided for feeding the first mentioned means independently of the feed table in the opposite direction.

Additional advantages of the present invention arise from means for controlling the extent of feed by regulating the return movement of each of the table movers, whereby the entire weight of the table is not transmitted to the stops.

I claim:

1. A feed spacer, comprising a metal working machine, means for operating the same, a feed table, means for securing the work thereon, feeding means for moving the table in one direction, and independent means for producing a return movement of said feeding means, substantially as described.

2. A feed spacer, comprising a metal working machine, means for operating the same, a feed table, feeding means for moving the table in one direction, and independent means for producing a return movement of said feeding means independently of said feed table, substantially as described.

3. A feed spacer, comprising a metal working machine, means for operating the same, a feed table, means for moving the table in one direction, and independent continuously acting means for producing a return movement of said feeding means, substantially as described.

4. A feed spacer, comprising a metal working machine, means for operating the same, a feed table, means for securing the work thereon, means for moving the table in one direction, and independent continuously acting means for producing a return movement of said feeding means independently of the feed table, substantially as described.

5. A feed spacer, comprising a feed table, a table mover, gripping members carried by said mover, means for positively operating said mover in one direction, means for forcing said gripping members into engagement with the feed table during such positive operation of the mover, and independent means for producing a return movement of the mover, substantially as described.

6. A feed spacer, comprising a feed table, a table mover, gripping members carried by said mover, means for positively operating said mover in one direction, means for forcing said gripping members into engagement with the feed table during such positive operation of the mover, and independent means for producing a return movement of the mover independently of the feed table, substantially as described.

7. A feed spacer, comprising a feed table, a table mover, a gripping member carried by said mover, means for positively reciprocating said mover in one direction, means for forcing said gripping member into engagement with the feed table during such reciprocation of the mover, and independent means for producing a return movement of the mover, substantially as described.

8. A feed spacer, comprising a feed table, a table mover, a gripping member carried by said mover, means for positively reciprocating said mover in one direction, means for forcing said gripping member into engagement with the feed table during such reciprocation of the mover, and independent means for producing a return movement of the mover independently of the feed table, substantially as described.

9. A feed spacer, comprising a metal working machine, means for operating the same, a feed table, feeding means for moving the table in one direction, means for producing a return movement of said feeding means, and means for varying the amount of said return movement, substantially as described.

10. A feed spacer, comprising a punch, means for operating the same, a feed table means for securing the work thereon, feeding means for moving the table in one direction for each operation of the punch, and independent means for producing a return movement of said feeding means, substantially as described.

11. A feed spacer, comprising a punch, means for operating the same, a feed table, feeding means for moving the table in one direction for each operation of the punch, and independent means for producing a return movement of said feeding means independently of the feed table, substantially as described.

12. A feed spacer, comprising a feed table,

a table mover, gripping members carried by said mover, means for positively reciprocating said mover in one direction, means for forcing said gripping members into engagement with the feed table during such positive reciprocation of the mover, independent means for producing a return movement of the mover, and means for varying the length of the return stroke, substantially as described.

13. A feed spacer, comprising a feed table, a table mover, gripping members carried by said mover, means for positively reciprocating said mover in one direction, means for forcing said gripping members into engagement with the feed table during such positive reciprocation of the mover, independent means for producing a return movement of the mover, and means adjustable at will for varying the length of the return stroke, substantially as described.

14. In a feed spacer, a feed table, a table mover comprising gripping members, and fluid pressure means for moving said members into and out of engagement with the feed table, substantially as described.

15. In a feed spacer, a feed table, a table mover, gripping members carried by said mover, means for operating said members, and means for operating said mover in opposite directions, substantially as described.

16. A feed spacer, comprising a table, a table mover, means for positively moving said mover and table in one direction, and independent means for moving said mover in the opposite direction independently of said table, substantially as described.

17. In a feed spacer, a table mover, a stop mechanism coöperating therewith, a series of independently operable stops in said mechanism, and means for operating said stops at will, substantially as described.

18. A feed spacer, comprising a table mover, an antifriction support for said mover, means for moving said mover in one direction, and independent means for moving said mover in the opposite direction, substantially as described.

19. A feed spacer comprising a metal-working machine, means for operating the same, a feed table, feeding means for moving the table in one direction, means for producing a return movement of said feeding means, and means for varying the amount of said return movement, said last mentioned means comprising a series of independently operable stops, and means for operating said stops at will, substantially as described.

20. A feed spacer comprising a feed table, a table mover, gripping members carried by said mover, means for positively reciprocating said mover in one direction, means for forcing said gripping means into engagement with the feed table during such positive reciprocation of the mover, independent means for producing a return movement of the mover and means for varying the length of the return stroke, said last mentioned means comprising a series of independently operable stops, and means for operating said stops at will, substantially as described.

21. In a feed spacer, a table mover, a stop mechanism coöperating therewith, a series of vertically movable stops in said mechanism, and means for moving said stops vertically at will, substantially as described.

22. In a feed spacer, a table mover, a stop mechanism coöperating with said mover to limit the movement thereof in one direction, a series of independently operable stops in said mechanism, and means operable at will for moving any of said stops into engagement with said mechanism, substantially as described.

In testimony whereof, I have hereunto set my hand.

CHRISTOPHER BYRNE.