United States Patent [19]

Vecchi

[11] **3,889,565**

[45] **June 17, 1975**

[54] **PUNCH PRESS SCRAP CUTTER**

[75] Inventor: **John C. Vecchi,** Natrona Heights, Pa.

[73] Assignee: **Oberg Manufacturing Co., Inc.,** Freeport, Pa.

[22] Filed: **Jan. 4, 1974**

[21] Appl. No.: **430,778**

[52] **U.S. Cl.** **83/255;** 83/228; 83/261; 83/923

[51] **Int. Cl.** **B26f 1/02;** B26d 5/26

[58] **Field of Search** 83/228, 255, 923, 637, 83/698, 261

[56] **References Cited**

UNITED STATES PATENTS

2,268,242	12/1941	Candee et al.	83/228 X
2,411,503	11/1946	Calleson et al.	83/923 X
3,046,825	7/1962	Thompson	83/698
3,440,910	4/1969	Scribner	83/637 X
3,589,221	6/1971	Deegan	83/923 X

FOREIGN PATENTS OR APPLICATIONS

462,244	1/1950	Canada	83/637

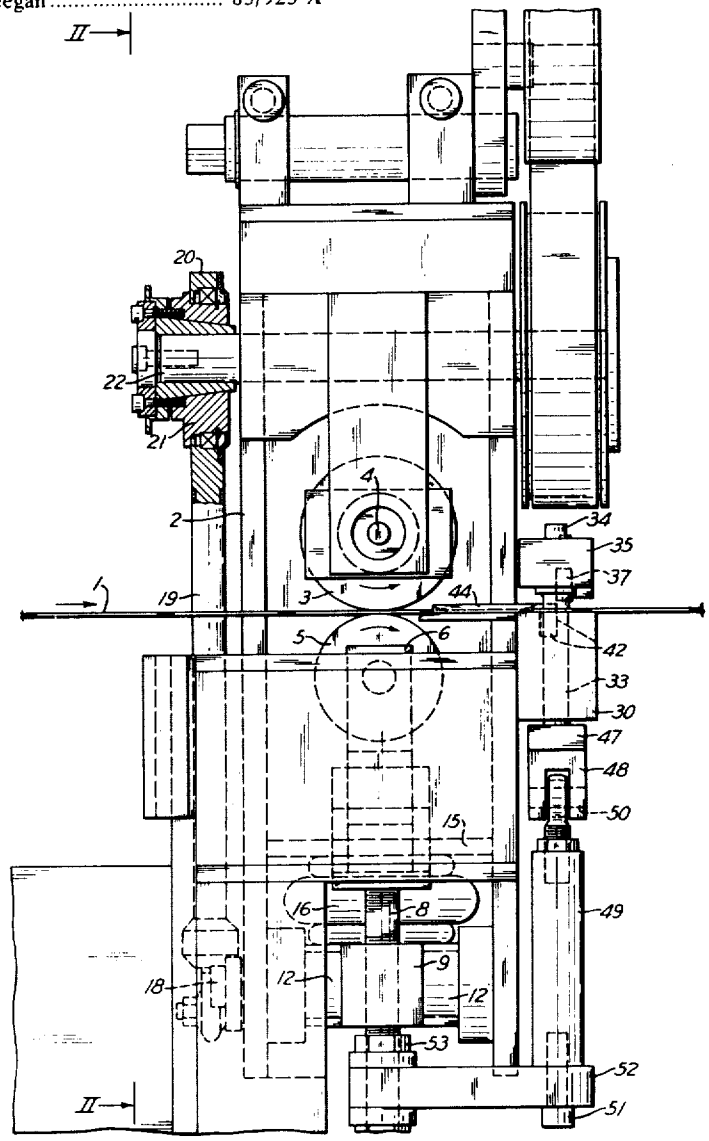
Primary Examiner—J. M. Meister

Attorney, Agent, or Firm—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

A punch press for metal strip has a lower outbound feed roll that is movable vertically toward and away from a driven upper feed roll to periodically press the strip against the upper roll. At the exit side of these rolls there is a stationary lower shear blade in a position to engage the bottom of punched strip as it leaves the rolls. A cooperating movable upper shear blade is spaced above the lower blade while the lower roll is in its upper position. Means operated by the roll-reciprocating means moves the upper blade downwardly toward the lower blade for cutting strip between them every time the lower roll is lowered.

5 Claims, 9 Drawing Figures



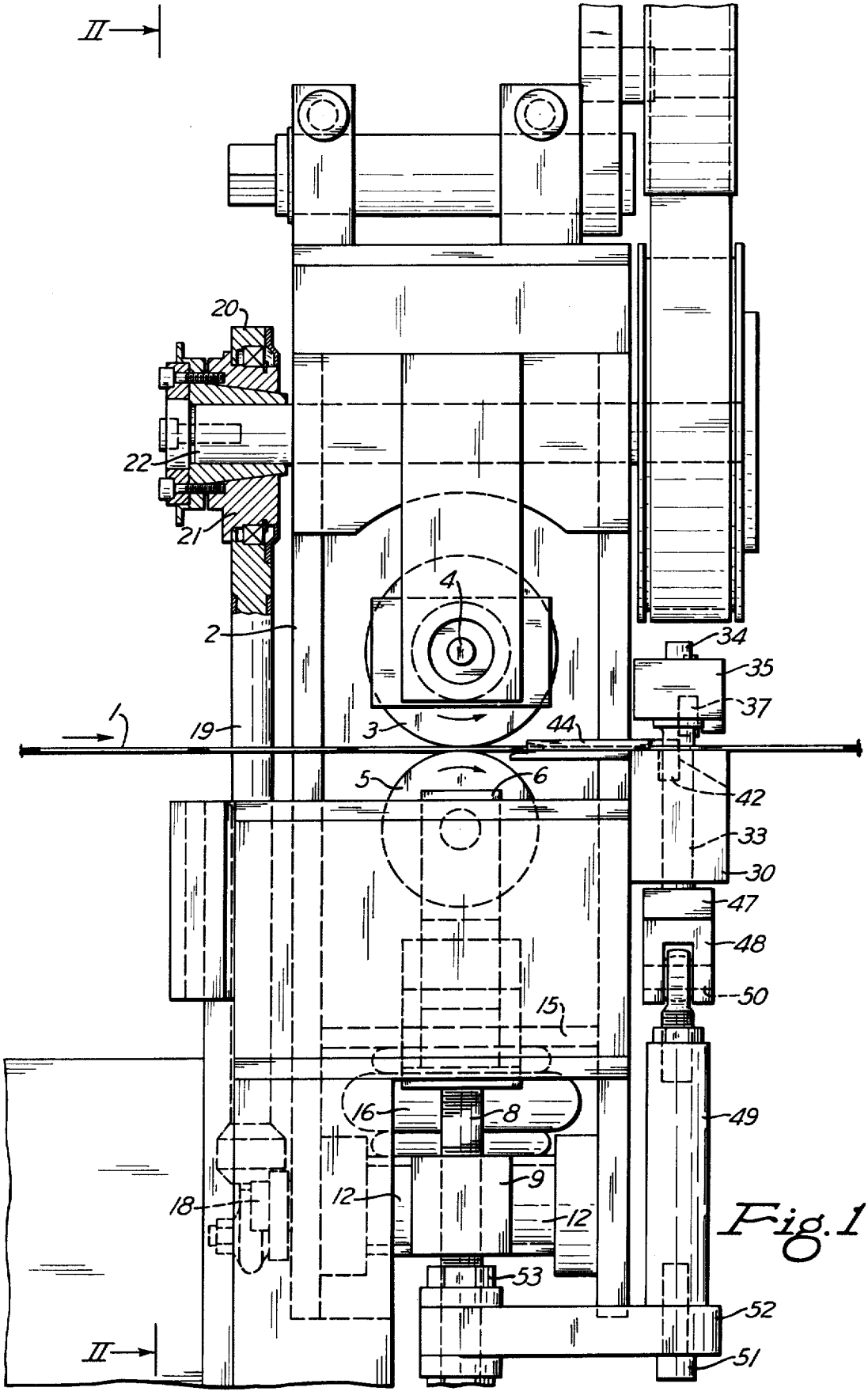

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Fig. 1

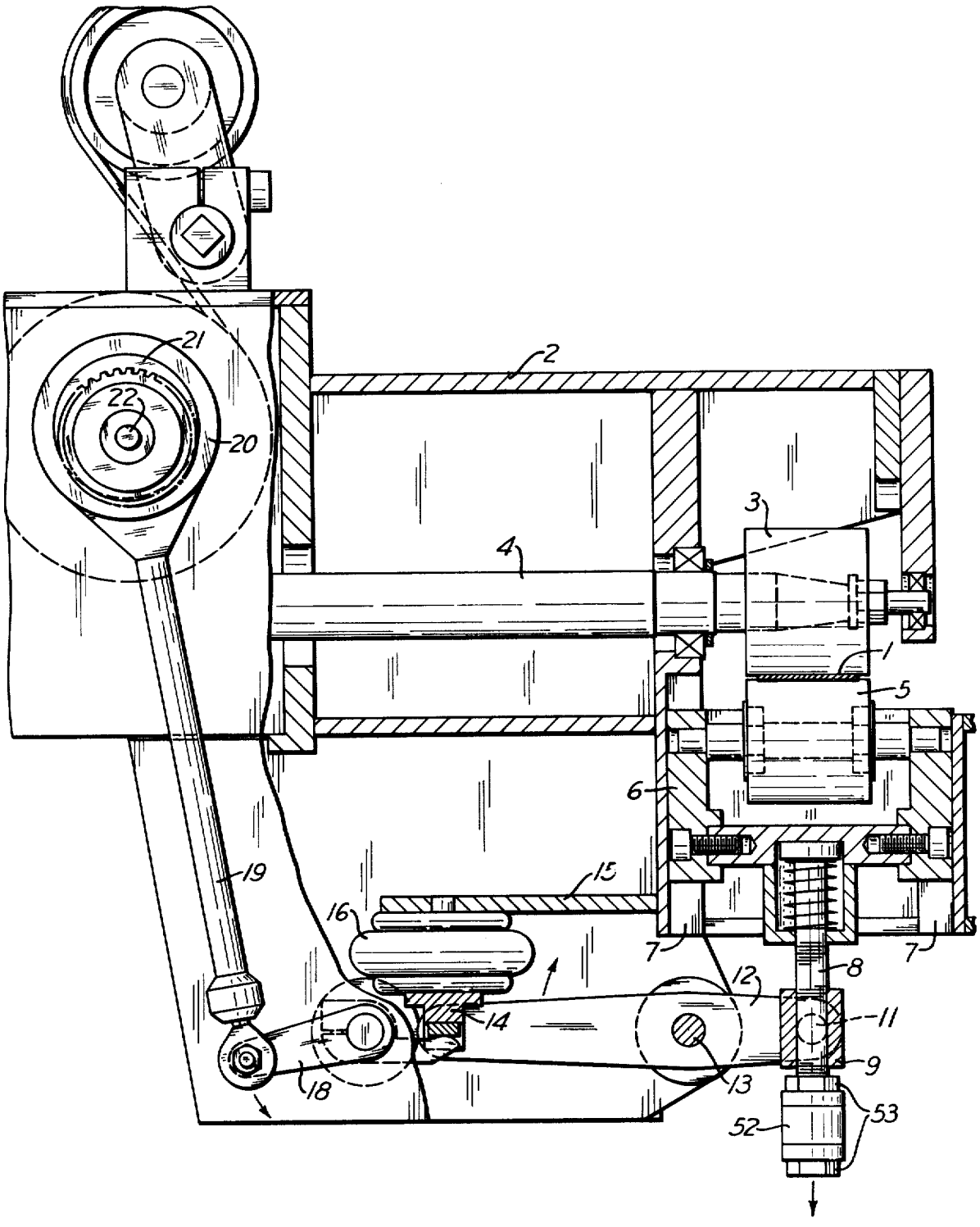


Fig. 2

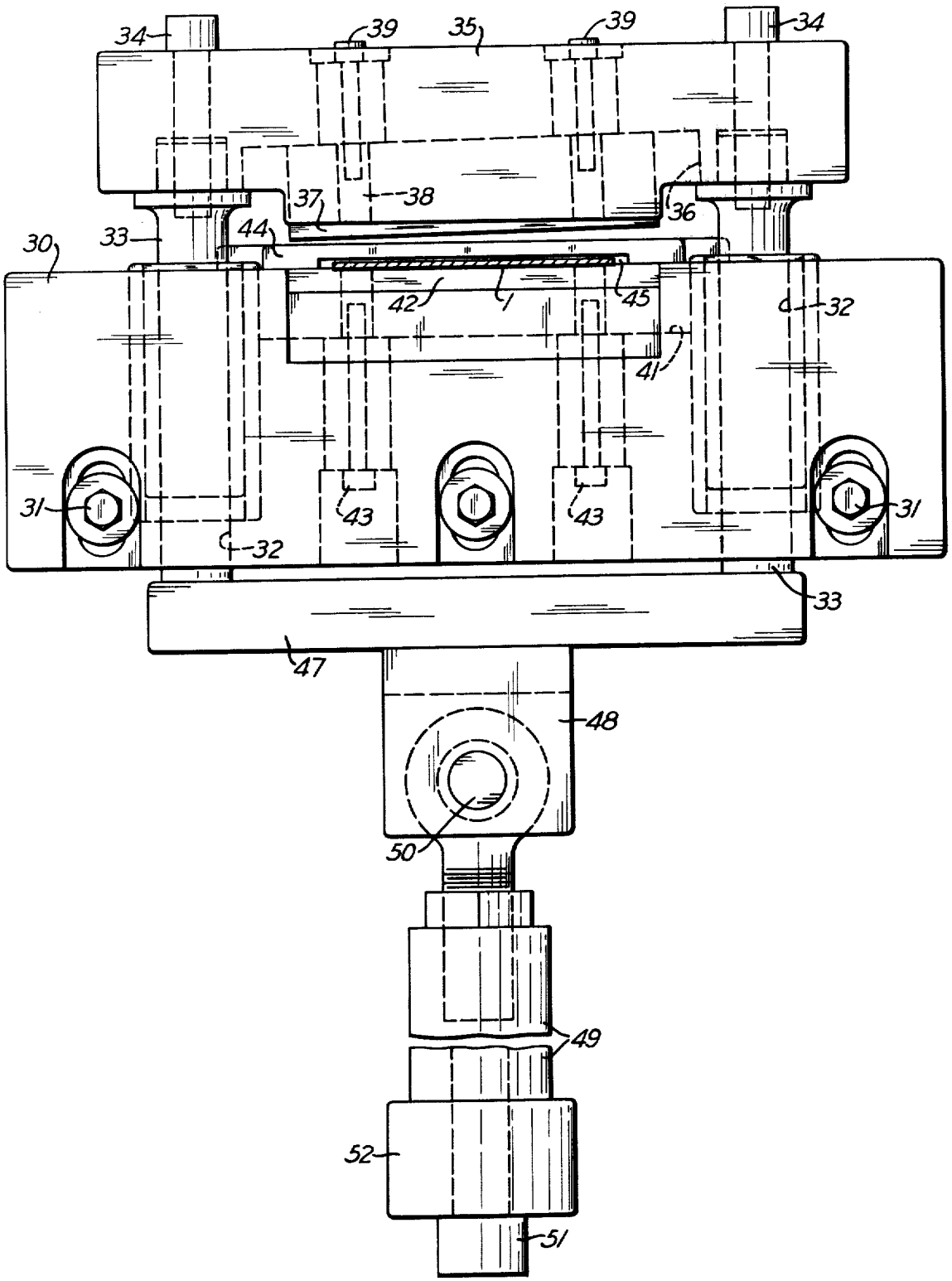

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Fig. 3

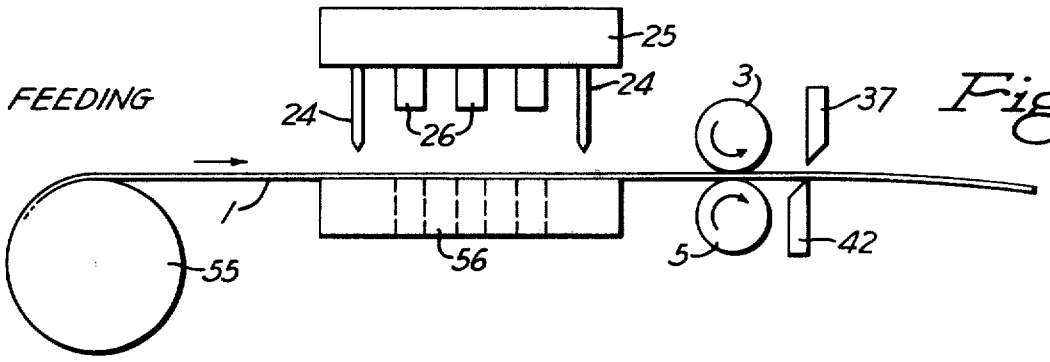


Fig. 4

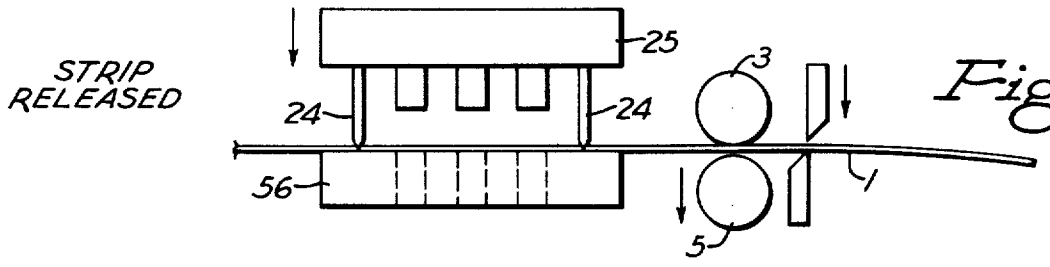


Fig. 5

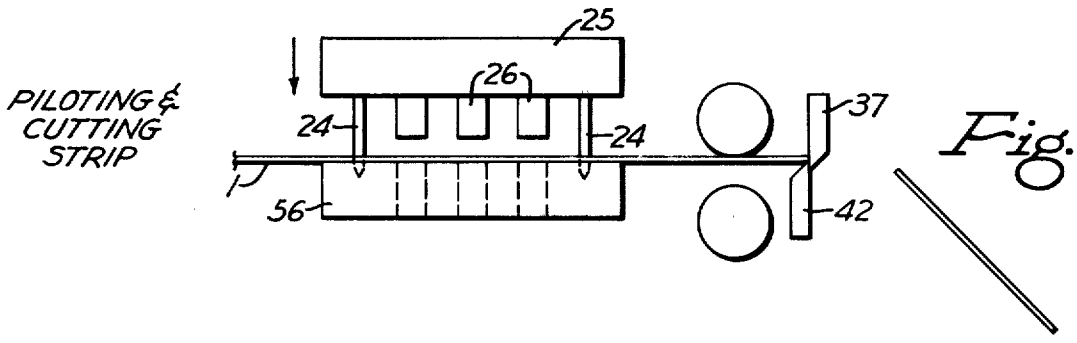


Fig. 6

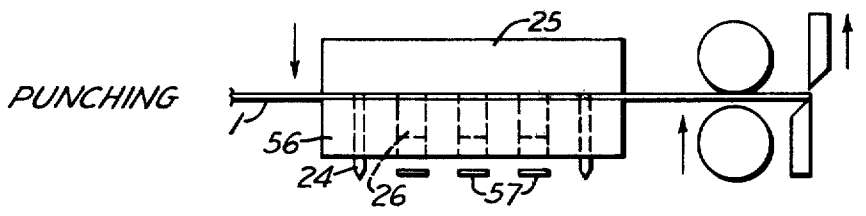


Fig. 7

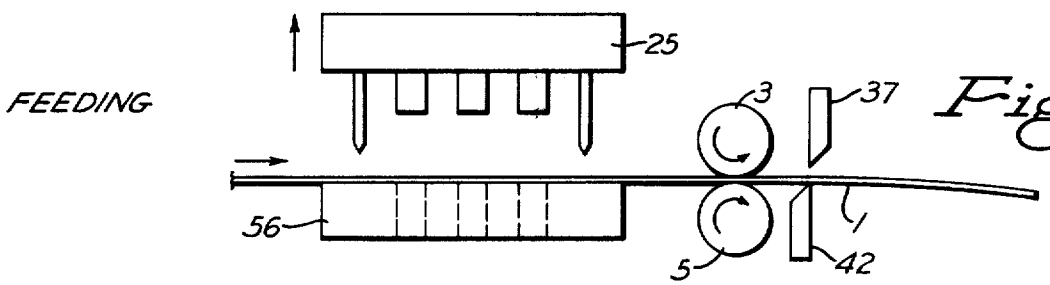


Fig. 8

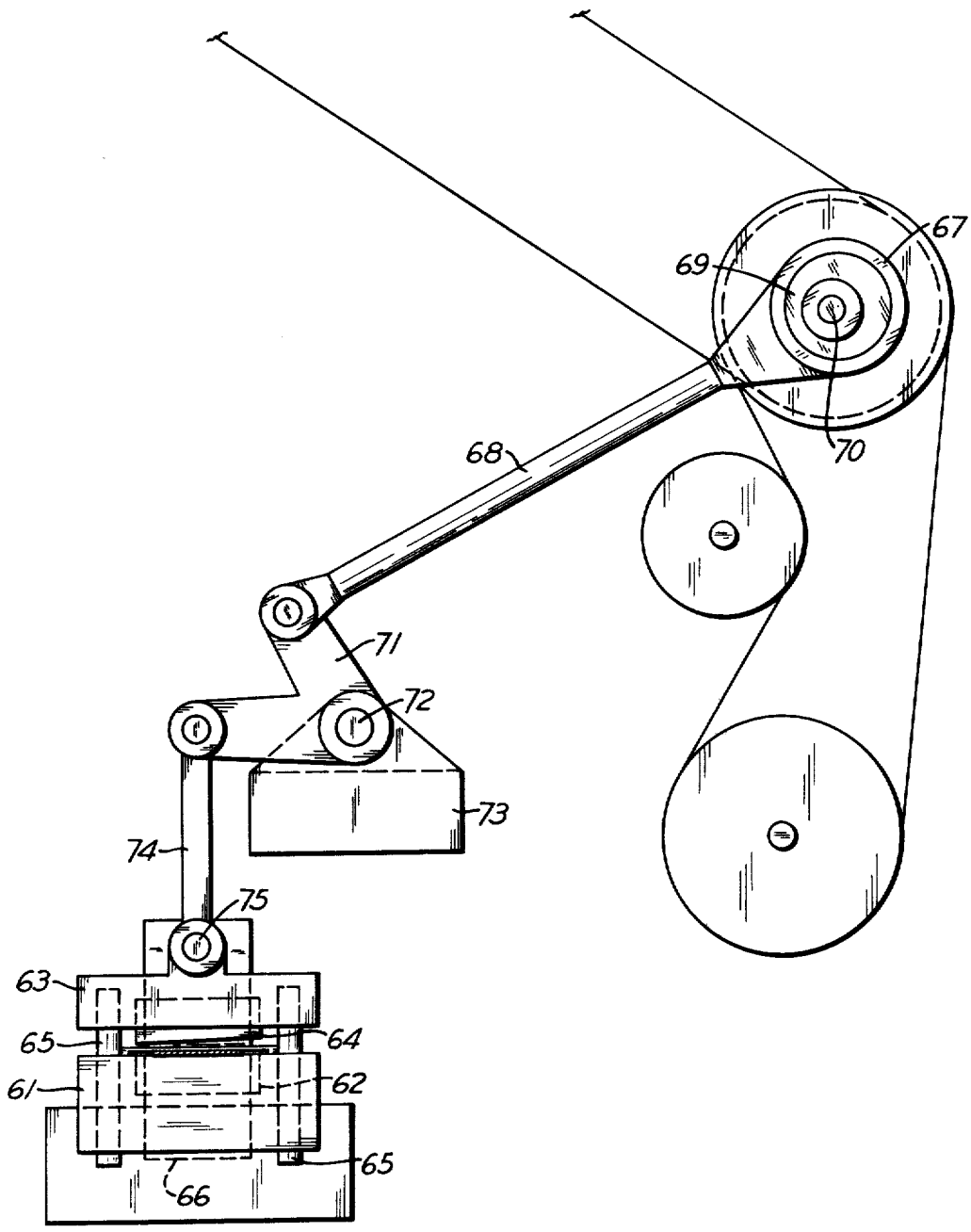


Fig. 9

PUNCH PRESS SCRAP CUTTER

In one type of high speed punch press a metal strip is fed very rapidly through the press step-by-step. Each time the strip stops it is punched to provide punchings of a desired shape. Since the punched strip leaves the machine at a high rate of speed, the problem of disposing of the scrap is very important.

It is among the objects of this invention to provide such a punch press with a high speed scrap cutter which is attached to the machine itself, which is synchronized with the machine, which is simple in construction and operation and which is operated by the press itself.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. **1** is a fragmentary view of the outbound side of a punch press provided with the scrap cutter;

FIG. **2** is a reduced view taken in the direction of the arrows II—II of FIG. **1** but with part of the press shown in vertical section;

FIG. **3** is an enlarged view of the exit side of the scrap cutter;

FIGS. **4** to **8** are diagrammatic views illustrating successive steps in the punching of strip and cutting of the resulting scrap; and

FIG. **9** is a view similar to FIG. **3** but showing a modification.

Referring to FIGS. **1** and **2** of the drawings, a portion of the outbound or exit side of a punch press is shown, which is provided with the usual outbound rolls that pull metal strip **1** through the press. The punching mechanism itself is not shown, as it is conventional and not necessary for understanding the invention. The two outbound rolls are rotatably mounted in a press housing **2**, and the upper roll **3** is driven by a shaft **4**. The lower roll **5** is an idler and is supported in a slide **6** that can be reciprocated vertically in guides **7**. The slide rests on a rod **8** that extends downwardly from it and through a bushing **9** rigidly mounted on the rod. Pivotally connected to pins **11** projecting from opposite sides of this bushing is the front end of a double lever **12** mounted on a horizontal pivot pin **13** secured to housing **2**. The rear end of this lever includes a block **14**, between the top of which and a cross member **15** in the housing a spring **16** is compressed. Any suitable type of spring may be used, the one shown being an air bag spring. This spring, by urging the rear end of the lever downwardly, causes the front end of the lever to raise the lower roll in order to press the metal strip against the driven upper roll so that the strip can be pulled through the press. The upper roll is rotated intermittently the number of degrees required to pull a punched length of strip out of the punch and to replace it with an unpunched length.

To pull the lower roll downwardly periodically, a crank **18** pivotally mounted in housing **2** has a front end that engages the bottom of lever block **14**. The rear end of this crank is pivotally connected to the lower end of a connecting rod **19** that extends upwardly to a ring **20** on its upper end encircling an eccentric **21**. The eccentric is rigidly mounted on one end of a continuously rotating horizontal shaft **22**. As this shaft rotates, the eccentric moves the connecting rod down and up. When the rod is moved down it causes crank **18** to lift the back end of lever **12** and thereby compress spring **16** as the front end of the lever pulls the lower roll downwardly away from the strip. The reason for doing this,

as shown in FIGS. **6** and **7**, is to permit guide pins **24** on the vertically movable punch head **25** that enter locating holes in the strip to correctly position the strip before it is punched. The pins do this by moving the strip in a horizontal plane to whatever extent may be necessary, without interference from the rolls. As soon as the punches **26** and the guide pins have been withdrawn from the strip, the lower roll is moved upwardly again by spring **16** pressing downwardly on lever **12**, so that the rolls will pull the strip forward a distance sufficient to bring an unpunched length into position beneath the punches. The punched portion of the strip is scrap and needs to be disposed of.

In accordance with this invention the punch press is provided with a high speed scrap cutter for cutting the punched strip into short lengths as it leaves the press. Accordingly, as shown in FIGS. **1** and **3**, a metal block **30** is secured to the side of the press housing beside lower roll **5** by means of screws **31**. This block has laterally spaced vertical openings **32** through it, and guide rods **33** extend through these openings and are movable vertically in them. Secured to the upper ends of the rods by screws **34** is a bar **35** provided in its bottom with a longitudinally extending slot **36**, in which an upper shear blade **37** is disposed. This blade is rectangular with parallel sides and has a pair of passages extending downwardly through it, in which there are threaded plugs **38** that receive the lower ends of screws **39** mounted in the bar. The upper wall of the slot is inclined lengthwise of the bar to incline the blade, so the screws likewise are inclined in order to be perpendicular to that wall. With this construction, any one of the four longitudinal edges of the shear blade can be used for shearing, thereby permitting a new shearing edge to be used by merely reversing or turning the blade in the slot.

The block **30** likewise is provided with a slot **41** for a blade **42** identical the the upper blade. The lower blade is held in place by screws **43** extending up into it from recesses in the lower part of the block. Welded to the top of the block is a strip guide **44** that extends into the press housing to a point near the rolls. This guide is provided with a rectangular channel **45**, through which the punched metal strip travels between the rolls and the shear blades. The guide not only supports the strip between the rolls and block **30**, but it also holds the strip down.

In order to reciprocate the upper shear blade, the lower ends of guide rods **33** are rigidly mounted on a horizontal bar **47** supported by a bifurcated block **48** in which the upper end of a post **49** is pivotally mounted on a pin **50**. The lower end of this post is rigidly attached by a screw **51** to the top of one end of a horizontal bar **52**, the opposite end of which is clamped onto the lower end of the roll-reciprocating rod **8** by means of nuts **53** screwed onto that rod as shown in FIGS. **1** and **2**. Consequently, every time the lower roll is moved up or down, the upper blade is moved in unison with it. The motions of the two are synchronized. This means, of course, that when the lower roll is moved downwardly the upper shear blade shears the punched strip extending between the shear blades.

The general operation of the punch press and scrap cutter is illustrated diagrammatically in FIGS. **4** to **8**. As shown in FIG. **4**, the metal strip from a reel **55** enters one side of the press, where it may be fed ahead by inbound rolls (not shown) like the outbound rolls **3** and

5 at the opposite side of the press. In traveling through the press the strip passes over a stationary die **56**, above which there is the vertically reciprocating punch head **25** provided with one or more downwardly extending punches and with the guide pins **24**. The strip is engaged by the outbound rolls and extends forward between the separated blades of the scrap cutter. In FIG. **4** the strip is shown being pulled ahead by the outbound rolls immediately after having been punched.

In FIG. **5** the points of the downwardly moving guide pins **24** are shown entering preformed guide holes in the strip the moment the lower roll has released the strip but before the upper shear blade has engaged it. The full diameter of the guide pins will then enter the guide holes and align the released strip a moment before the upper blade engages the strip and cuts off its leading end portion as shown in FIG. **6**. Immediately following this, as shown in FIG. **7**, the punches **26** punch out the desired blanks **57** from the strip while the lower roll and upper shear blade have been returned to the position shown in FIG. **5**. The blanks fall from the bottom of the die. The punches and guide pins are then raised out of the strip while the lower roll continues to rise until it again pinches the strip against the upper roll so that the rolls will again pull the strip ahead and cause a predetermined length of it to extend beyond the scrap cutter as shown in FIG. **8**. Everything is now in the same position as in FIG. **4** and the cycle is repeated with the projecting length of the strip being cut off just before the strip is punched.

Since the scrap cutter does not require a separate drive, its construction is simple and its cost low. Also since it is operated by the punch press and the movement of the upper blade is synchronized with the movement of the lower roll, each time the lower roll is lowered a length of scrap will be cut off. Therefore, no matter how fast the press is operated, the scrap cutter will be operated just as fast for cutting the punched strip into short lengths. The importance of the scrap cutter can be gathered when it is realized that some of these presses punch 800 times a minute so that the punched strip practically shoots out of the press.

In the modification shown in FIG. **9** the main body of the scrap cutter can be substantially the same as the one first described. That is, a metal block **61** is attached to the side of a punch press and supports a lower shear blade **62**. Above the block there is a bar **63** that supports an upper blade **64**. Rigidly mounted in the ends of this bar are the upper ends of guide rods **65** that slide in vertical passages through the block. This particular scrap cutter differs from the one first described in that in this modification the movable blade is not connected with the rod that supports the lower roll **66**, but is reciprocated by members directly connected with one of the rotating shafts of the press operatively connected with shaft **22** of FIG. **1**. Thus, a ring **67** on the upper end of a connecting rod **68** is mounted on an eccentric **69** on the shaft **70**, and the lower end of the rod is pivotally connected to one end of a bell crank **71**. The central portion of the crank is mounted on a pin **72** projecting from a bracket **73** attached to the press housing. The other end of the crank is pivotally connected to the upper end of a link **74**, the lower end of which is pivoted to the scrap cutter bar **63** by a pin **75**. As the connecting rod is moved back and forth by the rotating shaft, it moves the upper shear blade up and down to cut the punched metal strip into short lengths in the same manner as shown in FIGS. **4** to **8**.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. The combination with a punch press for metal strip having a driven outbound feed roll, a lower roll movable vertically toward and away from the upper roll, and means for reciprocating the lower roll vertically to periodically press strip against the upper roll; of a scrap cutter comprising a stationary lower shear blade at the exit side of said rolls in a position to engage the bottom of punched strip as it leaves the rolls, a cooperating movable upper shear blade spaced above the lower blade while said lower roll is in its upper position, and means operated by said roll-reciprocating means for moving the upper blade downwardly toward the lower blade for cutting strip between them every time the lower roll is lowered.

2. The combination recited in claim **1**, in which the press has a frame, said lower shear blade is rigidly connected with the side of the frame beside said lower roll, a strip support extends from said lower blade inwardly toward said rolls, and means mounted on said support guide strip passing over it to the lower blade.

3. The combination recited in claim **1**, in which said blade-moving means include a vertical rod below said lower shear blade, means operatively connecting the upper end of the rod with said upper blade, and means rigidly connecting the lower end of the rod with said roll-reciprocating means below said lower roll.

4. The combination recited in claim **3**, in which said roll-reciprocating means include a vertically movable rod extending downwardly from said lower roll, and said connecting means is a rigid member connecting the lower ends of the two rods.

5. The combination recited in claim **1**, in which the press has a frame and includes a block secured to the side of the frame beside said lower roll, the block being provided with laterally spaced vertical openings extending downwardly therein, guide rods slidably mounted in said openings and extending above them, and means rigidly mounted on the upper ends of the rods and supporting said upper shear blade between the rods, said blade-moving means being disposed above the shear blades and connected to said rod-mounted means to reciprocate the rods.

* * * * *