United States Patent [19]

Vecchi

[11] **3,742,797**

[45] **July 3, 1973**

[54] **DIE SET WITH STRIPPER PLATE**

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

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

[22] Filed: **June 14, 1971**

[21] Appl. No.: **152,821**

[52] **U.S. Cl.** **83/140,** 83/637, 83/698

[51] **Int. Cl.** **B26d 7/18,** B26f 1/02

[58] **Field of Search** ..... 83/637, 140, 698; 308/237 A, 237 R, 4 C, 6 B

[56] **References Cited**

UNITED STATES PATENTS

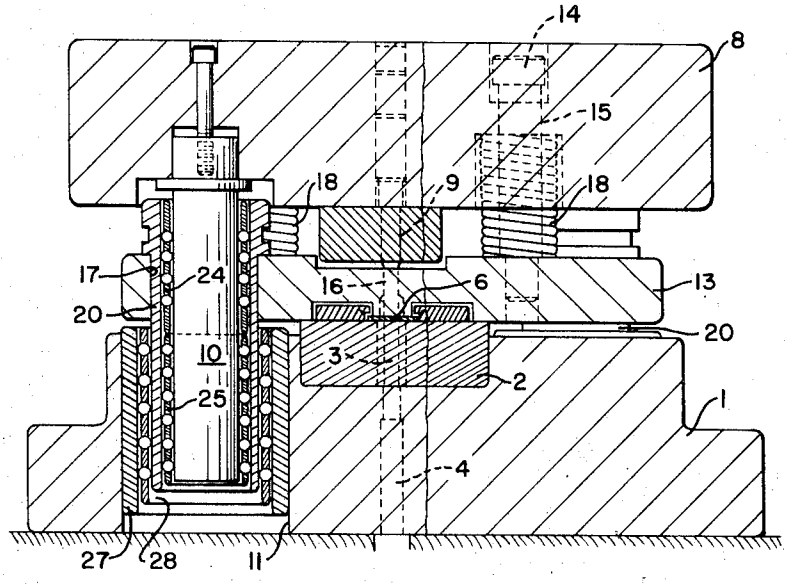
2,364,835	12/1944	Whistler et al.	83/140
2,422,774	6/1947	Conner	308/4 C
2,997,907	8/1961	Constantino	83/637
2,428,698	10/1947	Deichmiller	83/140
3,140,630	7/1964	Wolf	83/140
3,357,755	12/1967	Danly	83/637 X
2,906,563	9/1959	Conner	83/637 X
3,417,643	12/1968	Bennett	83/637 X
3,631,765	1/1972	Neumeister	308/6 B

Primary Examiner—Andrew R. Juhasz
Assistant Examiner—Horace M. Culver
Attorney—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

Disposed between the upper punch holder and lower die holder of a die set is a stripper plate that is movable vertically relative to both holders. The plate is suspended from the punch holder and between them there are springs that resist movement of the plate and punch holder toward each other when the plate is pressed against the work being punched. Guide posts rigidly mounted in the punch holder extend down through guide passages in the stripper plate and into vertical passages in the die holder. A bearing sleeve is mounted on each guide post for vertical movement thereon and extends through the adjoining stripper plate passage and down along the post. A bushing encircling this sleeve, which it engages, fits in a bearing sleeve mounted in an underlying passage in the die holder. The upper ends of the bushings are rigidly connected to the stripper plate. The bushings hold the stripper plate against tilting relative to the punch and die holders.

4 Claims, 4 Drawing Figures



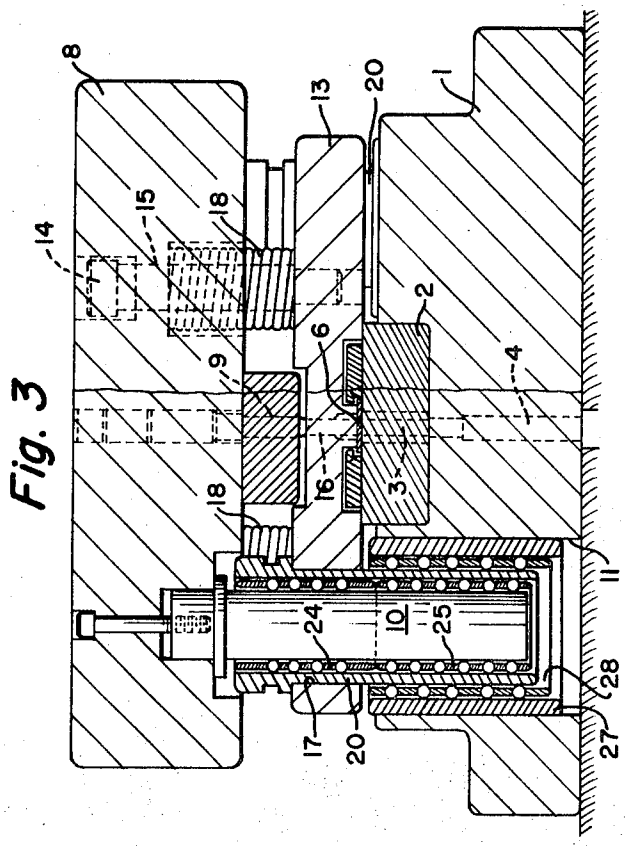


Fig. 3

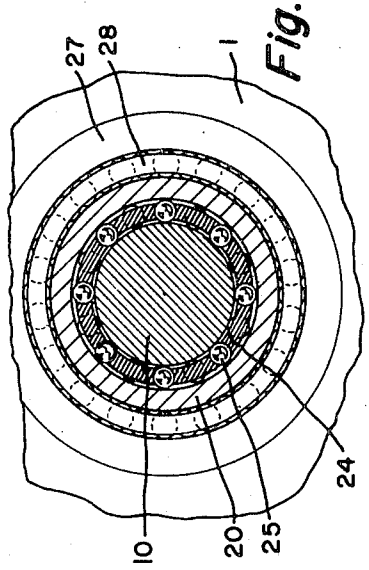


Fig. 4

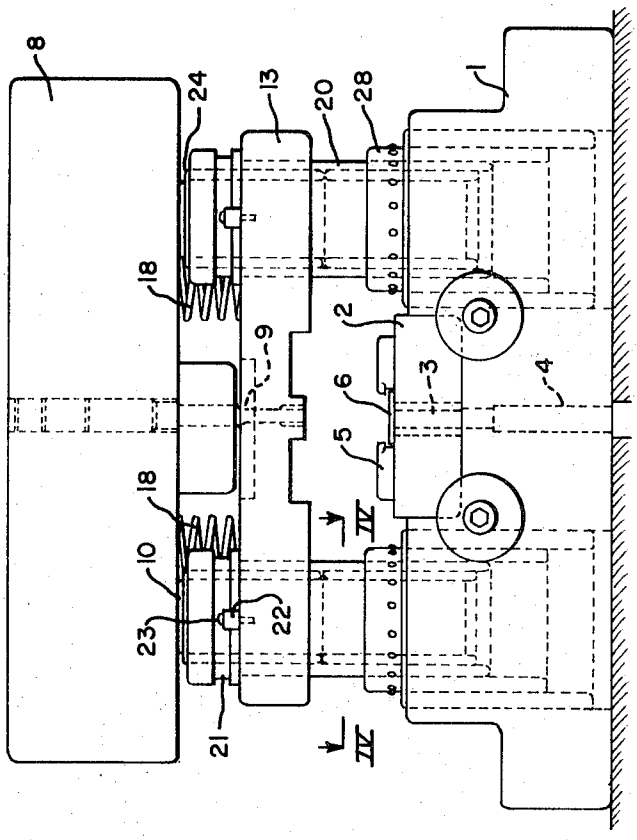


Fig. 2

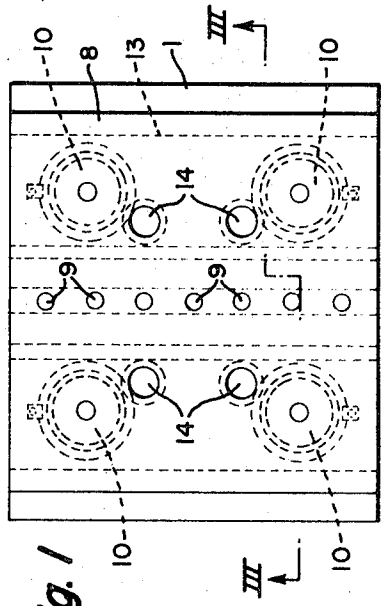


Fig. 1

INVENTOR
JOHN C. VECCHI
BY
Brown, Murray, Flick & Peckham
ATTORNEYS

DIE SET WITH STRIPPER PLATE

Die sets are known in which a spring-loaded stripper plate is disposed between an upper punch holder and a lower die holder for holding the work down on the die holder while the punch or punches are withdrawn from it. Guide posts mounted in the punch holder extend down through the stripper plate and into vertical passages in the die holder for guiding the punch holder as it reciprocates. In addition to stripping, a second purpose of the stripper plate is to help guide the punches that slide up and down in the plate. Usually, to guide the stripper on the guide posts it is provided with short bushings, only slightly longer than the thickness of the plate, that slide on the guide posts. Nevertheless, if something applies uneven pressure to the stripper in operation, the stripper will cock or tilt and thereby deflect the punches and cause them to strike the die face instead of entering the openings in the die.

It is among the objects of this invention to provide a die set, in which a spring-loaded stripper plate is guided in such a manner that it cannot tilt and deflect the punches.

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

FIG. **1** is a plan view of the die set;

FIG. **2** is an enlarged end view, with the die set open;

FIG. **3** is an enlarged vertical section taken on the line III—III of FIG. **1**, but with the die set closed; and

FIG. **4** is a further enlarged horizontal section taken on the line IV—IV of FIG. **2**.

Referring to the drawings, a lower die holder **1** is rigidly mounted on a suitable base and supports a die **2** that may be provided with a plurality of vertical openings **3** through it that are aligned with similar openings **4** down through the holder for disposal of the punchings. The die may support a pair of laterally spaced guide rails **5**, between which the work, such as a metal strip **6**, is fed.

Spaced above the die holder is a punch holder **8** that is supported by conventional means (not shown) by which the holder can be moved toward and away from the die holder. The punch holder carries punches **9** that extend down below it in alignment with the die openings **3**. To guide the punch holder in its vertical movements, the upper ends of guide posts **10** are rigidly mounted in it, with the posts extending down into vertical passages **11** in the die holder.

Between the two holders there is a floating stripper plate **13** secured to the lower ends of studs **14** that are slidably mounted in vertical passages **15** through the punch holder. When the die set is open, i.e., the punch holder is at the top of its stroke as shown in FIG. **1**, the stripper plate may be roughly midway between the punch holder and the die holder. The central part of the plate is provided with passages **16**, in which the punches are slidably disposed. The stripper plate also is provided with vertical guide passages **17**, through which the guide posts extend. When the die set is closed, which means that the punch holder is at the bottom of its stroke, as shown in FIG. **2**, the stripper plate is moved down into contact with the top of the work **6**, which stops further downward movement of the plate, but the punch holder continues down to cause the punches to punch the work. When the punch holder starts to move up again, the stripper plate remains pressed tightly against the work for a short time because coil springs **18** encircling studs **14** between the plate and the punch holder were compressed when the die set was closed and therefore must expand again before the studs can start to lift the stripper plate. The action of the die set as described thus far is conventional.

It is a feature of this invention that the stripper plate **13** will guide the punches without any danger of the plate tilting and thereby deflecting the punches so that they may not enter the die openings. Accordingly, a bushing **20** encircles each guide post **10**. The bushings fit tightly in the stripper plate passages **17**, but are spaced from the guide posts. The bushings also extend down the posts and into the die holder passages **11** at all times. To attach the bushings to the stripper plate they may project above it and have enlarged upper ends seated on the plate and provided with circumferential grooves **21**, in which lugs **22** are seated. These lugs are attached to the top of the stripper plate by screws **23**. The space between each guide post and the surrounding bushing **20** is filled by a bearing sleeve that can move vertically relative to both of them. Such a sleeve preferably is one formed from a cylindrical cage **24** provided with a plurality of radial openings, in each of which there is a small ball **25** that presses tightly against both the post and the bushing. This gives the rigidity required and keeps the bearing sleeves in place. It will be seen that as the guide posts move up and down in the bushings, the bearing sleeves will likewise move vertically but only half as far as the posts.

The portions of bushings **20** within the die holder passages **11** are spaced inwardly from the walls of those passages, which may be formed by hard liners **27** rigidly mounted in the passages. The space between these liners and the guide post bushings are likewise filled by bearing sleeves **28** of the same construction as those previously described. This lower set of bearing sleeves likewise moves up and down with the guide post bushings, but only half the distance that they move.

With the guide post bushings **20** not only rigidly mounted in the stripper plate but also rigidly mounted in the die holder, except that they can move vertically in the holder, the bushings will guide the stripper plate at all times and prevent it from cocking or tilting, which could damage the punches. Nothing can get out of alignment, so the die set can safely be operated at very high speed.

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. A die set comprising an upper punch holder and lower die holder, at least one punch extending downwardly from the punch holder, a normally elevated stripper plate disposed between and spaced from said holders and movable vertically relative thereto, the plate having a punch-receiving opening therethrough, means suspending the plate from the punch holder, springs between the punch holder and plate urging the plate away from the punch holder, the plate being provided with vertical guide passages therethrough, guide posts rigidly mounted in the punch holder and extending down through said plate passages, the die holder having vertical passages therein containing said posts, a lower bearing sleeve mounted in each die holder pas-

sage for vertical movement therein, a bearing sleeve mounted on each guide post for vertical movement thereon and extending through the adjoining stripper plate passage and down along the post, a bushing fitting tightly in each plate passage and lower bearing sleeve and encircling the post-mounted bearing sleeve therein in engagement with it, and means rigidly connecting the upper ends of the bushings to the stripper plate, whereby said bushings hold the stripper plate against tilting relative to said holders.

2. A die set according to claim **1,** in which said lower bearing sleeves extend above the die holder while the die set is open and are disposed substantially entirely within the die holder while the die set is closed.

3. A die set according to claim **1,** in which said bushings project above the stripper plate, and said connecting means are mounted on top of said plate and are secured to the upwardly projecting bushings.

4. A die set according to claim **3,** in which the bushings above the stripper plate are provided with circumferential grooves, and said connecting means are lugs projecting into said grooves.

* * * * *