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(71) Applicant: **Lenzotti, Eugenio**
Via Petrarca, 6
I-41049 Sassuolo (Modena)(IT)

(72) Inventor: **Lenzotti, Eugenio**
Via Petrarca, 6
I-41049 Sassuolo (Modena)(IT)

(74) Representative: **Modiano, Guido, Dr.-Ing. et al**
Modiano & Associati S.r.l.
Via Meravigli 16
I-20123 Milan (IT)

(54) Fitting for mounting and centering tools on a single punching machine.

(57) Fitting for mounting and centering tools on a single punching machine comprising a turret-like head (4) which accommodates a hammer (5), a column (6) to which at least one horizontally rotating arm (7) is articulated, the arm (7) including a prism-like seat (8) in which the various punches (9) can be accommodated in each instance, means (16) being provided to actuate the arm from a position which does not interfere with the head (4) to a position which interferes therewith and is exactly vertically centered between the axes of the prism-like seat (8) and of the hammer (5); locking elements (15) being provided to lock the arm (7) in its active configuration.

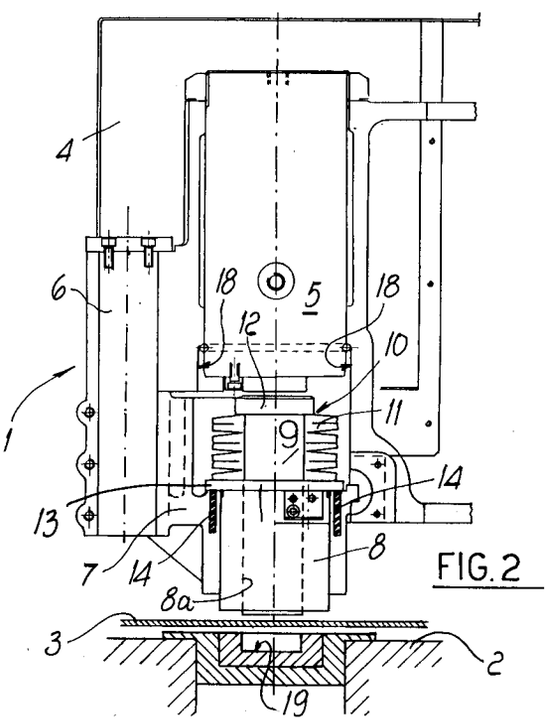

FIG. 2

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The present invention relates to a fitting for mounting and centering known tools on a single punching machine.

In order to produce holes with different cross-sections and profiles according to the requirements in the metal sheets being processed, punching machines manufactured so far can be fitted with templates which are interposed between the hammer of the machine and the metal sheet to be processed and allow to perforate said sheet for example with slots, holes with ellipsoidal cross-sections, and others.

For each one of said profiles and for each one of said templates there is an equal number of punches, in practice one for each type of hole; although they operate excellently, they entail multiplying the expenditure in order to have a wide operating choice: furthermore, not all currently commercially available machines are compatible with the tools produced by the various manufacturers, and many times this forces the operators in the field to equip themselves with a plurality of punching machines in order to have the above mentioned operating range, with an increase in production and maintenance costs.

In addition to this, there is always the need to have machines which offer very high machining precision, in the range of a hundredth of a millimeter, and this characteristic is currently not available in all known punching machines, due both to problems in the wear and mechanical play of the moving parts and to actual design problems.

The technical aim of the present invention is to provide a fitting for mounting and centering known tools on a single punching machine which allows to use the currently commercially available production of punches, regardless of the company which manufactures them, while maintaining the possibility of achieving higher part machining precision than currently obtainable.

This aim is achieved by a fitting for mounting and centering tools as defined in the accompanying claims.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of a fitting for mounting and centering known tools on a single punching machine, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic top view of the present invention in a possible embodiment;

figure 2 is a side view thereof.

With particular reference to the above figures, the reference numeral 1 generally designates a fitting for mounting and centering known tools on a single punching machine, which is constituted by a base 2 for supporting metal sheets 3, above which a turret-like head 4 is operatively mounted.

Said head is provided with a single hammer or tool means 5. Moreover, a vertical column 6 is laterally associated with the head, said vertical column 6 articulating an arm 7 which rotates in a vertical plane along a circular path.

The free end of the arm 7 is equipped with a prism-shaped seat 8 which is affected by a through seat 8a for accommodating punches 9 of a known type after interposing adapter elements which are not illustrated in the drawings.

Elastic compression means 10 are provided between the hammer 5 and the prism-like seat 8, said compression means being arranged to automatically extract the punch 9 from the metal sheet 3 once punching has occurred; said elastic means 10 are constituted by at least one large helical spring 11 which is coiled around the punch 9, coaxially thereto, and is arranged to cooperate with a cap 12 in an upward position and with a circular collar 13 in a downward position and extract by contrast the punch 9 from the metal sheet 3 once punching has occurred; said collar is associated with the prism-like seat 8 with the interposition of a plurality of elastic compression springs 14.

The active position of the arm 7 is kept stable by virtue of related elements 15 which consist of at least one hydraulically actuated cylinder 16 which is arranged horizontally on the punching machine and whose stem 16a extends tangentially to the lateral surface of the prism-like seat 8 until it enters a shaped recess 17 defined therein.

Finally, the fact is stressed that the seat 18 for the accommodation of the hammer 5 and the recessed shape 19 of the die 2 are produced in a single boring step which makes them absolutely concentric.

The operation of the invention can be deduced intuitively from the above description: in the non-interference position of the arm 7, shown in figure 1, the prism-like seat 8 is ready to receive a commonly commercially available punch, which is inserted in the through seat 8a after interposing an adapter element which is not illustrated in the drawings.

Once the locking of the punch in the prism-like seat 8 is complete, the arm 7 is rotated until the axes of the hammer 5 and of said prism-like seat 8 are exactly centered vertically; in this configuration, the axis of the recessed shape 19 is also exactly centered with respect to the preceding ones, by virtue of the machining performed in order to define it, which entails, in a single machining step, the boring which generates the seat 18 for the snug-fit accommodation of the hammer 5 and the shape 19 itself. Once centering has occurred, the cylinder 16 is actuated, and its stem 16a, by protruding therefrom, engages the recess 17, keeping the arm 7

motionless during the punching step.

Once the active step of said punching step, which entails the compression of the large spring 11, has ended, the spontaneous expansion of said spring facilitates the extraction of the punch 9 from the metal sheet 3; the stem 16a is retracted and the arm 7 can, if required, be rotated again into the configuration in which it does not interfere with the hammer 5. Subsequently the punch 9 can be replaced in the prism-like seat 8 with another one which has a different cross-section and is in any case of a known type.

In practice it has been observed that the invention thus described achieves the intended aim.

The invention thus conceived is susceptible to modifications and variations, all of which are within the scope of the inventive concept; thus for example, the hydraulically actuated cylinder 16 can be replaced with a rotating pawl whose hook can be precisely inserted in the recess 17. Furthermore, all the details may be replaced with other technically equivalent elements.

In the practical execution of the invention, the materials employed, as well as the dimensions, may be any according to the requirements without thereby abandoning the protective scope of the following claims.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Fitting for mounting and centering tools on a single punching machine comprising a base (2) for supporting metal sheets (3) above which a turret-like head (4) is operatively mounted, said head (4) being provided with a related hammer means (5), characterized in that a vertical column (6) is provided laterally to said hammer means (5) and is associated with said head (4) for the rotary articulation, in a horizontal plane, of an equally horizontal arm (7) whose free end is provided with at least one prism-like seat (8) which has a snug-fit through seat (8a) for punches (9), said arm (7) being rotatable from a position which does not interfere with the hammer means (5) to a position in which the seat (8) and the related punch (9) accommodated therein are rotated so as to be vertically centered between their own axes and the axis of the hammer means (5), elastic compression means (11) being provided, between said hammer means (5) and said prism-like seat (8), for the automatic extraction, by contrast, of the punch (9) from the metal sheet (3) once punching has occurred.

2. Fitting according to claim 1, characterized in that locking means (15) are provided to lock the arm (7) in its active configuration.

3. Fitting according to claims 1 or 2, characterized in that said locking means (15) are constituted by a hook which is supported by a rotating pawl which is suitable to snugly enter a corresponding shaped recess (17) defined on the perimetric face of the prism-like seat (8).

4. Fitting according to claims 1 or 2, characterized in that said locking means (15) are constituted by at least one hydraulically actuated cylinder (16) which is rigidly supported by said punching machine and is arranged so that its axis is horizontal, the stem of said cylinder (16) being orientated tangentially with respect to the outer perimeter of the prism-like seat (8) in a centered configuration with respect to the hammer means (5), the free end of said stem being snugly insertable in a corresponding shaped recess (17) defined on the perimetric face of the prism-like seat (8).

5. Fitting according to one or more of the preceding claims, characterized in that said hammer means (5) is accommodated in a corresponding seat (18) defined coaxially to an underlying die (2) of the punching machine.

6. Fitting according to one or more of the preceding claims, characterized in that said elastic compression means (11) are constituted by at least one large helical spring which is coiled perimetrically at the upper end of the punch (9), said helical spring being retained by a related upper cap (12) and resting, in a downward position, on a circular collar (13) which is associated with said prism-like seat (8), whereat elastic compressing springs (14) are interposed between the prism-like seat (8) and the circular collar (13).

7. Fitting according to one or more of the preceding claims, characterized in that adapter elements are provided to accommodate the punch (9) into the prism-like seat (8).

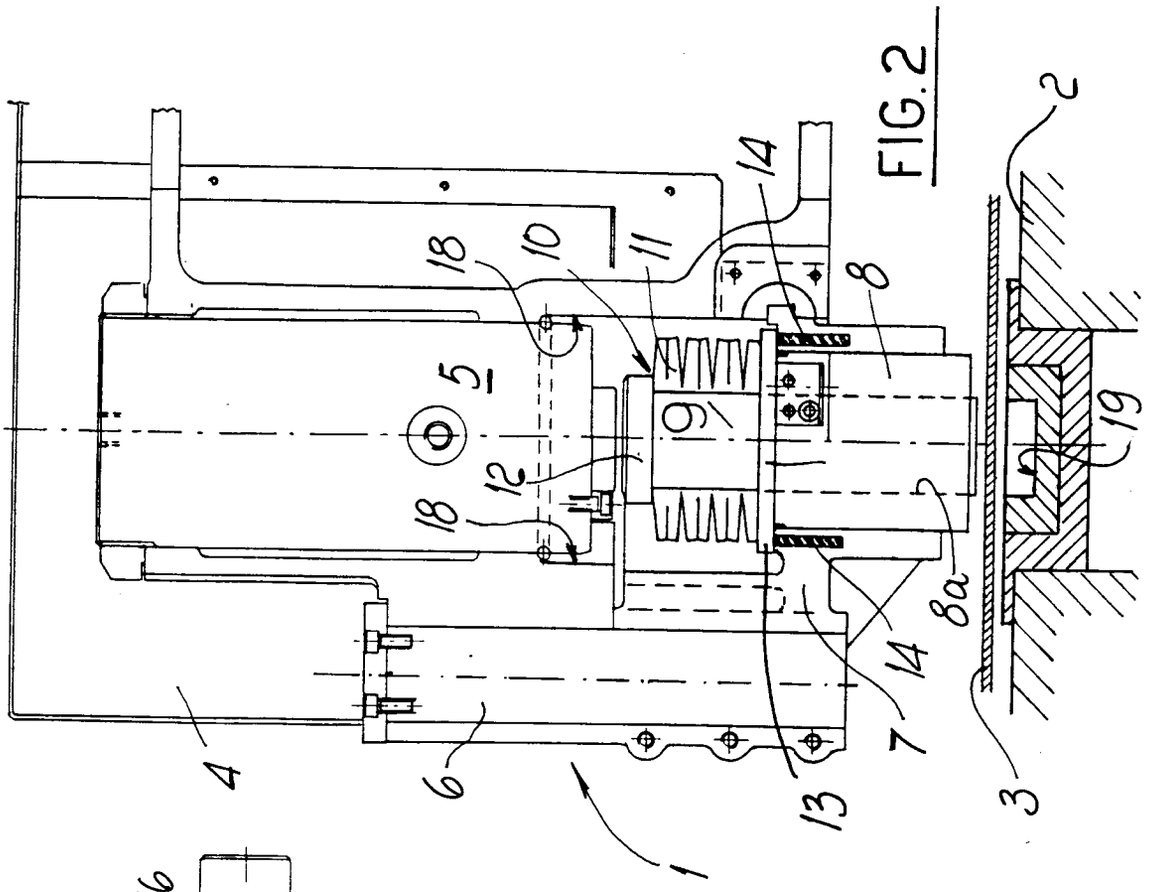

FIG.2

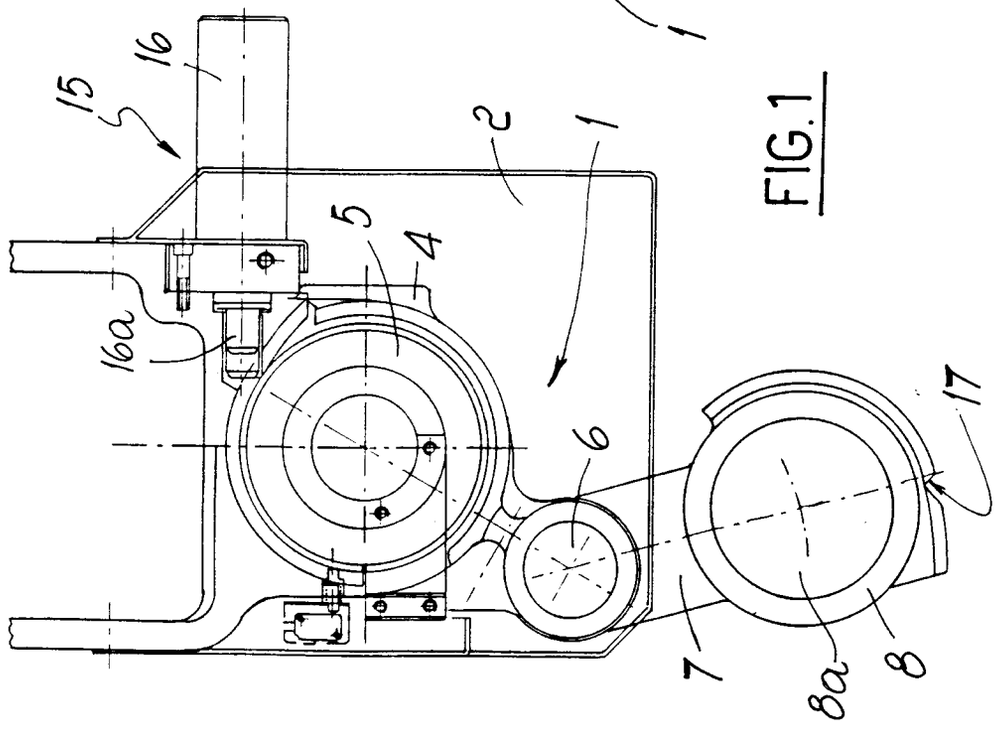

FIG.1

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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 8959

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-B-1 302 423 (CAPITAL GROWTH FUND) * column 3, line 5 - line 9; claim 1; figures 1,4,5 *	1,2	B21D37/06
X	FR-A-2 300 636 (AMADA) * claims 1-4; figures 1-3 *	1,2	
A	DE-U-7 434 706 (WILLIAM PRYM-WERKE) * page 2, column 5; claims 1-3; figure 1 *	1,2	
A	DE-B-1 296 481 (EDEL) * claim 1; figures 1,2 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B21D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	24 JUNE 1993	SCHLAITZ J.

CATEGORY OF CITED DOCUMENTS

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