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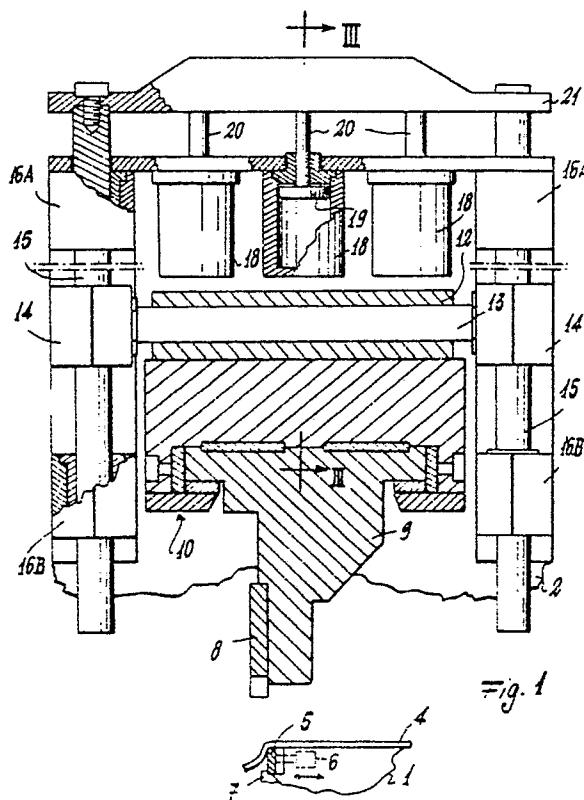
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(54) **Improved machine for producing expanded sheet metal.**

(57) The improved machine comprises a ram operated in such a manner as to undergo reciprocating movement away from and towards the sheet metal to be expanded. The ram carries a toothed blade driven with reciprocating movement in a direction perpendicular to that of the ram and acting on the sheet metal in cooperation with a backing blade able to retract against the action of elastic means. At its ends the ram is connected to rods. These rods are slidingly guided in fixed supports. The rods are connected together in pairs by a cross-member. The rods of pneumatic cylinders operating as pneumatic springs act on the cross-member.



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IMPROVED MACHINE FOR PRODUCING EXPANDED SHEET METAL

This invention relates to expanded sheet metal production machines comprising a ram driven to undergo reciprocating movement away from and towards the sheet metal to be expanded and carrying a toothed blade which moves with reciprocating movement perpendicular to the movement of the ram and acts on the sheet metal in cooperation with a backing blade able to retract against the action of elastic reaction means.

machines of the indicated type are known for example from Italian patent No. 896,425 and the corresponding extensions in the United States (No. 3,677,055) and in the German Federal Republic (No. 2,109,216.

In these known machines the ram (of considerable weight) and consequently the toothed blade are driven by drive members comprising crank mechanisms.

When operating at high speed such members are subjected to considerable stress particularly when in the end-of-stroke position representing the change-over from the active downward stroke to the passive upward stroke. This considerable stress negatively affects the machine life with the result that a limit is placed on its operating speed.

The main object of the present invention is to provide an improved machine of the specified type in which for equal conditions the moving members have a longer life, or alternatively in which for equal life the production rate can be increased.

This and further objects which will be apparent from the detailed description given hereinafter are attained according to the invention by a machine of the indicated type characterised essentially in that elastic means act on the ram, at least when this latter is in the region of that end-of-stroke position which is closer to the sheet metal.

According to an advantageous embodiment of the invention, the elastic means are of pneumatic type and are preferably pneumatic cylinders. The use of pneumatic cylinders allows the pressure of the contained air mass and hence their elastic reaction to be easily adjusted.

According to an important aspect of the invention, rigid with the ram there are provided rods axially guided in stationary supports and connected together in pairs by cross-members on which the rods of fixedly-mounted pneumatic cylinders operate.

The invention will be more apparent from the detailed description of a preferred embodiment thereof given hereinafter by way of non-limiting example and illustrated on the accompanying drawing in which:

Figure 1 is a simplified partial longitudinal section through the machine of the invention;

Figure 2 is a perspective cut-way view thereof incorporating a slight modification;

Figure 3 is a diagrammatic section therethrough on the line III-III Figure 1, with parts omitted.

With reference to Figure 1, the machine incorporates a static structure comprising a bed 1, two parallel side members 2 extending vertically beyond the base, and a cross-member, not shown, which upperly joins the two side members together.

The bed 1 comprises an upper surface 3 on which the sheet metal 4 to be stretched slides and at the end of which there is slidably mounted (see arrows) a backing blade 5 which is held by an elastic reaction means such as a pneumatic cylinder 6 against a stop member 7 provided on the bed.

The backing blade 5 is designed to cooperate with a toothed blade 8 fixed to a slide 9 which is mounted in and slidable in the longitudinal direction of a ram 10 and is driven with reciprocating movement by known means, not shown.

The ram 10 is driven with reciprocating movement away from and towards the sheet metal 4 by crank mechanisms or the like, of which the connecting rod small end 11 can be seen in Figure 3. An example of such crank mechanisms is known for example from the patent cited in the introduction.

At its lateral ends the ram 10 comprises a cylindrical seat 12 formed from two cylindrical half-seats removably joined together, and in which a bar 13 is mounted and clamped. The projecting ends of said bar 13 are rigid with a support 14. A guide rod 15 is rigid with the support 14 and can slide axially in two stationary supports 16A, B connected to the machine side members 2.

A cross-member 17 is fixed to the upper supports 16A.

In an intermediate position of said cross-member 17 there are fixed three single-acting pneumatic cylinders 18 which can be connected to a compressed air source below the relative piston 19. The piston comprises a rod 20 which passes through the cross-member 17 in a sealed manner.

The rods 20 are in contact with the cross-member 21. This contact is due to the air acting below the piston 19 at a given pressure. Such contact can be permanent or be limited to around the bottom dead centre of the motion of the ram 10 and thus of the relative toothed blade 8.

When the ram 10 moves downwards it com-

presses the air in the pneumatic cylinders 8, this compression increasing as the piston approaches its bottom dead centre. The cylinders store energy which they yield up on inversion of motion, ie as the ram moves upwards, to thus facilitate this upward movement. 5

Claims

1. An improved machine for producing expanded sheet metal, comprising a ram (10) driven to undergo reciprocating movement away from and towards the sheet metal (4) to be expanded and carrying a toothed blade (8) which moves with reciprocating movement perpendicular to the movement of the ram (10) and acts on the sheet metal (4) in cooperation with a backing blade (5) able to retract against the action of elastic reaction means (6), characterised in that elastic means (18, 19, 20) act on the ram (10), at least when this latter is in the region of that end-of-stroke position which is closer to the sheet metal (4). 10 15 20

2. An improved machine as claimed in 1, characterised in that the elastic means (18, 19, 20) are pneumatic. 25

3. An improved machine as claimed in claim 2, characterised in that the pneumatic means (18, 19, 20) are fixed cylinders chargeable with compressed air and having their rods (20) acting on a cross-member (21) connected to the ram (10). 30

4. An improved machine as claimed in claim 3, characterised in that the cross-member (21) is connected to two rods (15) guided slidingly in stationary supports (16A, B) and interconnected by a means (13) rigid with the ram (10). 35

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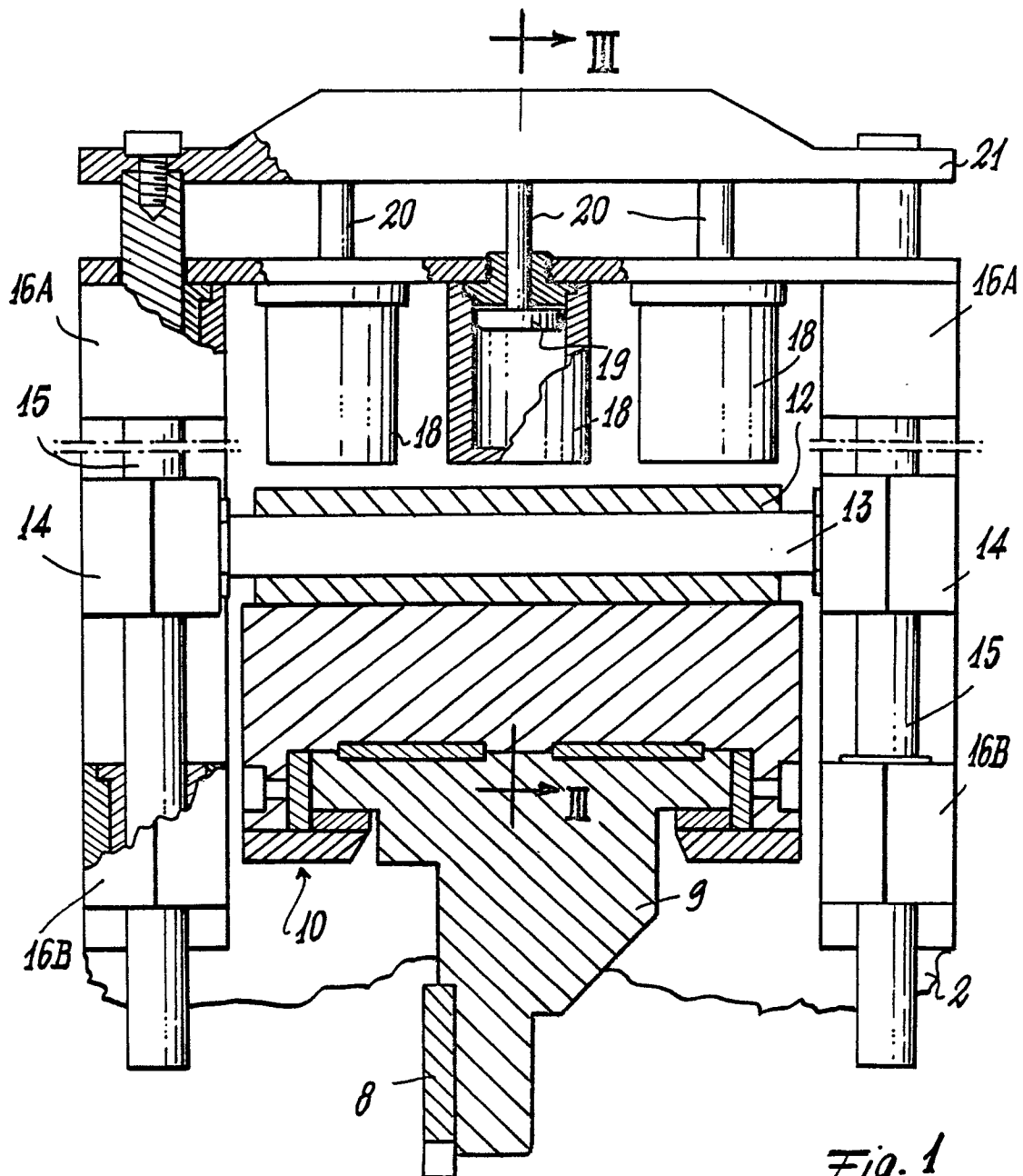


Fig. 1

