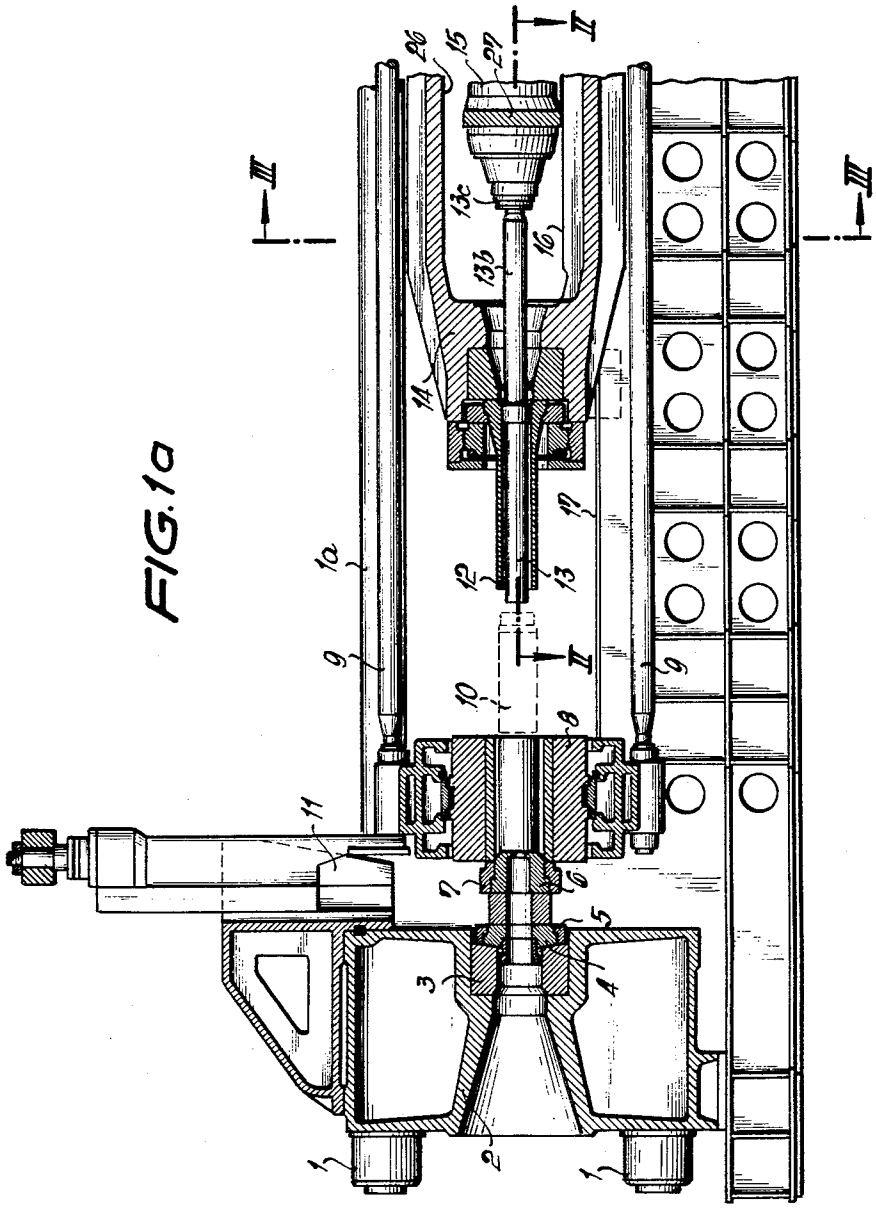
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HORIZONTAL METAL-EXTRUSION PRESSES

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FIG. 1a

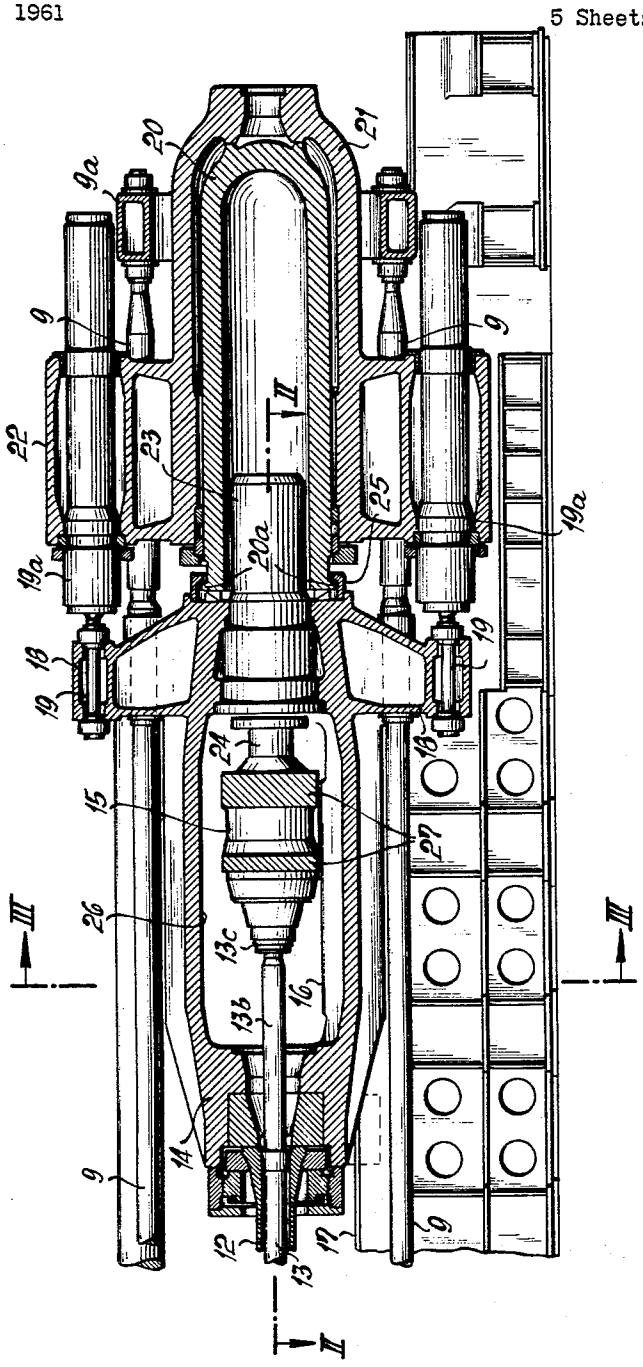


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FIG. 1b



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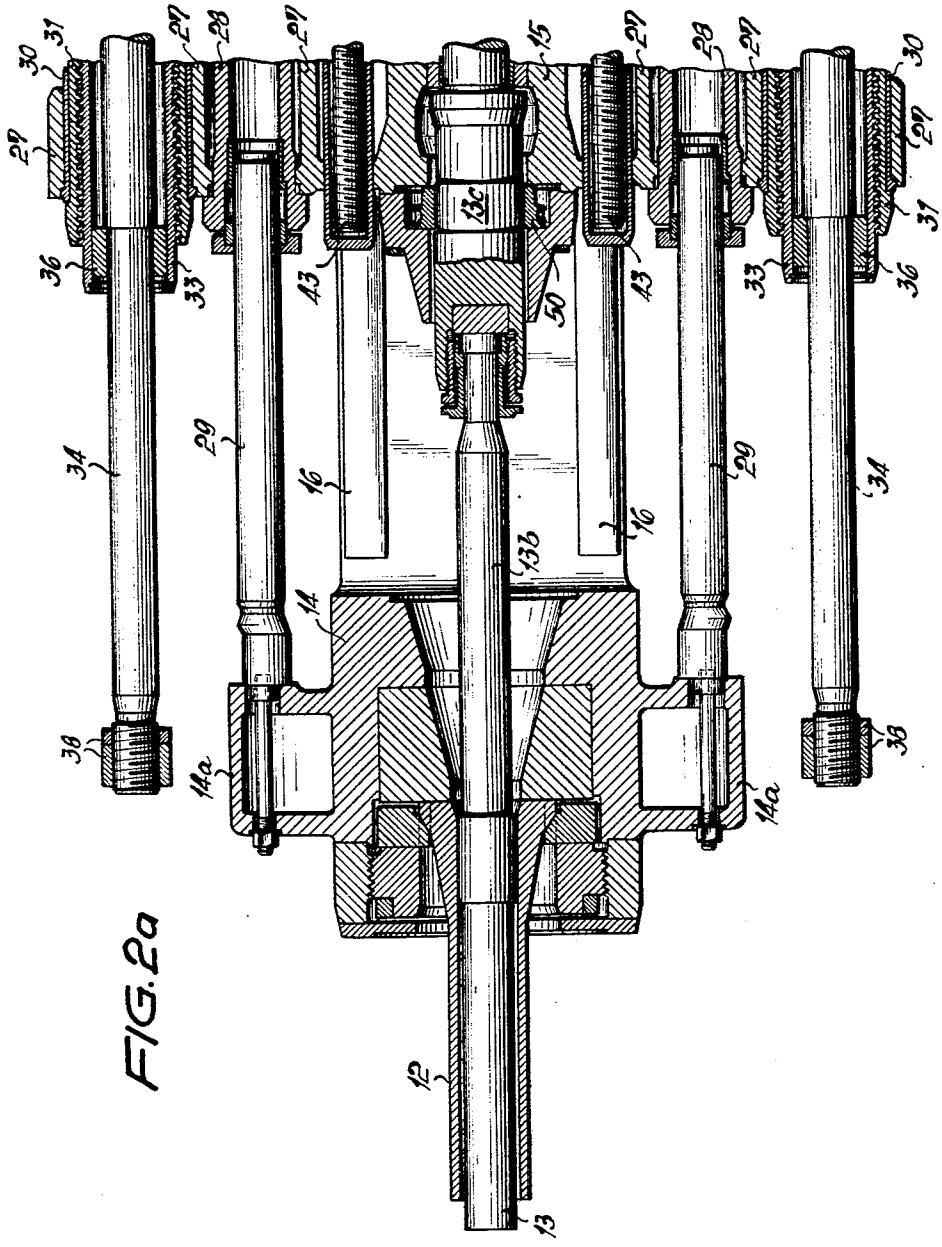


FIG. 2a

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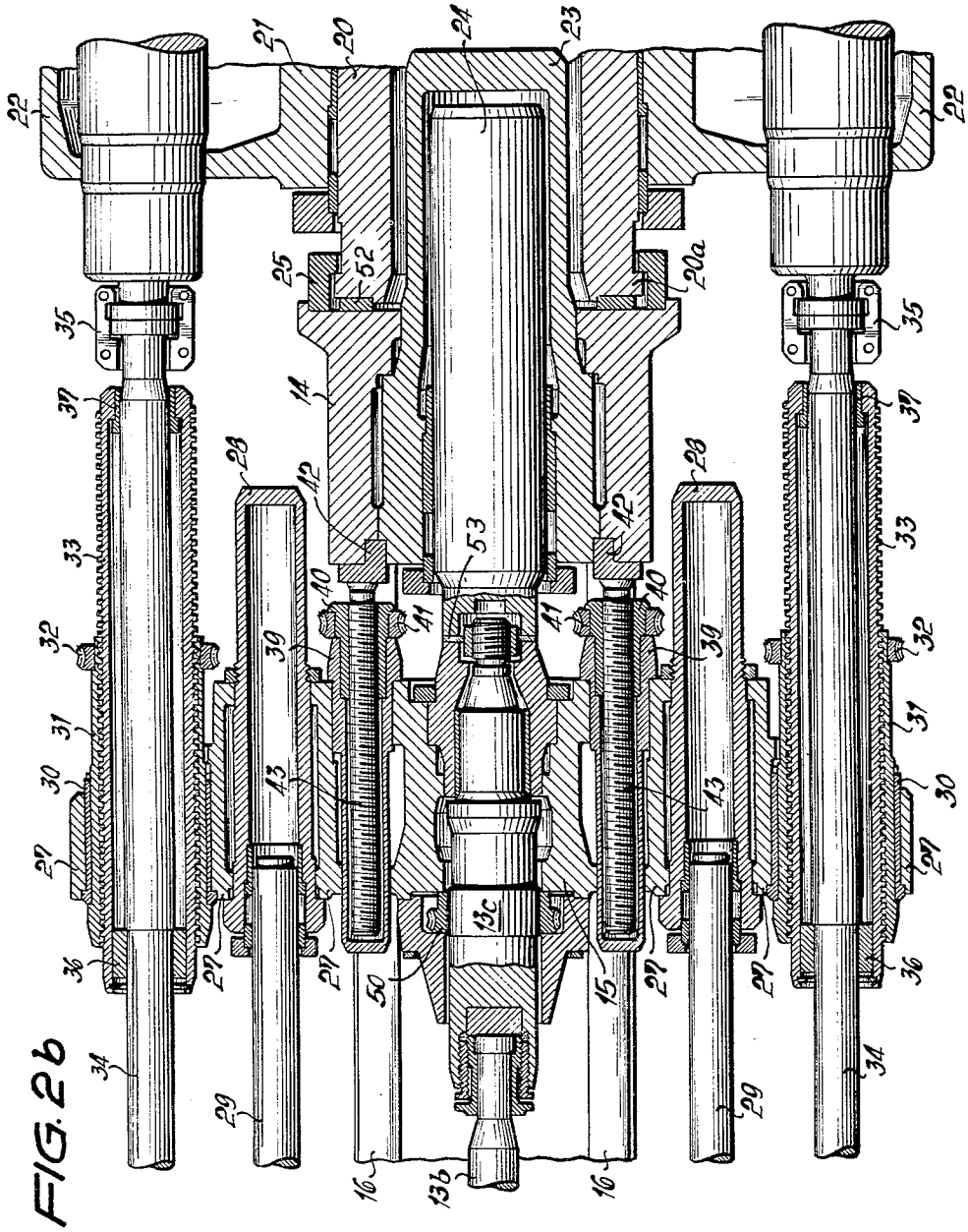


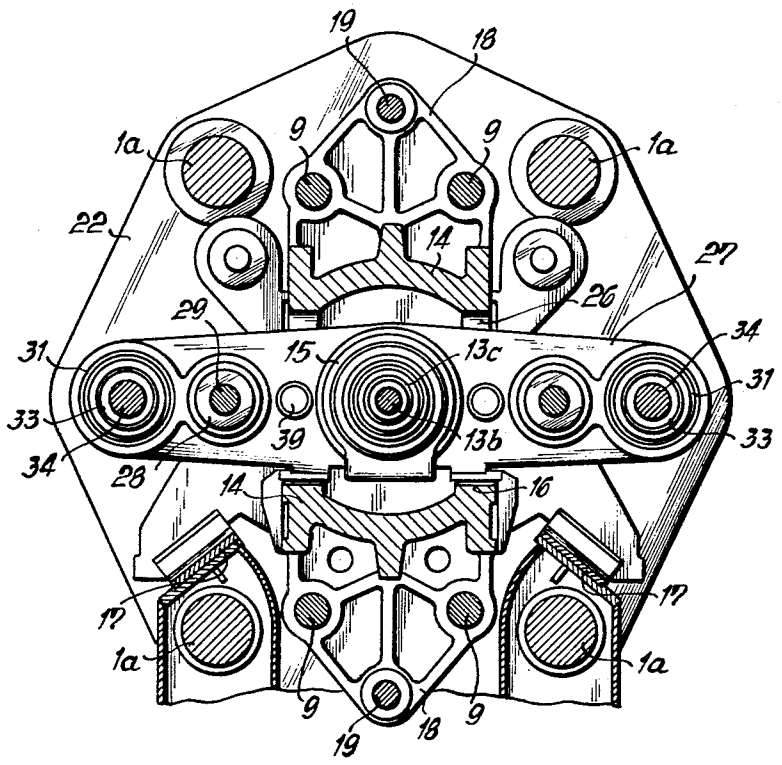
FIG. 2b

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FIG. 3



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HORIZONTAL METAL-EXTRUSION PRESSES

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6 Claims. (Cl. 207—3)

This invention relates to a horizontal metal-extrusion press, with a main extrusion piston guided in a cylinder cross-beam, and with a cross-head secured to this piston and constituting the carrier of a press ram. In particular the invention is applicable to a press for extruding metal tubes, having a piercing device, the drive for which is located in the main extrusion piston. Thus it is based on the problem of bringing extruded tubes to a very high degree of concentricity. For this it is necessary to render the piercing device that serves for the manufacture of tubes independent of all wear which is not directly connected with the piercing device. This includes, amongst other things, the wear, and also the machining, as well as the inaccuracies in the mounting of the main extrusion piston in relation to its cylinder, and of the cylinder in relation to the cylinder cross-beam. These have a directly unfavourable effect upon the piercing device, and therefore upon the concentricity of the tubes.

In general it is usual to connect the cross-head of such a press rigidly with the main extrusion piston. The most varied presses are known, both in frame construction and in column construction, with a short-flanged cross-head, or with a long cross-head which rests upon adjustable guideways; but the construction is always such that the cross-head and the main extrusion piston are centered together and relatively to one another.

From this there accrue disadvantages, which, together with the machining and mounting in accuracies occurring between the cylinder cross-beam and the main extrusion piston, as well as the wear thereof, lead to a sinking of the piston in the cylinder. Thus edge pressures arise. The rigid connection of the cross-head with the main extrusion piston occasions the transmission of any eccentric deviations of the piston to the cross-head, and with it, when there is a piercing appliance present, to the latter also, and ultimately they have an unfavourable influence upon the concentricity of the tubes. With an internally located piercing appliance, the piercing cylinder is supported in the main extrusion piston, and occasions, in the event of any eccentric supporting of the main extrusion piston, edge pressures, and the deviation of the piercing mandrel from the central. The tendency to exchange the main extrusion piston on account of these phenomena is indisputable; but the expense of doing so would increase the cost of the extruded products in an uneconomical manner.

According to the invention, therefore, the cross-head is arranged in a radially adjustable manner in relation to the main extrusion piston. In a similar manner the piercing cross-bar is radially adjustable in relation to the piercing piston or pistons. The piercing cylinder has its seat in the cross-head, and projects, with clearance, into the main extrusion piston. The radial adjusting, both of the cross-head in relation to the main extrusion piston and of the piercing cross-bar in relation to the piercing piston, is effected, according to the invention, by putting in an intermediate member.

The mandrel rod of the piercing appliance is rotatably supported, as known in itself, in a slide, the slide being guided in the cross-head. According to a further feature of the invention, the slide is constructed as a yoke,

and the limbs of the yoke carry appliances for limiting the stroke of the mandrel.

Further features of the invention will be gathered from the description of a constructional example illustrated in the accompanying drawing, in which:

FIGURES 1*a* and 1*b* illustrate a press in accordance with this invention, partly in longitudinal section, and partly in elevation, and with FIGURE 1*b* duplicating a portion of the structure shown in 1*a* for the purposes of clarity;

FIGURES 2*a* and 2*b* illustrate the press in sectional plan on the line II—II in FIGURE 1*a* and 1*b*, portions of the structure again being duplicated; and

FIGURE 3 is a view partly in elevation and partly in cross-section taken along lines III—III of FIGURES 1*a* and 1*b*, respectively.

In FIGURE 1, the essential parts of the press are marked as follows: By 1, the nuts of the press columns 1*a*, by 2 the bolster, with tool pressure plate 3, further pressure plates 4 and 5, a die 6, and a holding arm 7. The container is denoted by 8, and has displacing rods 9, the rear ends of which are mounted on a ring-traverse 9*a*. A billet to be pushed into the container 8 is marked 10. Shears 11 can be introduced from above. The press ram is marked 12, and a piercing mandrel guided therein is marked 13. The press ram 12 is secured to a cross-head 14, and the piercing mandrel 13 is secured, by way of the mandrel-holder 13*b*, to a mandrel cross-bar 15. The mandrel cross-bar 15 is longitudinally slidable upon a slideway 16, which is rigidly arranged in the cross-head. The cross-head 14 is guided on slideways 17. To crossbar-like limbs 18, projecting upwards and downwards from the cross-head 14, are attached the piston rods 19 of pistons sliding in retraction cylinders 19*a* for the withdrawal of the cross-head.

The main extrusion piston 20 is slidable in the extrusion cylinder 21, which, with its extrusion-cylinder cross-beam 22 carrying the retraction cylinders 19*a*, is supported in the usual manner. As a coupling there serves a multi-part ring flange 25, which is fixedly mounted on the cross-head and an annular ledge 20*a* on the extrusion piston 20, which engages, with radial clearance, behind the ring flange. The piercing cylinder 23 is supported in the limbs 18 of the cross-head 14, and projects freely, with its rear end, into the open cavity of the main extrusion piston 20. In the cylinder 23 is slidable a piercing piston 24, which has radial clearance with the mandrel cross-bar 15. The mandrel-holder 13*b* is attached to a mandrel-holder-carrier 13*c*, which can be rotated by means of a worm wheel 50, the mandrel-holder and the mandrel then rotating with it. This serves for the adjusting of the mandrel when producing non-circular hollow profiles.

Out from lateral window apertures 26 in the cross-head 14 project overhanging arms 27 of the mandrel cross-bar 15. These arms carry cylinders 28, in which slide the retraction pistons 29 for the mandrel cross-bars 15. These pistons 29 are attached to the front portion 14*a* of the cross-head 14. Moreover they carry means for restricting the stroke of the mandrel, that is, means which absolutely limit the forward travel of the mandrel cross-bar 15, which is necessary when extrusion is to be effected with the mandrel stationary. The arms 27 of the mandrel cross-bar 15 are for this purpose each provided with a liner 30, in which there is journalled, non-slidably but rotatably, a displacing sleeve 31, which carries a worm wheel 32. The displacing sleeve 31 is provided with an internal screw thread. It accommodates an externally screw-threaded abutment sleeve 33, which is in each case non-rotatably mounted upon one of the abutment rods 34, the rear ends of which are stationarily secured at 35. Each abutment sleeve 33 has two sliding

bushes 36 and 37, in which it carries the abutment rod 34, which at its free front end has two abutment nuts 38, against which the abutment sleeve 33 strikes when the mandrel cross-bar 15 advances. The mandrel, during its forward travel, comes to a standstill earlier or later, according to the position of the abutment sleeve 33 in relation to the projecting arms 27 of the mandrel cross-bar 15. The worm wheels 32 located on opposite sides of the mandrel cross-bar may have a common drive, in a manner not illustrated, for instance by the worms that drive them being mounted upon a common shaft.

Furthermore an appliance is provided which limits the rearward travel of the mandrel cross-bar 15 in the cross-head 14. Owing to the arrangement thereof, according to the tools inserted and the extrusion problems to be solved, the rearward travel of the mandrel cross-bar 15 relative to the cross-head can be limited, in order that no unnecessary distances may be traversed, which would obviously waste time and power. Bushes 39 are mounted for this purpose in the projecting arms 27 of the mandrel cross-bar 15, and these bushes, in sleeves 40 are non-slidably but rotatably supported. The sleeves 40 can each be driven by way of a worm wheel 41, and they each have an internal screw threaded, with which they can push out rearwards, that is, towards the right, a threaded rod 43, which is non-rotatably supported. The threaded rods 43 push with their right-hand ends against abutment plates 42, which are supported in the cross-head 14. By screwing outwards the threaded rods 43 to a greater or smaller extent, therefore, the rearward path of the mandrel cross-bar 15 in relation to the cross-head 14 can be limited. The two worm wheels 41 can be driven by worms that are mounted on a common shaft, so that the movements of the threaded rods 43 will be effected in synchronism.

Between the cross-head 14 and the main extrusion piston 20, and between the mandrel cross-bar 15 and the piercing piston 24, intermediate members 52 and 53 respectively, of soft metal or synthetic material, are provided for the purpose of compensation for any unevenness or lack of parallelism between the contact surfaces.

We claim:

1. A horizontal metal-tube extrusion press, comprising: a cylinder cross-beam, a main extrusion cylinder substantially integral with the cylinder cross-beam, a main extrusion piston guided in the main extrusion cylinder, a cross-head secured in a radially movable manner to the said piston, the cross-head being formed with lateral window apertures, a press ram carried by the cross-head, and piercing means, including: a piercing cylinder, a piercing piston slidable in the piercing cylinder, a piercing mandrel, means located in the main extrusion piston for driving the piercing means, and a mandrel cross-bar which is radially adjustable in relation to the piercing piston; and the press further comprising: arms extending from the mandrel cross-bar and projecting out of the window apertures of the cross-head, stationary abutments carried by the said arms for limiting the stroke of the mandrel, and abutment bodies, carried by the arms projecting from the mandrel cross-bar, these abutment bodies being slidable in the direction of extrusion, and being adapted to co-operate with the stationary abutments so as to stop the advance of the mandrel cross-bar when the abutment bodies meet the stationary abutments.

2. A horizontal metal-tube extrusion press as claimed in claim 1, further comprising stationary stroke-limiting rods, at the front ends of which the said stationary abutments are secured, the abutment bodies being sleeves slidable along the stroke-limiting rods as the mandrel cross-bar moves to and fro, and the abutment sleeves also being longitudinally adjustable relatively to the mandrel cross-bar.

3. A horizontal metal-tube extrusion press as claimed in claim 2, the abutment sleeves each being externally screw-threaded, and the press also comprising internally screw-threaded displacing sleeves rotatably but non-slidably mounted in the projecting arms of the mandrel cross-bar and engaging the external screw-threads of the abutment sleeves, and means for effecting the longitudinal adjustment of the abutment sleeves by rotating the displacing sleeves.

4. A horizontal metal-tube extrusion press as claimed in claim 3, further comprising worm wheels secured to the displacing sleeves, and a common worm shaft for rotating the worm wheels synchronously.

5. A horizontal metal-tube extrusion press as claimed in claim 4, further comprising: abutments on the cross-head, and axially adjustable abutments in the mandrel cross-bar adapted to co-operate with the abutments on the cross-head so as to limit the rearward movement of the mandrel cross-bar.

6. A horizontal metal-tube extrusion press as claimed in claim 5, the axially adjustable abutments being externally screw-threaded rods, and the press further comprising worms and worm wheels for rotating these rods and thereby effecting the axial adjustment of the abutments in the mandrel cross-bar.

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