DEVICE FOR FASTENING THE OPERATING DIE OR RAM IN AN EXTRUSION PRESS

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ABSTRACT OF THE DISCLOSURE

A device for fastening and centering the operating die or ram in an extension press by means of a pair of rela-

tively to the ram axis longitudinally converging pressure

loaded clamping pistons movably mounted in a cradled

open-top support for the ram; said support is attached to

and moves with the hydraulic driving piston for the ram

and houses in its cradle an inwardly conical centering ring

which embraces a conical section of the end portion of

the ram and which has on its frontal face a pair of flats in-
clinal conformingly to the operative faces of said longi-

tudinal converging clamping pistons for cooperation ther-

with.

BACKGROUND OF THE INVENTION

My invention relates to a device for fastening and

centering the driven die or ram in an extrusion press by

hydraulic clamping pistons arranged in the ram holder.

In a known device, the ram is axially inserted into a

holder and is fastened therein by hydraulically operated

slides inclined on the horizontal and distributed around

the circumference of the ram holder. The end faces of

the slides engage radially into an annular groove in the

base of the ram. To center the ram in the holder, the

latter is provided with an axially movable centering ring

whose conical opening cooperates with a corresponding

conical face of the ram. The centering ring and conical

face of the ram are provided with complementary grooves

and can be mutually locked in the manner of a bayonet

joint. This known device has the disadvantage that the

ram must be axially introduced into the holder and that

the exact guiding of the ram, whose claws must be intro-

duced into the grooves of the centering ring, necessitates

special assembly tools. In like manner, when the ram is to

be taken out, it must first be pulled in axial direction

out of the holder before it can be taken out of the press.
Further, the centering by the slides, which are only slight-

ly inclined relative to the horizontal, is quite defective,

so that in the known device the centering ring must be

pressed by special compression springs against the con-

conal face of the ram or respectively, in the direction of

the counter-bearing of the main driving piston. To insert

and remove the ram however, the force of the compres-

sion springs acting on the centering ring must be over-

come, and for this reason special hydraulic pressure pis-

tons acting on the centering ring are arranged in the ram

holder. Accordingly, the known device is very compli-

cated not only generally in its design and operation but

also with respect to the hydraulic controls of the two

independent pistons acting on the centering ring and on

the slides.

SUMMARY OF THE INVENTION

The problem underlying the invention consists in pro-

viding a fastening and centering device of simple design

which permits the operating die or ram to be easily and

quickly inserted into and removed from its holder in the

press without the use of special tools. According to the

invention, this problem is solved by arranging in the ram

holder on each side of its longitudinal center two clamp-

ing chucking pistons whose longitudinal axes converge

and are inclined toward the axis of the ram, the piston

faces bearing against guide tracks or flats of a centering

ring resting in a horseshoe-shaped open-top opening of

the ram holder.

The special advantage of the device according to my

invention results from the fact that the forces exerted by

the clamping or chucking pistons on the centering ring

divide into two components, one of which presses the ram

embraced by the centering ring against its axial counter-

bearing, while the other component presses the center

ring with the ram against its rear counter-bearing lying

in the direction of insertion. In this way an exact adjust-

ment of the ram in relation to the centering ring is always

insured. A further advantage of my improved device con-

sists therein that the ram at its free end has a centric threaded bore with eyebolt and a locking

pin or bolt to be inserted into the eye of the bolt. In this way the ram and the receiver can be taken out

together when the ram is in the receiver and is locked

thereto by said cooperating lockbolt and eyebolt. By hook-

ing a disassembling tool into an eyelet on the receiver

shell or cover the receiver and the ram can then be lifted

clear of the device together.

BRIEF DESCRIPTION OF DRAWING

In the following, an illustrative embodiment of the in-

vention is described in detail with reference to the draw-

ings in which is

FIG. 1 a side view, partly in section, as defined by

line I-I in FIG. 2, of an extrusion press provided with

the fastening and centering device according to the inven-

tion;

FIG. 2, a vertical longitudinal section along line II-II

in FIG. 1;

FIG. 3, a horizontal section along line III-III of

FIG. 1;

FIG. 4, an enlarged partial side view of the centering

ring resting in the ram holder of the extrusion press;

FIG. 5, a horizontal longitudinal section along line

V-V of FIG. 4;

FIG. 6, a vertical section through the centering ring

along line VI-VI of FIG. 4; and

FIG. 7, a horizontal section through a part of the press,

the ram being locked in the receiver during disassembly.

DESCRIPTION OF THE SHOWN

SPECIFIC EMBODIMENT

In the press frame comprising a cross-head 7 and the

standards 7', is a cylinder 8, which houses a driving pis-

ton 9. A cradled cross support 11 is fastened by screws

12 to a piston 9 and includes a substantially horseshoe-

shaped open-top opening 10 in which centering ring 13

rests which receives and holds the head portion of ram

14. The central opening of the centering ring 13 is at

least partially conicaldistilling towards the piston 9 and

the therein received head portion of the ram 14 has a

cooperating conical surface. The support 11 is desirably

guided by the standards 7' of the press frame. To facili-

tate the insertion and removal of the centering ring with

the ram 14, the centering ring 13 is provided on its ac-

cessible top surface with an eyelet 15, into which a jack

can be hooked. The centering ring 13 has in the head por-

tion of its front face (FIGS. 4 and 5) upwardly con-

verging longitudinal bearing faces 16, 17 against which

bear the frontal faces of clamping pistons 18, 19 located
in conforming bores in the cradled support 11, said bores longitudinally converging and being inclined toward the axis of the ram 14.

The inclined position of the clamping pistons 18, 19 effects that after insertion of the centering ring 13 with the ram 14, when the driving piston 9 is pressure-loaded, the ram 14 is pressed by the centering ring 13 against its counter-bearing face 21 of the drive piston 9 as well as against the cylindrical contact face 22 of the horseshoe-shaped opening 10 acting as radial counter-bearing. The clamping pistons 18, 19 are connected by channels 24 or by a known piping system from a pressure source, said pipings including according to the invention a check valve between which and the clamping pistons 18, 19 a hydraulic accumulator is arranged.

After the insertion of the centering ring 13 with ram 14, the clamping pistons 18, 19 are connected by a three-way valve with a pressure source, so that the centering ring 13 with ram 14 are pressed against the axial counter-bearing face 21 and against the radial counter-bearing face 22 thereby the ram 14 being centered. To facilitate assembly, a certain amount of play is provided between the cylindrical inner wall of the horseshoe-shaped opening 10 of the cradled support 11 and the outer surface of the centering ring 13. Moreover, the said play effects that the clamping pistons 18, 19, when the maximal retractile force of the press pulls the ram 14 back, are pressed counter to the prevailing hydraulic pressure into their cylindrical bores by an amount corresponding to the assembly clearance until the centering ring 13 rests on the axial counter-bearing face 23. The pressure medium thus displaced by the clamping pistons 18, 19 is taken up by the accumulator, thereby causing a slight increase of pressure which upon easing of the traction forces again presses the centering ring 13 with ram 14 against its counter-bearing face 21, 22.

When changing rams, the space of the cylindrical bores of the clamping pistons 18, 19 is switched to outflow by a three-way valve operated manually or electrically, while the pressure medium supply from the accumulator is shut off. When a jack is hooked into the eyebolt 15 on the centering ring 13, the same together with the ram 14 can in radial direction be pulled out of the horseshoe-shaped opening 10 in the support 11. The operating flats 16, 17 arranged on the centering ring 13 then push the clamping pistons 18, 19 back into their cylindrical bores, so that the horseshoe-shaped opening 10 is completely freed for the insertion of a new centering ring with ram.

Instead of the pressure-medium loaded clamping pistons 18, 19, there may be provided in the ram support 11 correspondingly inclined screw-bolts, with which a good fastening and centering can be effected; this however, has a number of disadvantages, so that generally the use of clamping pistons is to be preferred. When said screw-bolts are used the loosening or tightening of the screws is often difficult because when changing tools after prolonged operation of the press, the insertion of a new cold ram results due to heat transfer and conduction at the ram head in head variations which have to be absorbed by the fastening screws. At the next following change of a ram it is then quite difficult to unscrew the overtensioned screws.

To permit a rapid joint removal of the receiver 25 and ram 14 together with the centering ring 13, ram 14 is provided with an axial threaded bore 26, into which an eyebolt 27 is screwed. By tightening the eyebolt 27 into the ring of the eyebolt 27, the ram 14 is locked in the receiver 25.

Disassembly is then effected in that first the receiver-holder 29 with the receiver 25 is moved in the direction of the ram 14 which is locked in the receiver 25 by said lockbolt 27. After the return movement of the receiver-holder 29, there is exposed at the receiver shell 31 an eyebolt 30 into which a gripping tool 32 can be hooked for lifting the receiver 25 and the ram 14 with the centering ring 13 (FIG. 7). As soon as the receiver-holder 29 is completely moved back i.e. pulled off the receiver 25, the latter and ram 14 with centering ring 13 can be lifted out of the machine together.

Having shown and described one desired specific embodiment of my invention to illustrate the principles thereof, it will be understood that it may be otherwise embodied without departing from such principles and from the scope of the appended claims.

I claim:

1. In an extrusion press a device for fastening and centering the operating die or ram comprising in combination a machine frame; a power cylinder with driving piston mounted therein; a ram operated by said piston; a supporting member for the ram attached to the outer face portion of said piston and having a substantially horseshoe-shaped cradled interior open at its top and a cylindrical bottom; a centering ring embracing the ram and adapted to be introduced into said supporting member through its open top to slidably rest upon said cylindrical bottom; the centering ring having a central conical opening dilating towards the outer face portion of the driving piston; one end of the ram contacting said outer face portion of the piston; a pair of bores in the supporting member, said bores arranged symmetrically to the longitudinal axis of the ram and converging in slanted position towards the driving piston; a clamping piston in each of said slanted bores having a power loaded end face and an operating end face; and operating flats on the front face of the centering ring for cooperation with the operating end face of each clamping piston the component of the force applied by the clamping pistons in a direction parallel to the axis of the ram being greater than the component perpendicular to the axis of the ram.

2. A device according to claim 1 comprising a hydraulic power piping leading towards said clamping pistons and a hydraulic accumulator within said piping.

3. A device according to claim 1 comprising a receiver shell cooperating with the ram and an eyebolt thereupon for lifting the same with the ram out of the machine frame.

4. In an extrusion press, a device for fastening the ram to the driving piston, said device comprising:

(A) a frame, a power cylinder attached to the frame, and a driving piston slidably mounted in the power cylinder, said driving piston having a power loaded end face and an operating end face;

(B) a horseshoe shaped supporting member fixedly attached to the operating end face of the power piston; and

(C) a dual piston means carried by the supporting member for clamping the ram to the operating end face of the power piston the component of the force applied by the dual pistons in a direction parallel to the axis of the ram being greater than the component perpendicular to the axis of the ram.

5. In an extrusion press a device for fastening the ram to the driving piston said device comprising:

(A) a driving piston having a power loaded end face and an operating end face;

(B) a horseshoe shaped supporting member fixedly attached to the operating end face of the power piston; and

(C) a dual piston means carried by the supporting member for clamping the ram to the operating end face of the power piston the component of the force applied by the dual pistons in a direction parallel to the axis of the ram being greater than the component perpendicular to the axis of the ram.

6. In an extrusion press, a device for fastening the ram to the driving piston said device comprising:

(A) a driving piston;
(B) a ram coaxially alignable with the driving piston;
(C) means for laterally moving the ram with respect
to the driving piston to coaxially align the ram and
the driving piston; and
(D) dual piston means for clamping the ram to the
driving piston the component of the force applied
by the dual pistons in a direction parallel to the
axis of the ram being greater than the component
perpendicular to the axis of the ram.
7. The device of claim 6 wherein the pistons of the dual
piston means each have a substantially planar operating
end face adapted to contact a corresponding face on
the ram.
8. The device of claim 6 wherein the pistons of the
dual piston means are arranged symmetrically to the
direction of lateral movement of the ram.

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