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(54) Improved press for extruding non-ferrous metal section members

(57) An extruding press for extruding non-ferrous metal section or profiled elements comprises an extruding punch (2) driven by hydraulic driving cylinders (3, 4), fluid-supplied by a pump controlled by at least a motor (16) having a low moment of inertia, in particular a three-phase asynchronous motor for converters.

With respect to prior extruding presses for extruding non-ferrous metal section members, the inventive press provides the advantage of overcoming a conventional requirement of providing servo-valves and a related driving pump, for controlling the cylinder driving pump flowrate or displacement.

A further advantage of the inventive extruding press is that the cylinder driving pump motor is driven only as it is necessary, and is left in a rest condition as the press cylinder is in a rest condition.

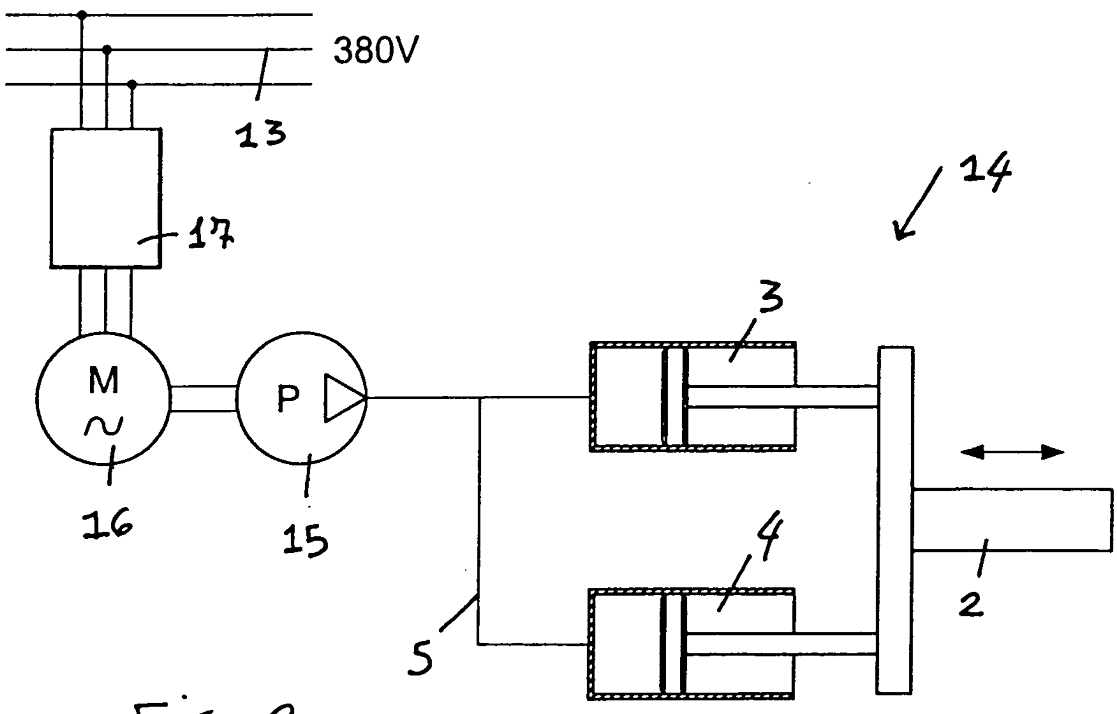

FIG. 2

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an improved press for extruding non-ferrous metal section members.

[0002] More specifically, the field of the invention is that of pressing apparatus using for extruding section members or profiled elements (such as door profiled elements, motor vehicle profiled elements and son on), starting from non-ferrous metals (such as aluminium, bronze, copper, brass and the like.

[0003] The above mentioned presses conventionally use variable displacement pumps, coupled to servo-valves and electric motors.

[0004] In such constructions, the press cylinder fluid (usually oil) is circulated by the pump, in turn driven at constant R.P.M.'s by the electric motor.

[0005] The displacement or flow-rate of the pump is changed depending on the press cylinder movement requirements (in particular during the filling of the material to be extruded), while holding the motor R.P.M.'s constant, and by changing the inclination of the pump plate, by means of a specifically designed servo-valve.

[0006] The above disclosed construction has the drawback that it requires that a servo-valve be used, which, in addition to being a separated component, susceptible to failure and requiring frequent servicing operations, also requires a dedicated driving system.

[0007] A further drawback of the above mentioned construction is the requirement of holding the electric motor in a rated operation range, even in periods in which the pump is in a rest condition, which negatively affects the overall system managing cost.

SUMMARY OF THE INVENTION

[0008] Accordingly, the main object of the present invention is to provide a novel extruding press for extruding non-ferrous metal section members, which is much more simple than conventional extruding presses and, moreover, comprises a small number of press components.

[0009] Another object of the present invention is to provide such an extruding press which, differently from prior like extruding presses, allows to achieve a very high power saving, in particular in driving the pump controlling motor.

[0010] The above objects, as well as yet other objects, are achieved by the extruding press according to claim 1.

[0011] Preferred embodiments of the invention are defined in the dependent claims.

[0012] With respect to prior non-ferrous metal section member extruding presses, the inventive extruding press provides the advantage of eliminating the requirement to include therein a plurality of servo-valves, and the related driving pump, as well as that to precisely control the cylinder driving pump flow-rate.

[0013] Yet another advantage of the inventive extruding press is that the cylinder driving pump operating motor is driven only as it is effectively required, while leaving said motor in a rest condition, or at low R.P.M.'s, as the press cylinder is a rest condition, while discriminating the number of driving motors to be used, depending on the contingent operating requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The above objects, as well as yet other objects, advantages and features of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred embodiment of the invention, which is illustrated, by way of a non limitative example, in the accompanying drawings, where:

Figure 1 is an operating diagram of a conventional extruding press for extruding non-ferrous material section members;
Figure 2 shows a schematic diagram of an inventive extruding press;
and
Figure 3 shows an operating diagram and principle of a low inertia motor used in the extruding press shown in figure 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] The extruding press 1 of figure 1, which is a conventional type of extruding press, comprises a pressing punch 2 for extruding a non-ferrous metal section member, made, for example, of an aluminium material (not shown).

[0016] The pressing or extruding punch 2 is in turn driven by oil-dynamic or hydraulic driving cylinders 3 and 4, therethrough the operating or driving fluid is conveyed, inside a respective driving circuit 5, by a variable displacement pump 6.

[0017] In particular, said variable displacement pump 6 comprises a pump plate 7, the inclination of which is controlled by a respective servo-valve 8, in turn controlled by a driving pump 9, controlled by a dedicated motor 10. The rotary movement of the pump 6 plate 7 is controlled with constant R.P.M.'s, by a driving motor 11, coupled to the electric mains 13, through a switching assembly 12.

[0018] In this prior embodiment, the electric motor 11 is a conventional asynchronous motor, rotatively driving the plate 7 of the pump 6 at a constant revolution number, and accordingly independently from the operating status of the cylinders 3 and 4 of the extruding press 1.

[0019] This is provided to overcome the drawbacks related to a slow response of the electric motor 11 to the operation of the pump 6, the flow-rate or displacement of which is controlled by the inclination of its plate 7.

[0020] The extruding press according to the invention, indicated by the reference number 14 in figure 2, comprises a pressing or extruding punch 2, in which the hydraulic cylinders 3 and 4 are driven by a fluid conveyed, inside the respective hydraulic circuit 5, by a piston pump 15.

[0021] Said piston pump 15 is in turn controlled by a low inertia electric motor 16, in particular a converter three-phase asynchronous motor, having a forced ventilating system and a square motor casing.

[0022] As is clearly shown in the diagram of figure 3, said electric motor 16 is a four-pole three-phase asynchronous motor, comprising a square casing 18, an independent radial electro-fan 19, a double-output shaft 26 for coupling an encoder assuring a high operating precision, connectors 20 for the motor brake 25 and for the encoder, insulating elements 21, strengthened by vacuum resins, a low inertia rotor 22, thermal probes 23, having a non-linear variable resistance, arranged in the motor windings, and a low leak magnetic sheet element 24, designed for providing a high electromagnetic efficiency.

[0023] The electric motor 16, in particular, is so designed to be coupled by frequency converters (either of a V/f or of a vectorial type) and is adapted to operate like a D.C. motor and brushless servo-motors, so as to provide a greatly improved performance with respect to a conventional asynchronous type of electric motor. The number of revolutions of the motor 16 is in turn controlled by an inverter 17 coupled to the mains 13.

[0024] According to the present invention, the flow-rate of the operating fluid to the cylinders 3 and 4 is herein controlled not by the pump 15 which, in this case, has a constant delivery flow-rate, but by the revolution number of the motor 16 driving said pump 15.

[0025] In fact, said motor 16, which, as stated, is a three-phase asynchronous motor of a type suitable for converters, has a very small inertia, thereby allowing to provide a quick response for quickly changing, if required, the displacement speed of the extruding punch 2, for example in feeding the metal material to be extruded, to properly distinguish this feeding step from the extruding step of the section member, performed with a constant extruding speed.

[0026] For further clarifying the advantages of the invention with respect to the above disclosed prior art, a Table is herein enclosed, showing the power drain of a conventional motor 11 and of a low inertia motor 16, as the flow-rate and pressure of the pumps 6 and 15 change depending on the fluid delivery required by the press oil-dynamic cylinders 3 and 4.

[0027] In the herein considered example, the pumps 11 and 16 of the extruding systems 1 and 2 respectively operate at 690 operating cycles/day, for a period of time of 15 sec during the extruding material loading step, 105 sec in the extruding step proper, and with 1 h of machine rest time. The motor 10 of the pump 9 of the servo-valve 8 of the system of figure 1, on the contrary, operates for 24 h/day.

[0028] The motors 11 and respectively 16 are herein provided in a number of three, each having a power of 135 kW, for controlling each respectively a respective pump 6 and 15.

[0029] The motor 10 has a power of about 25 kW.

TABLE

	MATERIAL LOADING	EXTRUDING	PERIOD OFREST OF THE PRESS	SERVO-VALVE 8	TOTAL CONSUMED POWER/DAY (kWh)
<u>Prior art</u> Consumed Power (kW) motors 11	I X 70 II X 70 III X 70	I X 130 II X 130 III X 25	I X 25 II X 25 III X 25		
Total consumed power (kW) by the motors 11	210	285	75		

(continued)

	MATERIAL LOADING	EXTRUDING	PERIOD OFREST OF THE PRESS	SERVO-VALVE 8	TOTAL CONSUMED POWER/DAY (kWh)
Power consume/day (kWh)	603	5.700	75	360	6.738
<u>Invention</u> Consumed Power (kW) by the motors 16	I X 70 II X 70 III X 70	I X 130 II X 130 III/	I/ II/ III/		
Total Consumed Power (kW) for the motors 16	210	260	/		
Consumed power/day (kWh)	603	5.200	/	/	5.803

[0030] As shown in the above Table, the power saving achieved by the system of figure 2 (due to the reduction of the number of the operating motors) corresponds to about 14%/day.

[0031] This power saving is obviously multiplied as a greater number of motors 16 and corresponding pumps 15 are used.

Claims

1. An extruding press for extruding non-ferrous metal section members, of the type comprising an extruding punch (2), driven by hydraulic driving cylinders (3, 4) in turn driven by at least a pump (15) controlled by a motor (16), **characterized in that** said motor (16) is a low moment of inertia motor.

2. An extruding press according to claim 1, **characterized in that** said motor (16) is a three-phase asynchronous motor for converters.

3. An extruding press according to claim 2, **characterized in that** said motor (16) is a four-pole three-phase asynchronous motor, including a square casing (18) and an independent radial electro-fan (19).

4. An extruding press according to claim 3, **characterized in that** said motor (16) comprises a double-output motor shaft (26) for coupling an encoder, vacuum resin reinforced insulating elements (21), a low inertia rotor (22), a non-linear variable resistance thermal probes (23) arranged in the motor windings and a low leakage magnetic metal sheet. element (24).

5. An extruding press according to any or more of the preceding claims 1 to 4, **characterized in that** said extruding press further comprises an inverter (17) for adjusting the number of revolutions of said motor (16).

6. An extruding press according to claim 5, **characterized in that** said at least a pump is a constant flow-rate pump (15) controlled by said motor (16) without an assistance of a servo-valve device.

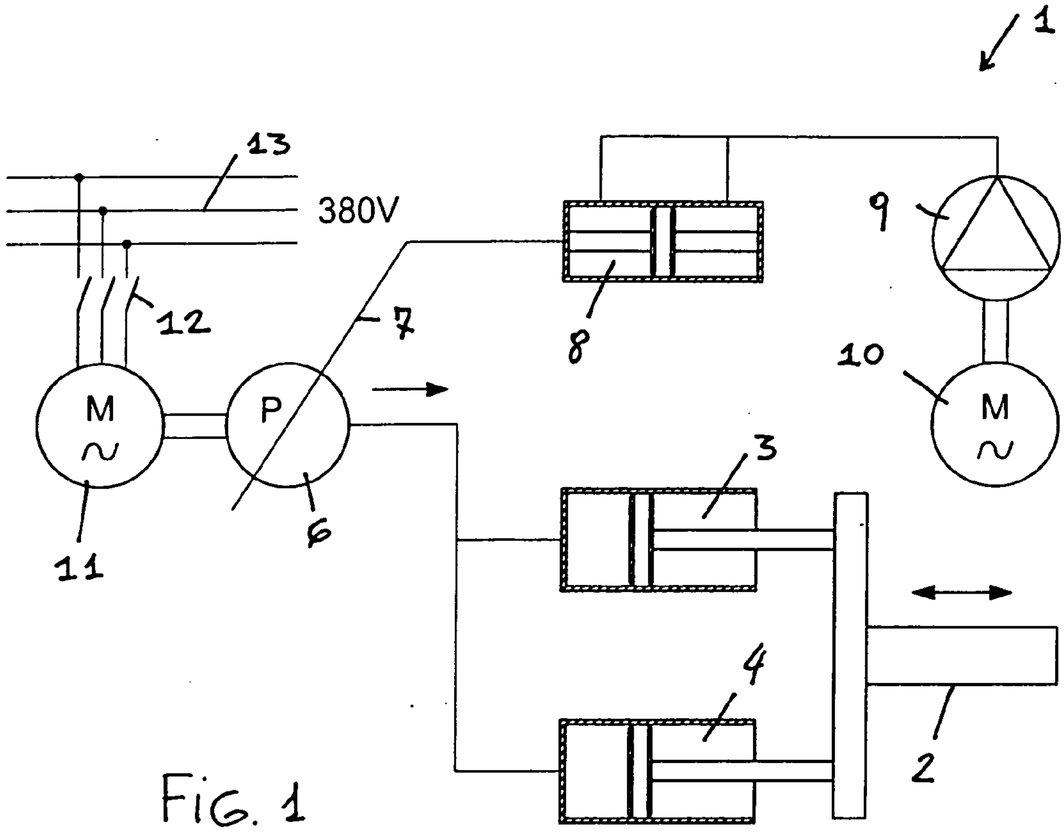

Fig. 1

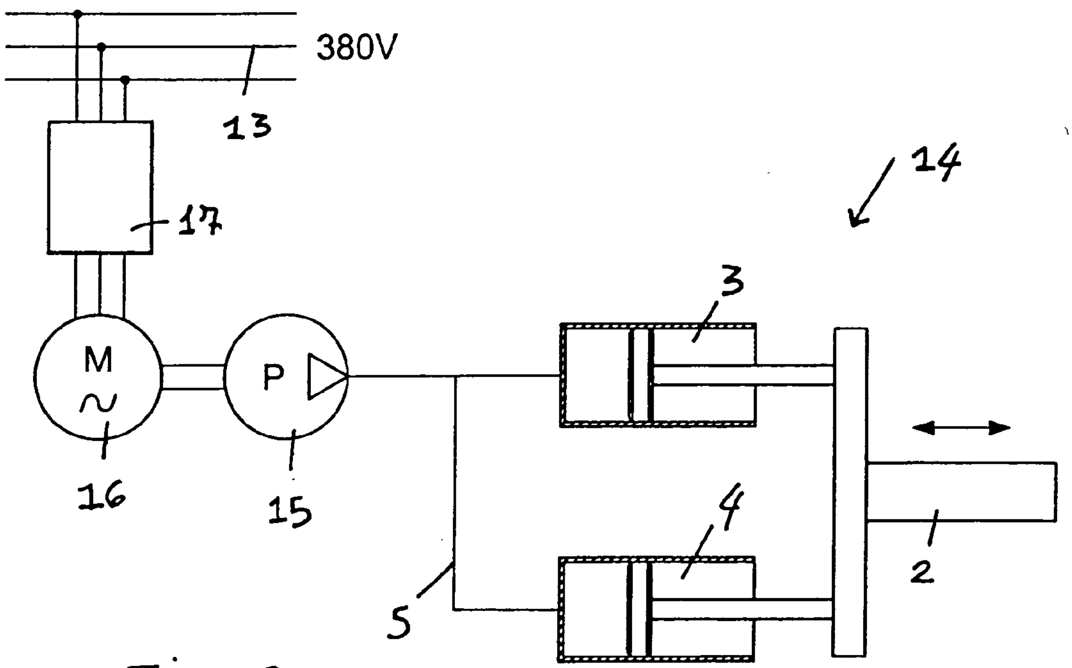

Fig. 2

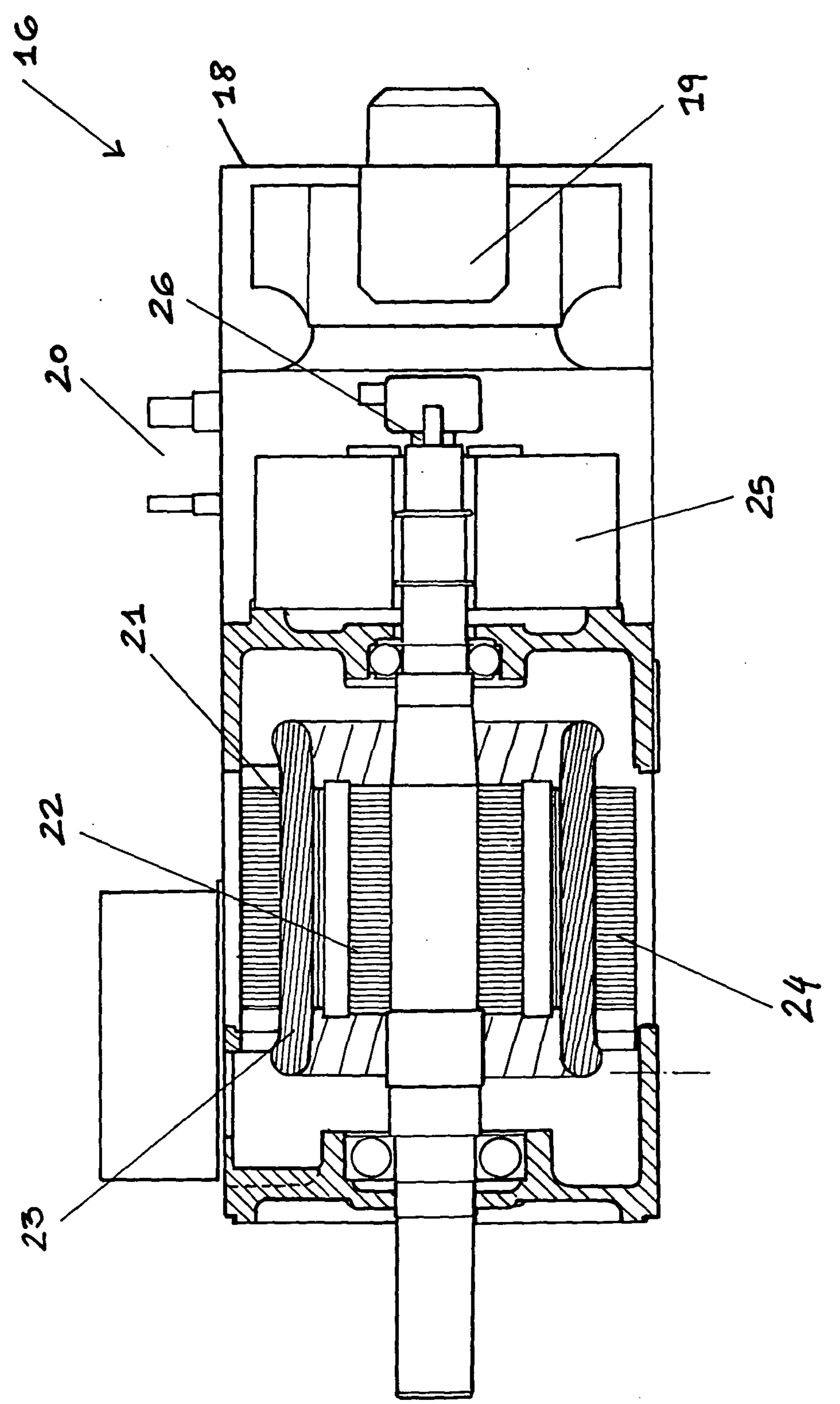

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 01 0226

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	JP 01 309718 A (NIPPON ALUMINIUM MFG; NIPPON ALUMINUM KENZAI KK) 14 December 1989 (1989-12-14) * abstract; figure 1 * -----	1	INV. B21C23/21 B21C31/00
A	US 3 649 816 A (JOHNES ALFRED W ET AL) 14 March 1972 (1972-03-14) * column 2, line 24 - line 73; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)
B21C
B30B

1

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 September 2008	Ritter, Florian

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 01 0226

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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25-09-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 1309718	A	14-12-1989	NONE	
US 3649816	A	14-03-1972	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82