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

Verbesserte Presse zum Strangpressen von Profilelementen aus Nichteisenmetall

Presse améliorée pour extruder des éléments à section métallique non ferreuse

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EP 2 000 226 B1

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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] An extruding press according to the preamble of claim 1 is e.g. known from JP-A-013 09 718.

[0003] 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.

[0004] The above mentioned presses conventionally use variable displacement pumps, coupled to servo-valves and electric motors.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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

[0009] 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.

[0010] 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.

[0011] The above objects, as well as yet other objects, are achieved by the extruding press according to claim 1.

[0012] Preferred embodiments of the invention are defined in the dependent claims.

[0013] 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.

[0014] 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 in a rest condition, while discriminating the number of driving motors to be used, depending on the contingent operating requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] 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

[0016] 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).

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] In the herein considered example, the pumps 6 and 15 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.

[0029] 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.

[0030] The motor 10 has a power of about 25 kW.

TABLE

	MATERIAL LOADING	**EXTRUDING**	**PERIOD OF REST OF THE PRESS**	**SERVO-VALVE 8**	**TOTAL CONSUMED POWER/DAY (kWh)**
Prior art					
Consumed Power	I X 70	I X 130	I X 25		
(kW)	II X 70	II X 130	II X 25		
motors 11	III X 70	III X 25	III X 25		

(continued)

	MATERIAL LOADING	EXTRUDING	PERIOD OF REST OF THE PRESS	SERVO-VALVE 8	TOTAL CONSUMED POWER/DAY (kWh)
Total consumed power (kW) by the motors 11	210	285	75		
Power consume/day (kWh)	603	5.700	75	360	6.738
Invention 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

[0031] 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.

[0032] 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 nonferrous 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 an electric 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 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.

Patentansprüche

1. Strangpresse zum Strangpressen von Profilelementen aus Nichteisenmetall von der Art, die einen Pressstempel (2) umfasst, der durch hydraulische Antriebszylinder (3, 4) angetrieben wird, die wiederum durch zumindest eine Pumpe (15) angetrieben werden, welche durch einen Motor (16) gesteuert wird, **dadurch gekennzeichnet, dass** der Motor (16) ein Elektromotor mit geringem Trägheitsmoment ist.

2. Strangpresse nach Anspruch 1, **dadurch gekennzeichnet, dass** der Motor (16) ein Drehstrom-Asynchronmotor für Umrichter ist.

3. Strangpresse nach Anspruch 2, **dadurch gekennzeichnet, dass** der Motor (16) ein vierpoliger Drehstrom-Asynchronmotor ist, der ein rechteckiges Gehäuse (18) und ein unabhängiges Radialelektrogebläse (19) aufweist.

4. Strangpresse nach Anspruch 3, **dadurch gekennzeichnet, dass** der Motor (16) eine Doppelausgangs-Motorwelle (26) zum Ankoppeln eines Codierers, vakuumharzverstärkte Isolierelemente (21), einen Rotor (22) mit geringer Trägheit, Wärmesonden (23) mit nichtlinearem veränderlichen Widerstand, die in den Motorwicklungen angeordnet sind, und ein magnetisches Metallblechelement (24) mit geringem Streuverlust umfasst.

5. Strangpresse nach einem der vorhergehenden Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Strangpresse ferner einen Inverter (17) umfasst, um die Anzahl der Umdrehungen des Motors (16) zu regulieren.

6. Strangpresse nach Anspruch 5, **dadurch gekennzeichnet, dass** die zumindest eine Pumpe eine Pumpe (15) mit konstanter Durchflussmenge ist, die durch den Motor (16) ohne Unterstützung einer Servoventilvorrichtung gesteuert wird.

Revendications

1. Presse à extruder permettant d'extruder des profilés en métal non ferreux, du type comprenant un poinçon d'extrusion (2), entraîné par des vérins hydrauliques d'entraînement (3, 4) à leur tour entraînés par au moins une pompe (15) commandée par un moteur (16), **caractérisée en ce que** ledit moteur (16) est un moteur électrique à faible moment d'inertie.

2. Presse à extruder selon la revendication 1, **caractérisée en ce que** ledit moteur (16) est un moteur asynchrone triphasé pour convertisseurs.

3. Presse à extruder selon la revendication 2, **caractérisée en ce que** ledit moteur (16) est un moteur asynchrone triphasé tétrapolaire, comportant un carter carré (18) et un électro-ventilateur radial indépendant (19).

4. Presse à extruder selon la revendication 3, **caractérisée en ce que** ledit moteur (16) comprend un arbre de moteur à double sortie (26) permettant de coupler un codeur, des éléments renforcés en résine d'isolation sous vide (21), un rotor à faible inertie (22), des sondes thermiques non linéaires à résistance variable (23) agencées dans les enroulements du moteur et un élément de tôle métallique magnétique à faible fuite (24).

5. Presse à extruder selon l'une quelconque des revendications 1 à 4, **caractérisée en ce que** ladite presse à extruder comprend en outre un inverseur (17) permettant de régler le nombre de tours par minute dudit moteur (16).

6. Presse à extruder selon la revendication 5, **caractérisée en ce que** ladite au moins une pompe est une pompe à débit constant (15) commandée par ledit moteur (16) sans aide d'une servo-vanne.

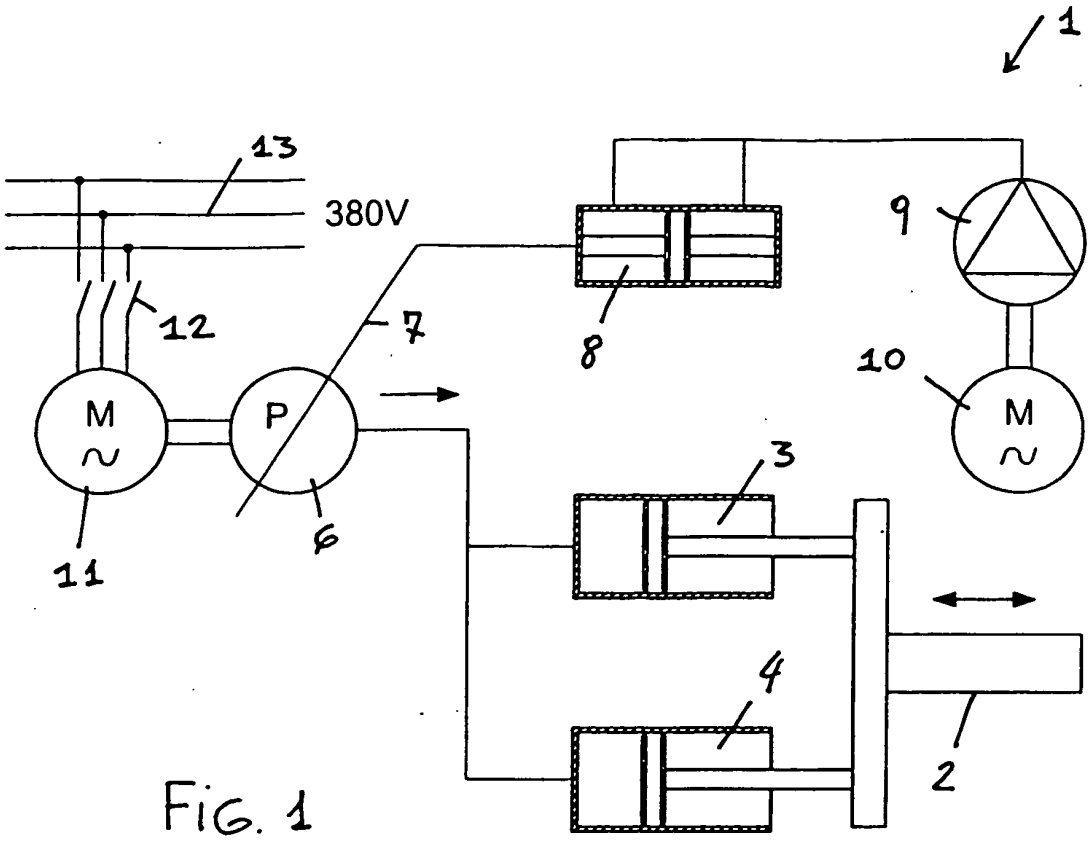

FIG. 1

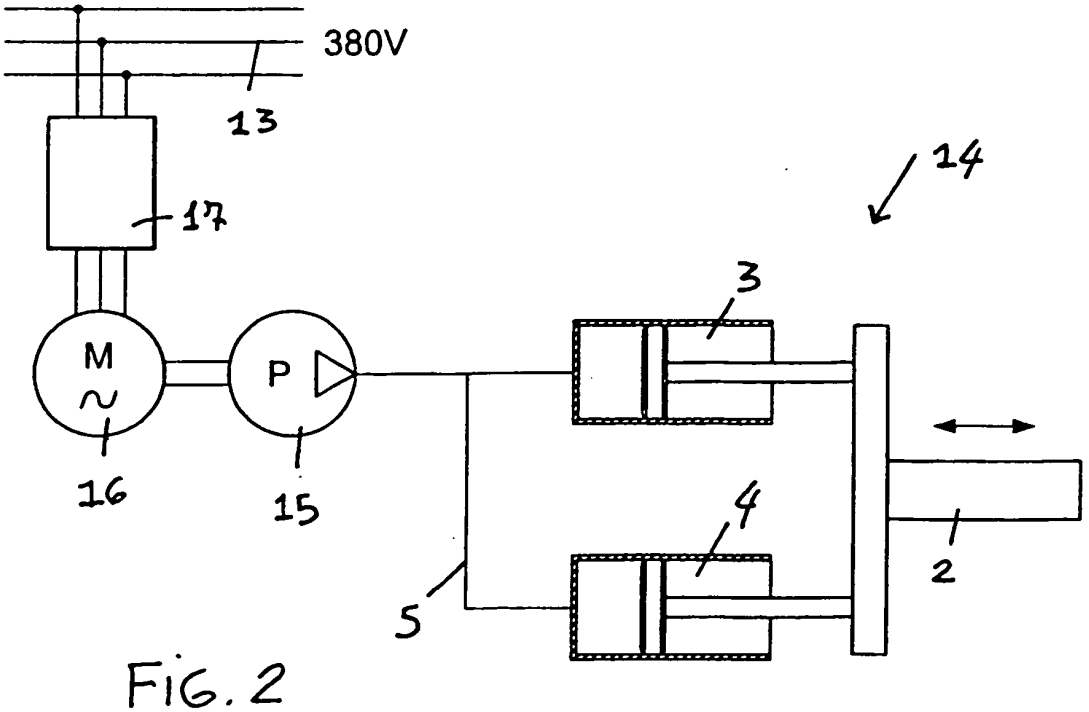

FIG. 2

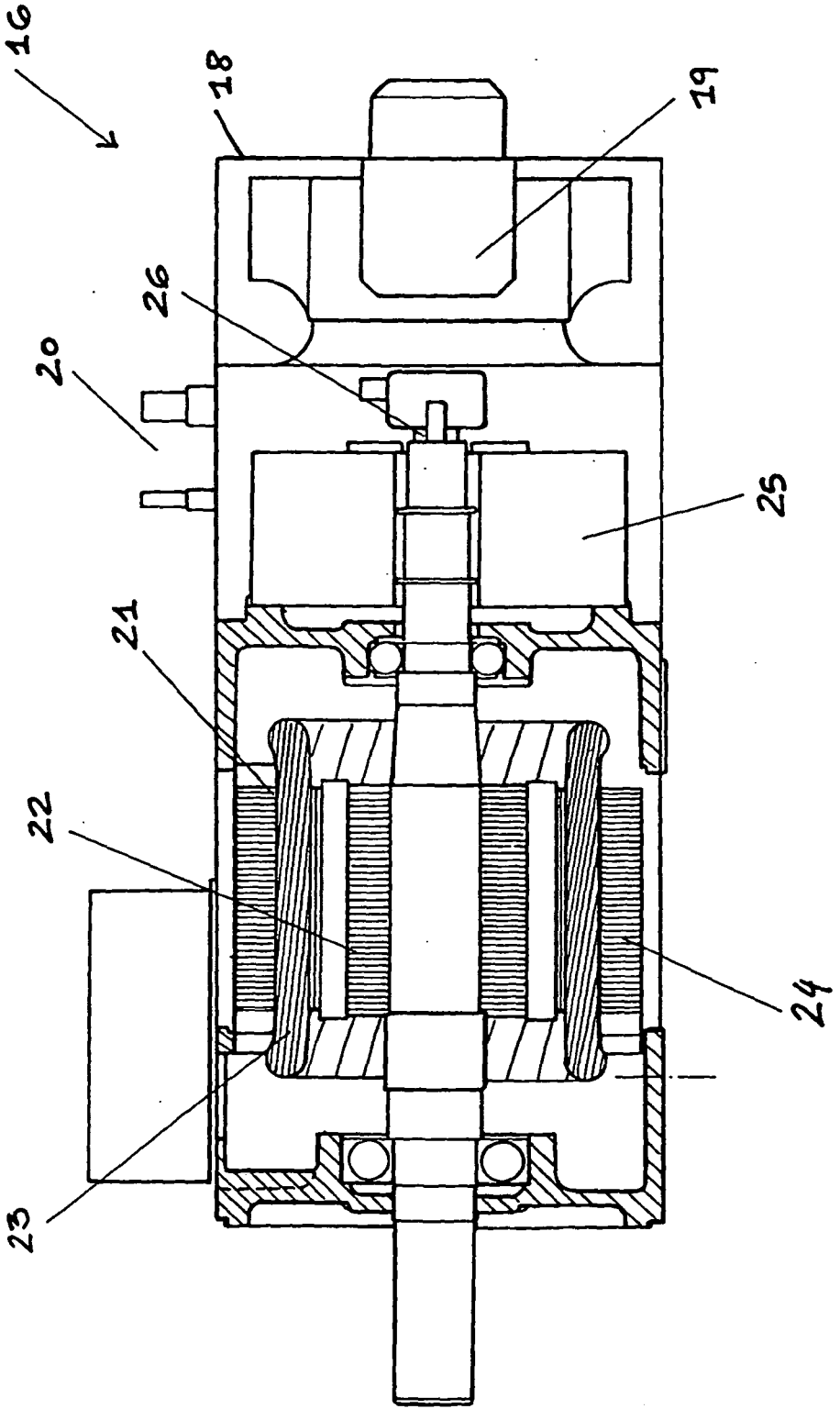

FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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