

[72] Inventor Lucien Diolot
Neuilly Sur Seine, France
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[73] Assignee Societe Nouvelle Spidem
Paris, France
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Primary Examiner—Edgar S. Burr
Assistant Examiner—Clifford D. Crowder
Attorney—Craig, Antonelli, Steward & Hill

[54] VARIABLE PRESSURE EMBOSsing MACHINE
8 Claims, 5 Drawing Figs.

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101/247, 100/170
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B30b 3/04
[50] Field of Search..... 101/23,
247; 100/170; 192/098; 107/68—69

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ABSTRACT: An embossing machine having means to vary the pressure of the cooperating embossing rolls employing hydraulic power cylinders to provide the substantially constant main force pressing the embossing cylinders together. Control hydraulic jacks are placed operatively between the cylinders to press them apart with a predetermined selected pressure to thereby selectively vary the resultant engaging pressure of the cylinders. Preferably, the jacks and power cylinders receive their hydraulic fluid from the same supply and the jacks are provided with motor reducer control units that may be coupled together for simultaneous adjustment of the jacks on each axial end of the cylinders or uncoupled for separate adjustment. Also, the jacks are retractable along with the upper cylinder supporting structure so that the cylinders may be easily removed and replaced.

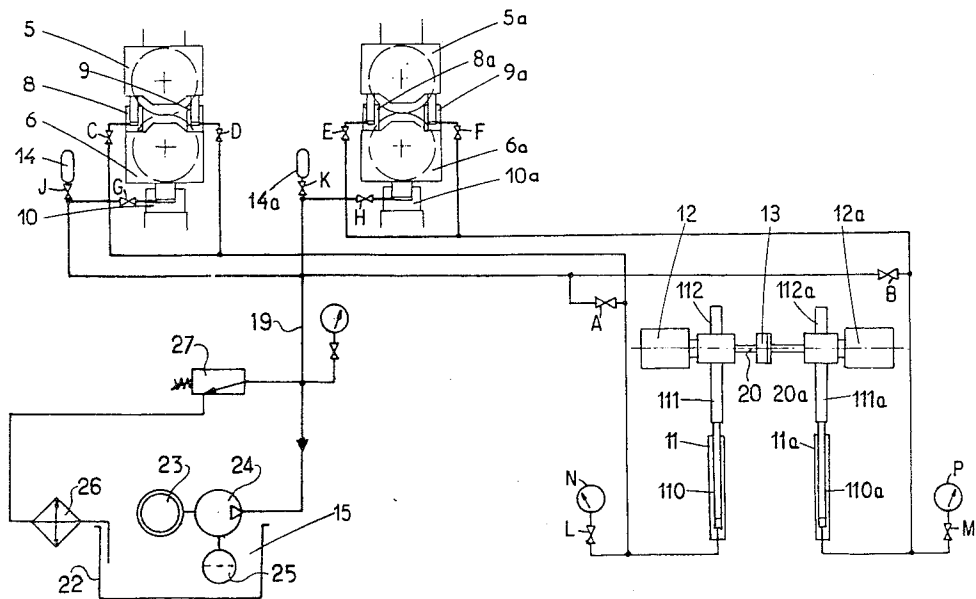


FIG. 2

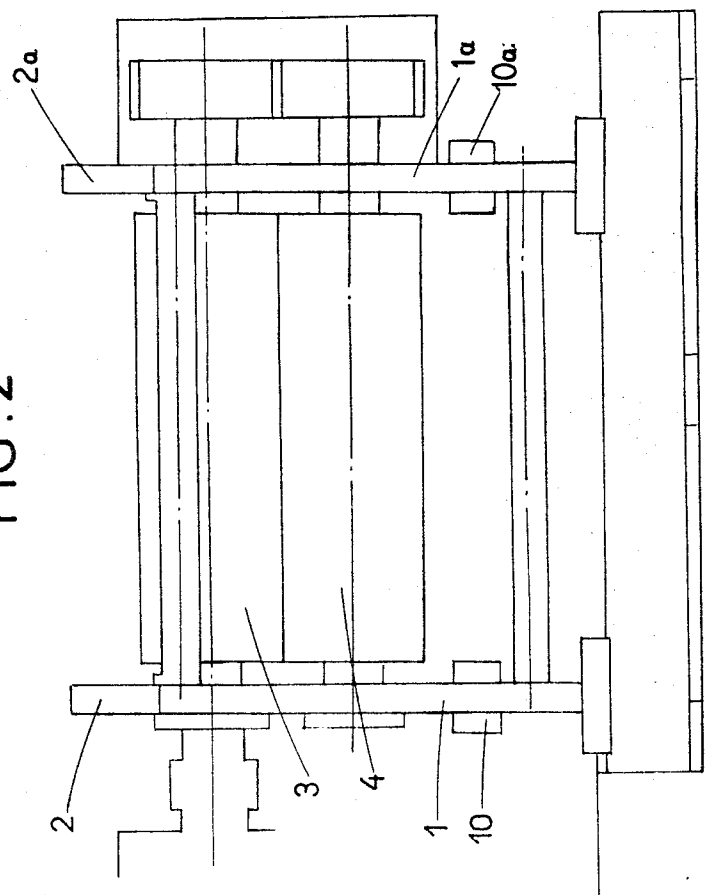


FIG. 1

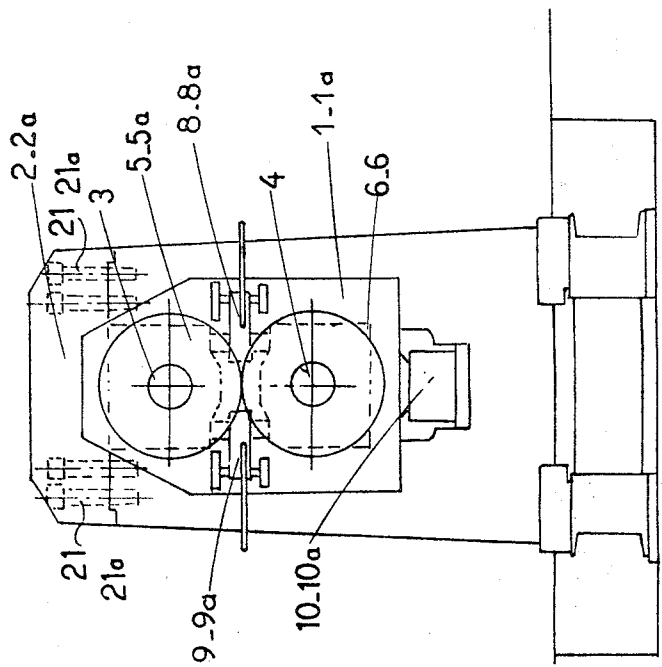
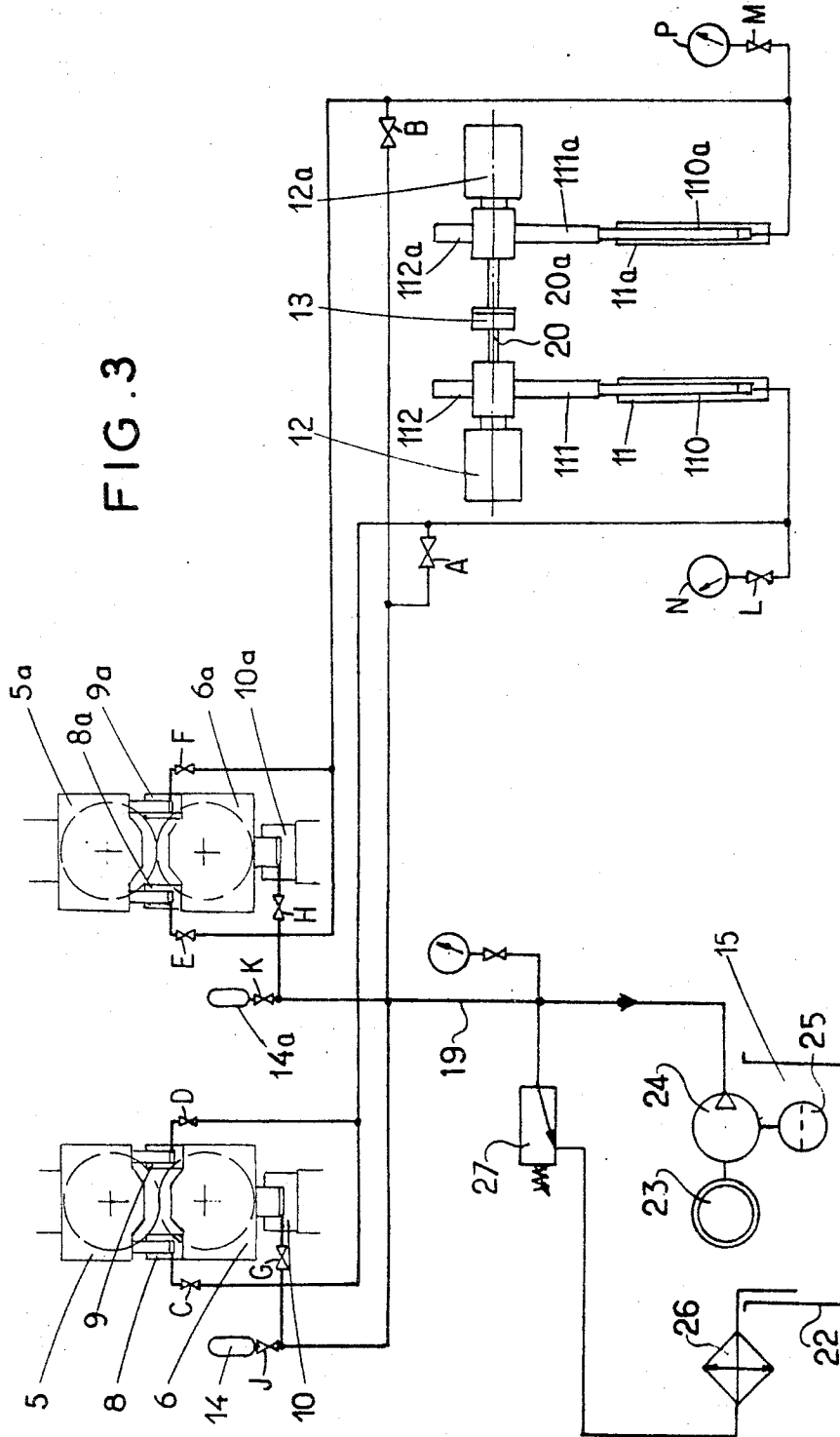
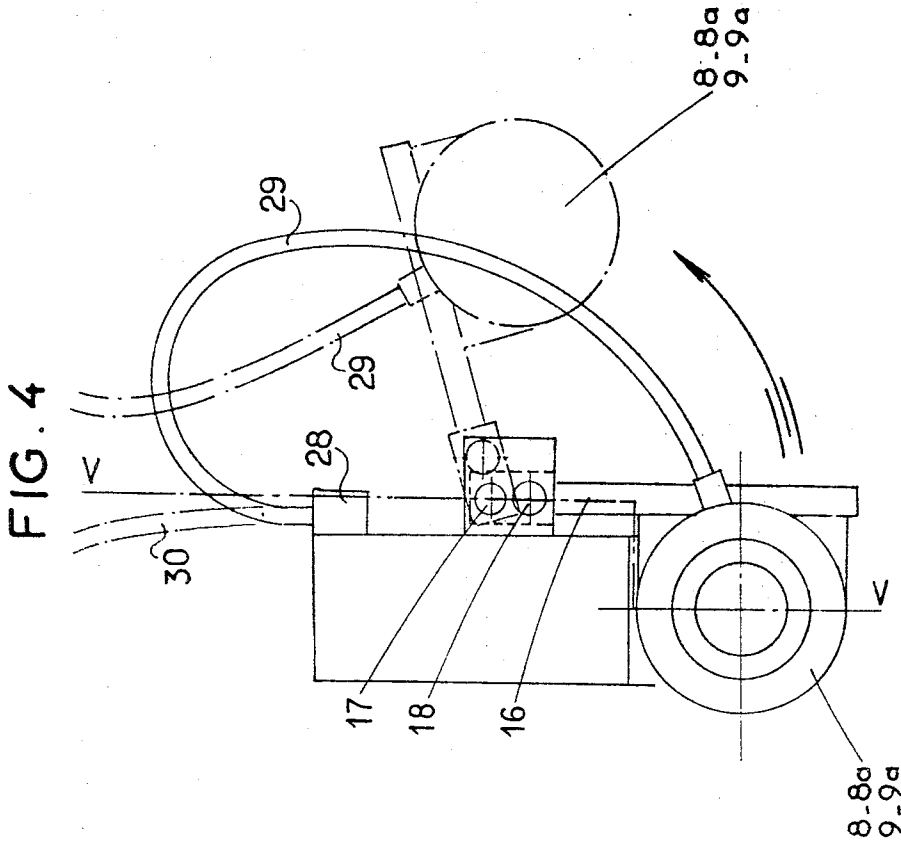
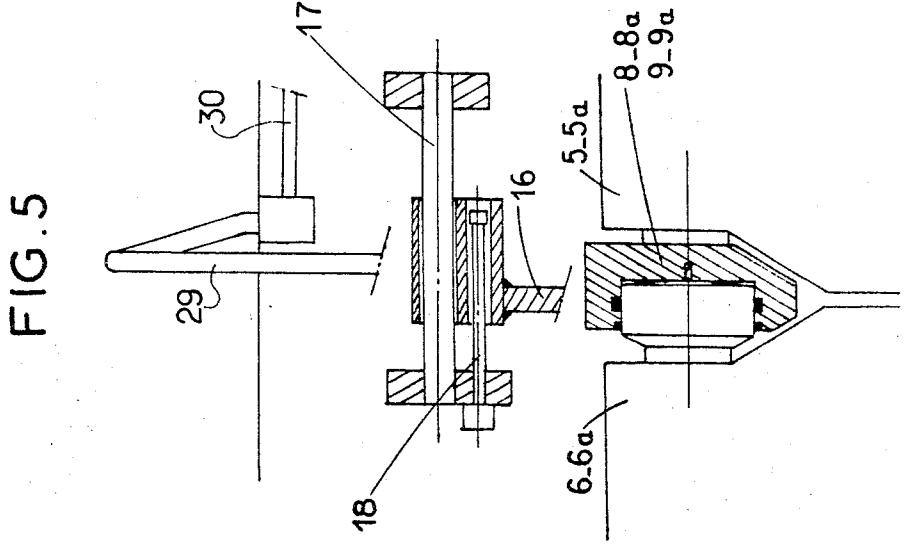


FIG. 3





VARIABLE PRESSURE EMBOSSEING MACHINE

Embossing machines in the past have produced designs in intaglio or in relief on metallic plates or bands by virtue of the passage of the metal between two embossing cylinders or rolls. The embossed design on the cylinders is imprinted in the metal under the pressure with which the two cylinders are forced together. In embossing machines of this type having hydraulic power cylinders pressing the embossing cylinders together, the engaging pressure has been varied by means of metallic wedges between the bearing blocks of the cylinders. These prior art arrangements have the disadvantage that the engaging pressure of the embossing cylinders cannot be varied at will, particularly the pressure at one axial end of the cylinders cannot be varied separately from the pressure at the other end in a convenient manner.

It is an object of the present invention to provide embossing machines of this type that will overcome the above disadvantages and provide for easy and simple adjustment of the engaging cylinder pressure.

The embossing machine of the present invention has embossing cylinders that are pressed together under the constantly applied force of main hydraulic power cylinders acting upon their bearing blocks at the respective axial ends. The resultant engaging force of the embossing cylinders is varied by means of control hydraulic jacks placed between the respective bearing blocks of the embossing cylinders at their opposite axial ends; the jacks at each axial end are controlled separately by means of ram-type hydraulic pistons driven by means of a motor-reducer drive group so that the pressure of the jacks may be controlled effectively, easily and independently at each axial end.

Other features, advantages, variations and modifications of the present invention will become more clear from the following detailed description of the drawing wherein:

FIG. 1 is a somewhat schematic side elevation view of the embossing machine according to the present invention;

FIG. 2 is a somewhat schematic longitudinal front elevation view of the embossing machine according to FIG. 1;

FIG. 3 is a schematic hydraulic circuit diagram for the controls of the FIG. 1 machine;

FIG. 4 is a somewhat schematic detailed representation of a control jack showing its means for retracting it during changing of the embossing cylinders; and

FIG. 5 is a partial cross-sectional view taken along line V-V of FIG. 4.

As shown in FIGS. 1 and 2, the embossing machine is provided with rigid upright supports or columns 1 and 1a at the respective axial ends of the machine. These supports are somewhat U-shaped, opening upwardly and are closed at their top ends by the transverse frame members 2 and 2a, respectively. The embossing cylinders or rolls 3 and 4 are provided with axially opposite bearing blocks 5, 5a and 6, 6a respectively.

The opposite axial bearing blocks 5 and 5a are relatively fixed to the frame and the lower bearing blocks 6 and 6a are mounted for vertical reciprocation. The bearing blocks at each axial end of the machine 5, 6 and 5a, 6a are separated by means of control hydraulic jacks 8, 9 and 8a, 9a respectively to provide a predetermined stressing or preloading of the embossing cylinders away from each other. The lower bearing blocks 6, 6a are forced toward the upper bearing blocks 5, 5a by means of the main hydraulic power cylinders 10, 10a, respectively.

The hydraulic control circuit for the preloading jacks and main hydraulic power cylinders is shown in FIG. 3. The control hydraulic fluid is delivered from the supply 15 under pressure through the main conduit 19 that provides pressurized fluid for the main hydraulic power cylinders 10 and 10a, on the one hand, and supplies hydraulic fluid for the jacks 8, 9 and 8a, 9a with their ram pistons 11, 11a respectively, on the other hand, which have the function of regulating the hydraulic pressure within the preloading jacks 8 and 9, 8a and 9a. The pressure accumulators 14 and 14a are mounted respec-

tively in the pressurized hydraulic supply lines for the main power cylinders 10 and 10a.

Each of the jack ram pistons 11 and 11a is controlled by means of a motor-gear reduction drive group 12 and 12a, respectively. Such motor-gear reduction drive units are conventional, as described in French Pat. Nos. 1,213,820 and 1,356,340. These groups may operate independently to produce independent hydraulic prestressing signals or they may be coupled together by means of the clutch 13 operatively connected between the axially aligned shafts 20a. By this means, the opposite axial ends of the embossing cylinders may be provided with the same prestressing force or with different prestressing forces. Suitable valves L and M are provided in the circuit along with pressure gauges N and P to maintain the desired operation. The opposite axial ends of the machine have been shown side-by-side in FIG. 3 along with their jacks and main power cylinders for purposes of illustration.

The hydraulic supply includes a fluid reservoir 22 for the hydraulic fluid, for example, oil, a pump 24 to provide a constant output or supply in a single direction toward the jacks and main hydraulic power cylinders through the appropriate valve A through G such as stopcocks, which are well known in the art, and a motor 23 for driving the pump 24. Once, the hydraulic fluid has been delivered to fill the pressure chambers of the jacks as well as the connecting conduits, valves A and B are closed, while the remaining valves are in an open condition. The hydraulic fluid is delivered to the pump 24 through the filter 25. A pressure limiter or regulator 27 is provided in the main conduit 19 and has a hydraulic return line passing through the cooler 26 to the reservoir 22.

The two jack ram pistons 11 and 11a serve the purpose of supplying to or withdrawing from the jacks 8, 9 and 8a, 9a small quantities of fluid so as to produce a variation in response to the requirements of the preload of each side of the cylinders of the embossing machine. The plunger pistons 110, 110a of the jack ram pistons 111, 111a terminate in endless screws 111, 111a, respectively, each being dependent upon a helical wheel 112, 112a, respectively. The helical wheels 112, 112a are driven by motor-gear reduction units 12, 12a which include electric motors engaging the corresponding helical wheel by means of a reduction gear train. As before mentioned, the axially aligned shafts 20, 20a are coupled together by means of the clutch 13.

Another particularly advantageous feature of the invention relates to the mounting of the above described components so that the embossing cylinders may be easily removed and replaced. As shown in FIG. 1, the transverse frame members 2 and 2a are secured to the upright supports 7 and 7a by means of bolts 21 and 21a, respectively. By removal of the bolts 21 and 21a, the respective transverse frame members 2 and 2a may be removed to allow upward removal of the embossing cylinder 3 with its bearing blocks 5 and 5a. Also, the control hydraulic jacks 8, 8a, 9, 9a may be retracted by means of the mechanism shown in FIGS. 4 and 5 so that the lower embossing cylinder 4 and its associated bearing blocks 6 and 6a may likewise be removed in the upward direction.

As shown in FIGS. 4 and 5, the jacks 8, 8a and 9, 9a have been illustrated in full lines in their normal working positions; dotted lines have been used to indicate the retracted position of the illustrated jack. Only one jack is illustrated, because they are all substantially identical. For retraction, the jack is mounted on a supporting arm 16, which is mounted for pivotal movement about the pivot pin 17. The supporting arm 16 and its associated jack is locked in either its horizontal normal position or in its retracted dotted line position by means of an indexing pin 18 that engages a correspondingly aligned bore for locking and is removable therefrom for pivoting of the arm 16.

A stationary hydraulic coupling 28 provides connection between the flexible hydraulic conduit 29 leading to the respective jack and the rigid supply conduit 30 that receives hydraulic fluid from the hydraulic supply 15.

I claim:

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1. An embossing machine, comprising: two cooperating embossing cylinders each supported by a bearing block at each opposite axial end; main power means adapted to provide a substantially constant source pressure for forcing said cylinders into embossing engagement preloading hydraulic jack means at each opposite axial end of said embossing cylinders arranged between said bearing blocks and adapted to control the effective embossing pressure between said cylinders by providing a variable control force opposing said source pressure; means for selectively controlling the hydraulic pressure of said hydraulic jacks comprising a separate motor-gear reduction drive unit and driven ram-type piston for the jacks on each opposite axial end of said cylinders.

2. The machine of claim 1, wherein each of said motor-gear reduction units has a drive shaft axially aligned with each other, and including a selectively disengageable clutch for drivingly connecting said shafts together.

3. The embossing machine according to claim 1, including upper transverse frame members for normally retaining said bearing blocks against movement and being removable to allow upward removal of the embossing cylinders and their as-

sociated bearing blocks; and means for retracting said jacks from between said bearing blocks to allow ready removal of said embossing cylinders and their associated bearing blocks.

4. The machine of claim 3, wherein said retracting means mounts each of said jacks for horizontal pivotal movement about a vertical axis.

5. The machine of claim 4, including a single hydraulic supply means for supplying hydraulic fluid to said power means, said ram-type pistons and said jacks.

6. The machine of claim 5 wherein each of said motor-gear reduction units has a drive shaft axially aligned with each other, and including a selectively disengageable clutch for drivingly connecting said shafts together.

7. The machine of claim 4, wherein each of said motor-gear reduction units has a drive shaft axially aligned with each other, and including a selectively disengageable clutch for drivingly connecting said shafts together.

8. The machine of claim 1, including a single hydraulic supply means for supplying hydraulic fluid to said power means, said ram-type pistons and said jacks.

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