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(54) **DEVICE FOR SUPPLYING INK TO A PRINTING PRESS**

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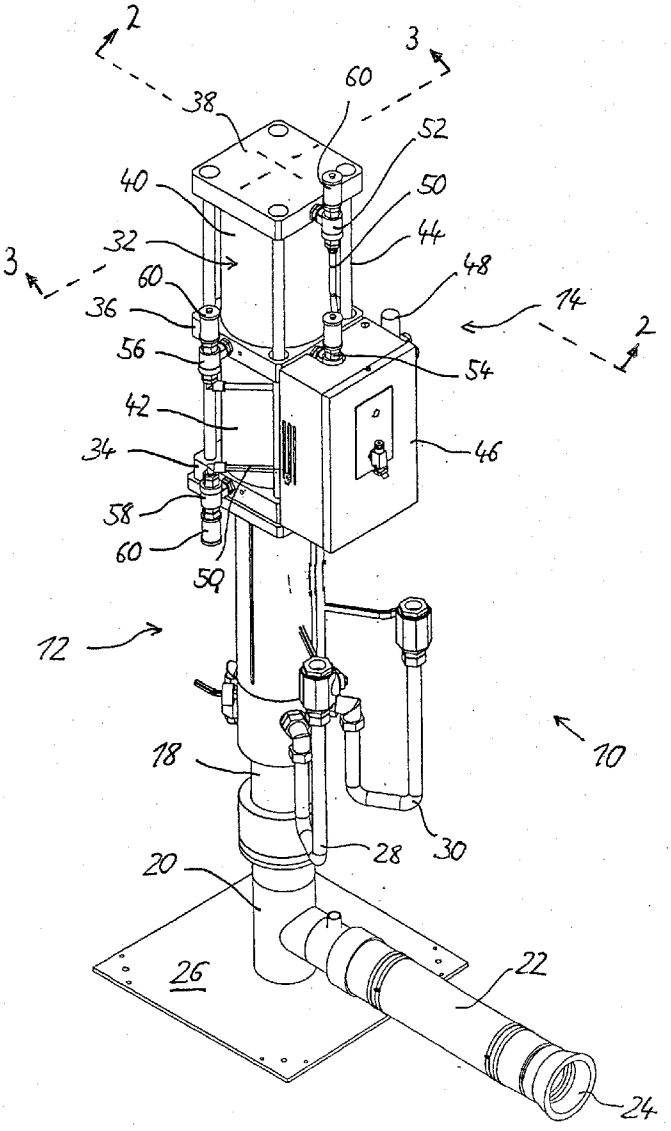
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(57) **ABSTRACT**

A device for supplying ink to a printing press, includes a piston pump and a hydraulic or pneumatic cylinder driving mechanism which drives the piston rod of the piston pump and the cylinder driving mechanism includes several cylinder chambers, which are separated from one another and each of which contains a driving piston, which can be acted upon with pressure.



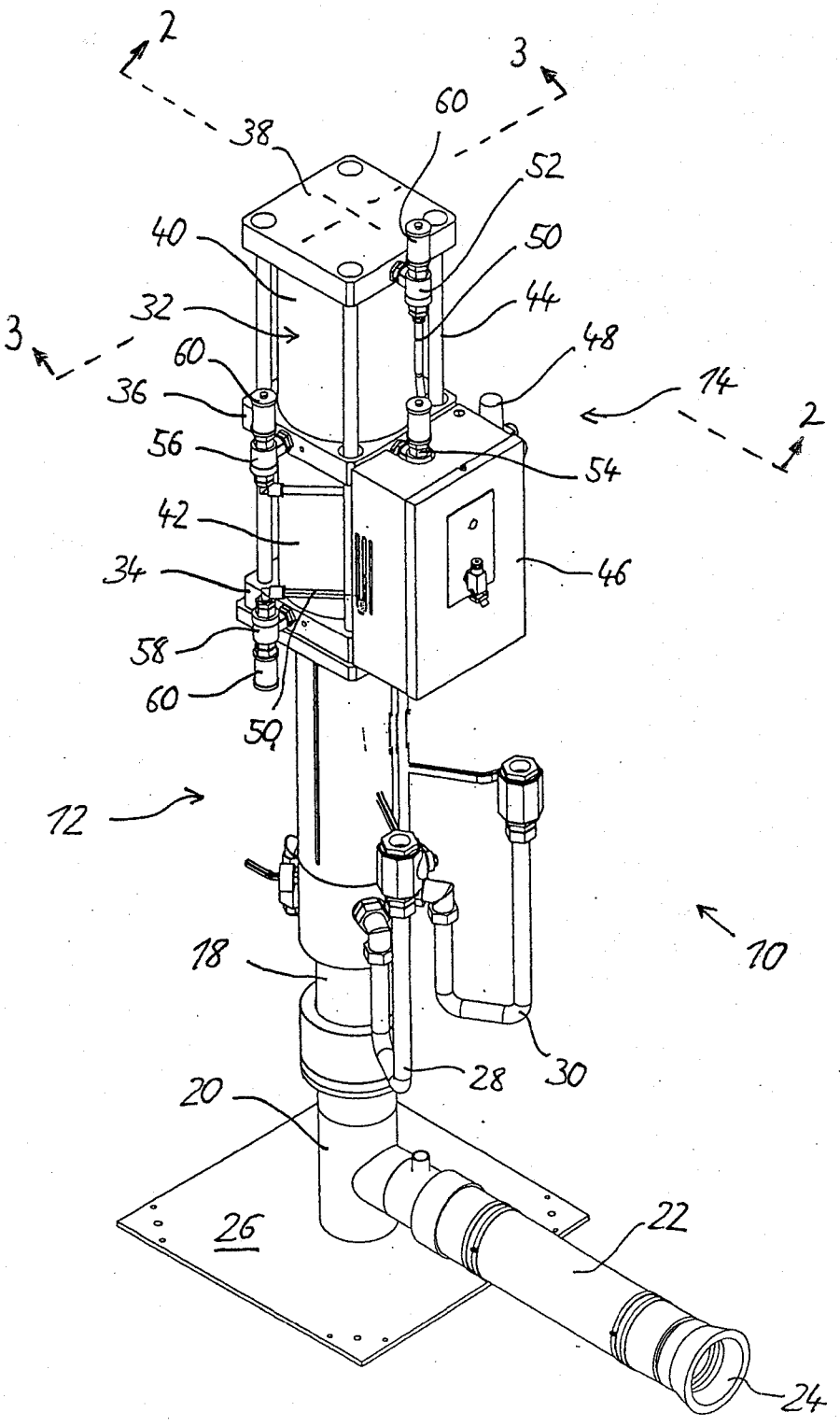

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Fig. 1

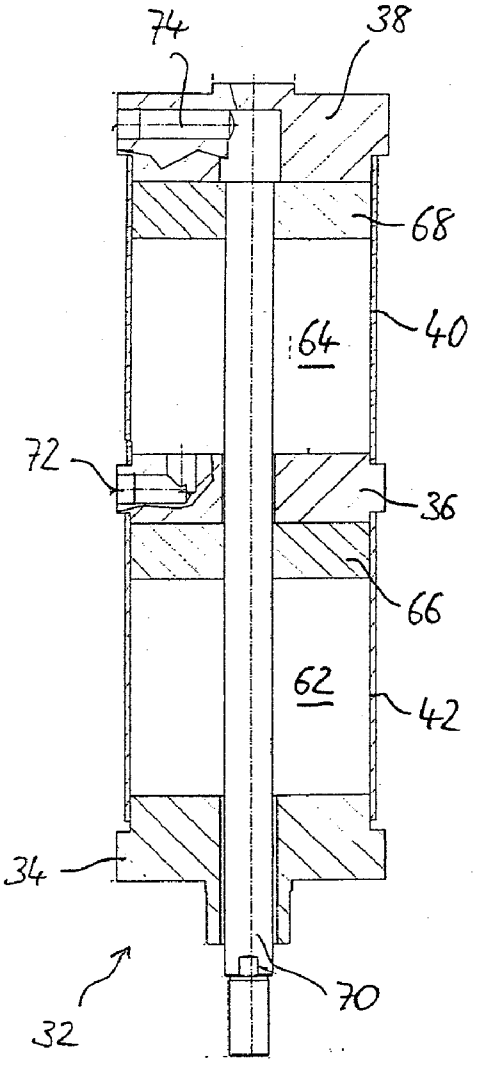

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Fig. 2

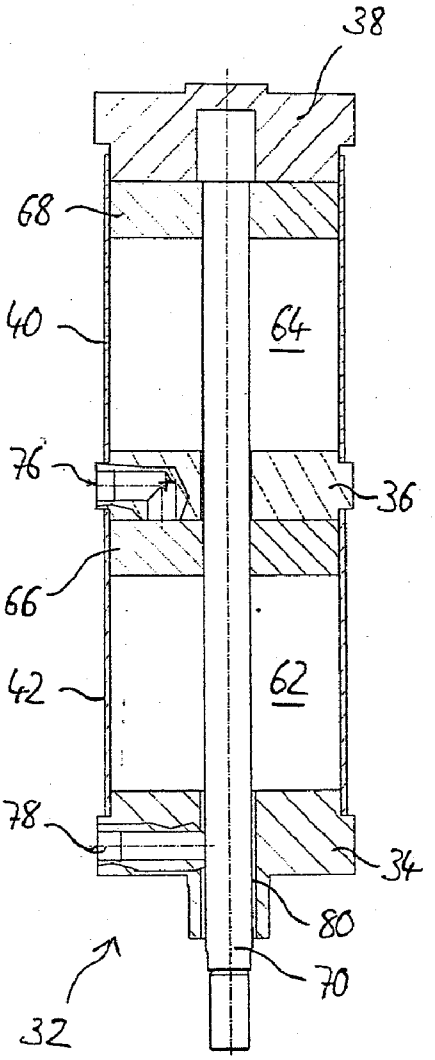

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Fig. 3

DEVICE FOR SUPPLYING INK TO A PRINTING PRESS

[0001] The present invention relates to a device for supplying ink to a printing press in accordance with the introductory portion of claim **1**.

[0002] Printing machines, for example, for offset printing, are usually supplied with ink by equipment, which comprises an ink pump and an appropriate driving mechanism for the public. Usually, piston pumps, the piston rod of which is driven by a hydraulic or pneumatic cylinder, are used in this connection.

[0003] As the operating speed and efficiency of modern printing presses increase, their ink consumption and, with that, the volume pumped by the ink pump also increase. Furthermore, in those cases, in which the ink barrels are far removed from the printing press, it may be necessary to build up a high pumping pressure. For this reason, there is a need for cylinder driving mechanisms, which are in a position to employ a very high driving force.

[0004] One possibility for achieving this objective consists of scaling the driving cylinder correspondingly, that is, of increasing the capacity of its cylinder chambers. However, this entails various disadvantages. The external dimensions of the driving cylinder are increased disproportionately. Furthermore, problems arise with respect to supplying fluid under pressure, especially in the case of pneumatic cylinders, since a correspondingly high fresh air pressure must be built up and the air consumption increases. Moreover, the costs of constructing suitable single stage cylinders, which can be used with the usual piston pumps for pumping ink, increase.

[0005] It is therefore an object of the present invention to provide a device for supplying ink to printing presses of the type named above, the driving force of which device can be increased for increasing the volume pumped and the pumping pressure of which can be increased while avoiding the structural disadvantages named above.

[0006] Pursuant to the invention, this objective is accomplished by a device for supplying printing ink with the distinguishing features of claim **1**.

[0007] The cylinder driving mechanism of the inventive device for supplying printing ink comprises several cylinder chambers, which are separated from one another and each of which contains a driving piston, which can be acted upon with hydraulic or pneumatic pressure. Due to this construction, a higher driving force can be attained without having to build up an excessive pre-pressure in the pressure fluid and without an excessive consumption of fluid. Moreover, the external dimensions of such a cylinder driving mechanism are kept within justifiable limits.

[0008] For a preferred embodiment, the cylinder driving mechanism comprises at least one tandem cylinder.

[0009] In a further preferred embodiment, the cylinder driving mechanism comprises at least two cylinder chambers, which are disposed parallel to and next to one another and which each contain a driving piston.

[0010] In the following, a preferred example of the invention is described in greater detail by means of the attached drawing, in which

[0011] FIG. **1** shows a perspective view of an embodiment of the inventive device supplying ink to a printing press,

[0012] FIG. **2** shows a perpendicular longitudinal section through the cylinder driving mechanism of the device for supplying ink along the plane A-A in FIG. **1** and

[0013] FIG. **3** shows a further longitudinal section in a plane B-B, which is perpendicular to the plane A-A.

[0014] The device **10** of FIG. **1** is provided for pumping ink from an ink barrel to an offset printing press. For the sake of clarity, the barrel as well as a printing press has been omitted in the Figure. As essential elements, the device **10** for supplying ink comprises a piston pump **12** in a lower section of the device **10** and a pneumatic cylinder driving mechanism **14**, which is mounted thereabove. The piston pump **12** and the cylinder driving mechanism **14** are disposed above one another in the form of a vertical column. As will be explained in even greater detail in the following, the cylinder driving mechanism **14** drives a vertical piston rod, which extends in the interior of the piston pump **12**, linearly in an up and down motion. For this purpose, the piston rod extends upward into the cylinder driving mechanism **14** and is provided with a driving piston, which can be acted upon with compressed air. Details of the construction of the driving mechanism **14** will be explained in even greater detail in the following.

[0015] The piston pump **12** itself is of a known construction and comprises a cylindrical tubing **18**, in which a pumping piston is driven up and down by a piston rod. The lower end of the tubing **18** is connected over a connector **20**, which is provided with seals and seals an inlet pipe **22**, at the free and **24** of which a hose or a pipeline for connection with the ink barrel can be connected. The inlet pipe **22** is connected by a connector **20** at right angles with the tubing **18**. A foot plate **26** for mounting on the floor, on a machine frame or the like, adjoins the lower end of the connector **20**.

[0016] The piston pump **12** furthermore comprises two connecting lines **28**, **30**, which start out laterally from different places of the periphery of the tubing **18** and are to be connected to hoses supplying the printing press, which is not shown. Accordingly, the piston pump **12** pumps the ink, aspirated through the inlet pipe **22** over the connector **20** and the tubing **18**, through the connecting lines **28**, **30** to the printing press.

[0017] The pneumatic cylinder driving mechanism **14** comprises a vertical tandem cylinder **32**, the interior of which has two separate cylinder chambers, in each of which a driving piston can be moved up and down. Both driving pistons are mounted at the piston rod of the piston pump **12**, the piston rod extending upward into the tandem cylinder **32**. A lower, square terminating plate **34** and a corresponding upper terminating plate **38** close off the tandem cylinder **32** at the upper and lower ends, while an intermediate plate **36**, halfway between the two terminating plates **34**, **38**, separates the two cylinder chambers from one another in the interior of the tandem cylinder **32**. An upper casing section **40** and a lower casing section **42** are disposed in each case between the upper terminating plate and the intermediate plate and between the lower terminating plate **34** and the intermediate plate **36** and, in each form the outer limiting wall of a cylinder chamber. Four outer struts **44**, the ends of which are bolted to the corners of the plates **34** and **38** and which extend through the intermediate plate **36**, give the tandem cylinder **32** adequate mechanical stability.

[0018] A control unit **46** in a switchbox, which is mounted outside on the side of the cylinder driving mechanism **14**, acts on the driving piston within the tandem cylinder **32**. The

control unit **46** distributes compressed air, which is supplied by a compressed air line **48**, over compressed air lines **50** to four compressed air connections **52**, **54**, **56**, **58**, which are mounted in pairs at the tandem cylinder **32**. Each pair of compressed air connections **52**, **54** as well as **56**, **58** serves to act with compressed air upon one of the two cylinder chambers of the tandem cylinder **32** in one of two directions of motion of the driving piston contained therein and, at the same time, to discharge the air, displaced by the driving piston during its movement, through rapid air bleeders **60** at the compressed air connections **52**, **54**, **56**, **58**, as explained further below. The upper pair of compressed air connections **52**, **54** is mounted one above the other at the upper terminating plate **38** and at the intermediate plate **36** in FIG. **1**, front right at the cylinder driving mechanism **14**, while the pair of lower compressed air connections **56**, **58** is mounted front left at the intermediate plate **36** and the lower terminating plate **34**.

[0019] The sections in FIGS. **2** and **3** explain the mode of functioning of the tandem cylinder **32**. The intermediate plate **36** divides the interior of the tandem cylinder **32** into two cylinder chambers of equal size, namely a first cylinder chamber **62** between the lower terminating plate **34** and the intermediate plate **36** and a second cylinder chamber **64**, which is disposed above in the operating position in FIG. **1** between the middle plate **36** and the upper terminating plate **38**. In each of the two cylinder chambers **62**, **64**, a driving piston **66**, **68** is disposed, which closes off the cylinder chamber **62**, **64** air-tight at its periphery with the outer section of the casing **40**, **42**. If therefore the piston **66**, **68** is acted upon with the pressure on one of its sides, it moves in a sliding motion to the opposite side.

[0020] An upper section of the piston rod **70** extends from the piston pump **12**, which is not shown, through the lower terminating plate **34** and the intermediate plate **36** through the driving piston **66** of the first cylinder chamber **62** into the driving piston **68** of the second cylinder chamber **64**. The piston rod **70** is guided and slides in the lower terminating plate **34** and in the intermediate plate **36**. However, it is seated firmly in the two driving piston **66**, **68** and is connected with these in one piece, so that the piston rod **70** is always carried along during a movement of the driving piston **66**, **68**. Accordingly, by the action of pressure on the driving piston **66**, **68** from above, the piston rod **70** is pressed into the piston pump **12** and, by the action in the opposite direction, it is pulled out once again.

[0021] Compressed air acts on the respective cylinder chamber **62**, **64** over compressed air channels, which are passed into the respective terminating plates **34**, **38** as well as into the intermediate plate **36**. In particular, a first, middle compressed air channel **72**, which extends in the radial direction perpendicularly to the piston rod **70** into the intermediate plate **36** and is angled therein to the second cylinder chamber **64**, and an also angled upper compressed air channel **72** in the terminating plate **38** serves to act upon the second cylinder chamber **64** with compressed air over the first compressed air connection **52** from the opposite side of the driving piston **68**.

[0022] As is evident in FIG. **3**, a second middle compressed air channel **76** extends similarly in the intermediate plate **36** to the first cylinder chamber **62** in order to act upon the lower driving piston **66** with compressed air from above, which is supplied over the compressed air connection **56** in FIG. **1**, while a lower compressed air channel **78** is passed into the lower connecting plate **34** in the radial direction and discharges into the opening **80**, through which the piston rod **70** is passed through the lower connecting plate **34**. Due to the axial opening **80**, there is a connection between the lower compressed air channel **78** and the first cylinder chamber **62**, so that the latter is acted upon with pressure over the lower compressed air connection **58** or, alternatively, if the lower driving mechanism piston **66** is moving in the opposite direction, can be vented over the rapid air bleeder **60**.

[0023] During the operation of the driving cylinder, initially the upper compressed air connections **52**, **56** of the respective cylinder chambers **62**, **64** are acted upon with pressure, so that the pressure is transferred to the respective upper action surfaces of the driving piston **66**, **68** and presses these, together with the piston rod **70**, in the direction of the piston pump **12**. Alternatively, the air, displaced by the driving piston **66**, **68**, can escape rapidly over the compressed air channels **72**, **78** and the rapid air bleeder **60** of the compressed air connections **54**, **58**. Moreover, the driving cylinders **66**, **68** move out of the end position, shown in FIGS. **2** and **3**, to their lower stop at the intermediate plate **36** and the lower terminating plate **34** respectively. Subsequently, the piston rod **70** is moved in the opposite direction, in that the driving pistons **66**, **68** are acted upon from their underside with pressure by way of the compressed air channels **72**, **78**, so that they are pressed upward, while the displaced air on the opposite side of the driving piston **66**, **68** escapes through the compressed air channels **74**, **76**. In this way, by alternately acting upon the appropriate pressure connections **52**, **54**, **56**, **58** with compressed air, an up and down movement of the driving pistons **66**, **68** and, with that, of the piston rod **70** can be obtained.

[0024] Compared to a one-stage pneumatic cylinder, the tandem cylinder **32**, presented here, has the advantage that the driving force, transferred to the piston rod **70**, can be increased without having to increase the pressure or consumption of the air supplied significantly. As can be seen particularly in FIG. **1**, the external dimensions of the cylinder driving mechanism **14** as a whole are maintained within justifiable limits. By increasing the driving force with relatively simple means, the pumping pressure and the volume pumped by the piston pump **12** can be increased in a simple manner.

[0025] The present invention is not restricted to hydraulic or pneumatic tandem cylinders in the strictest sense. Instead, other arrangements of separate cylinder chambers of the driving mechanism are also conceivable, such as a multistage driving mechanism with several consecutively connected chambers in structurally separate cylinders, the driving pistons of which are seated on a piston rod **70**, extending through the cylinders, in much the same way as shown here in the Example. Moreover, the cylinder chambers of the driving mechanism **14** may be disposed in parallel and their driving pistons may act jointly on the piston rod **70**.

What is claimed is:

1. A device for supplying ink to a printing press, comprising:

a piston pump having a piston rod, and

a cylinder driving mechanism which drives the piston rod of the piston pump, the cylinder driving mechanism including several cylinder chambers which are separated from one another and each of which includes a driving piston which can be acted upon with pressure.

2. A device for supplying ink of claim **1**, wherein the cylinder driving mechanism comprises at least one tandem cylinder.

3. A device for supplying ink of claim **1**, wherein the cylinder driving mechanism comprises at least two parallel cylinder chambers, which are disposed next to one another, each of which includes a driving piston.

4. A device for supplying ink of claim **1**, wherein said cylinder driving mechanism is one of:

a pneumatic cylinder driving mechanism, and

a hydraulic cylinder driving mechanism.

5. A device for supplying ink of claim **2**, wherein the cylinder driving mechanism comprises at least two parallel cylinder chambers, which are disposed next to one another, each of which includes a driving piston.

6. A device for supplying ink of claim **1**, wherein the cylinder driving mechanism comprises at least two serial arranged cylinder chambers, which are disposed one above another, each of which includes a driving piston.

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