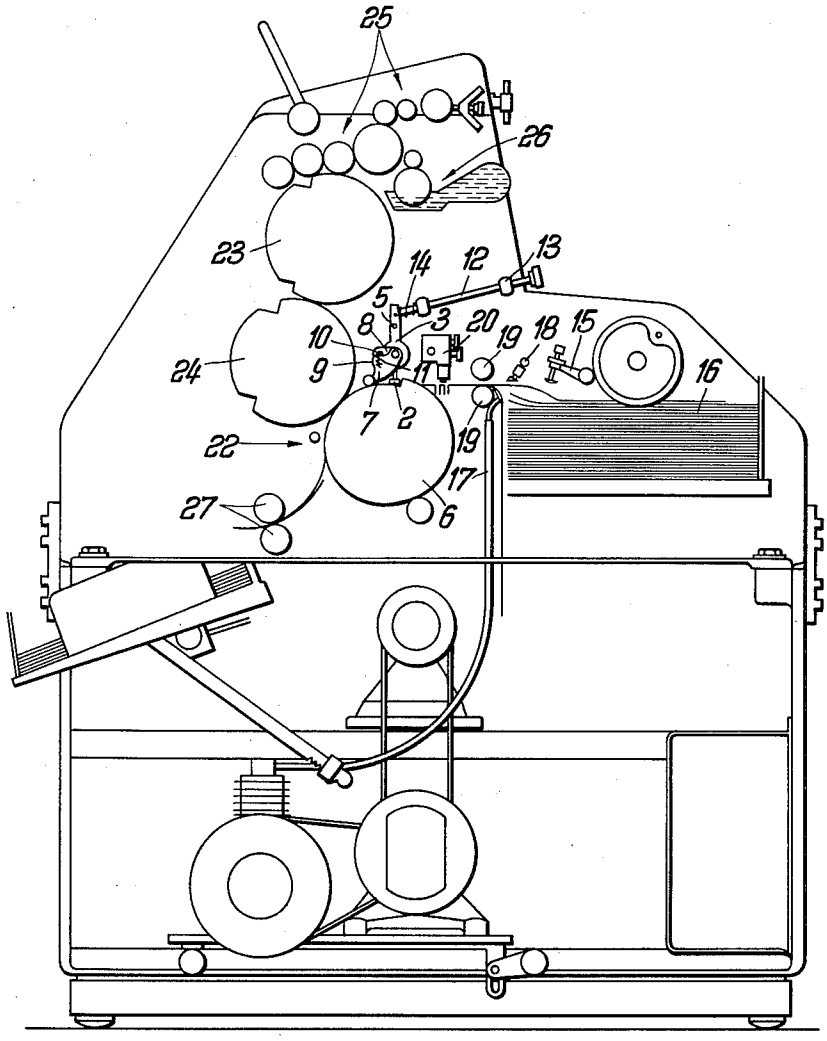
April 17, 1962 E. GERICKE 3,030,106

PRINTING OR DUPLICATING MACHINES

Filed April 20, 1959 4 Sheets-Sheet 1

Fig. 1



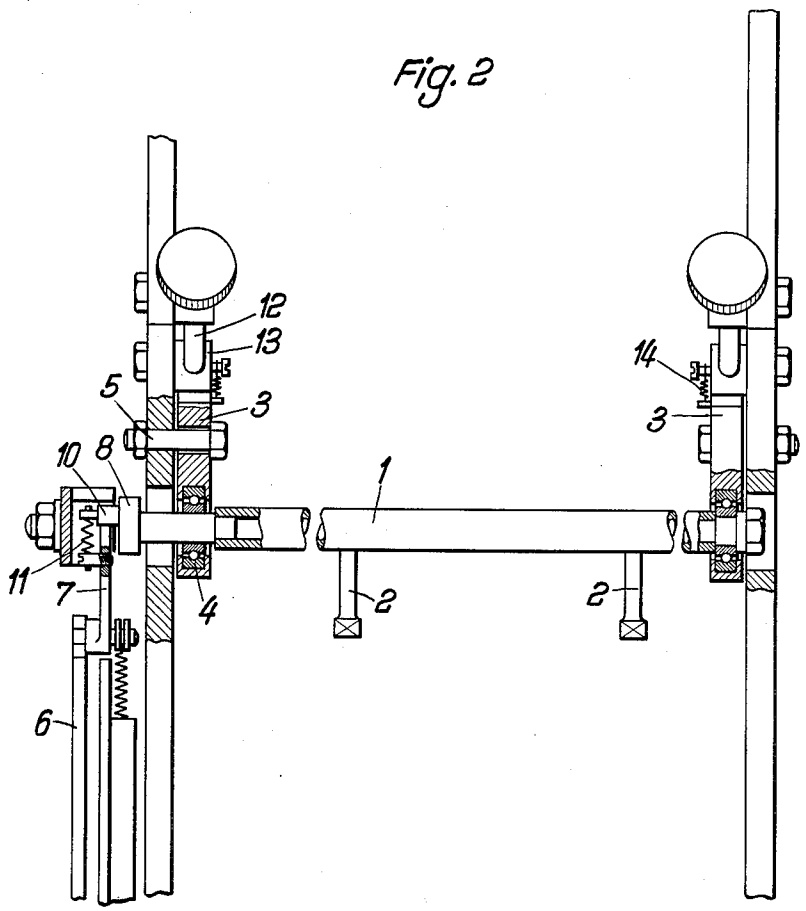
Inventor:
ERICH GERICKE
Wenderoth, Lind & Ponack
Attys.

April 17, 1962 E. GERICKE 3,030,106

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Fig. 2



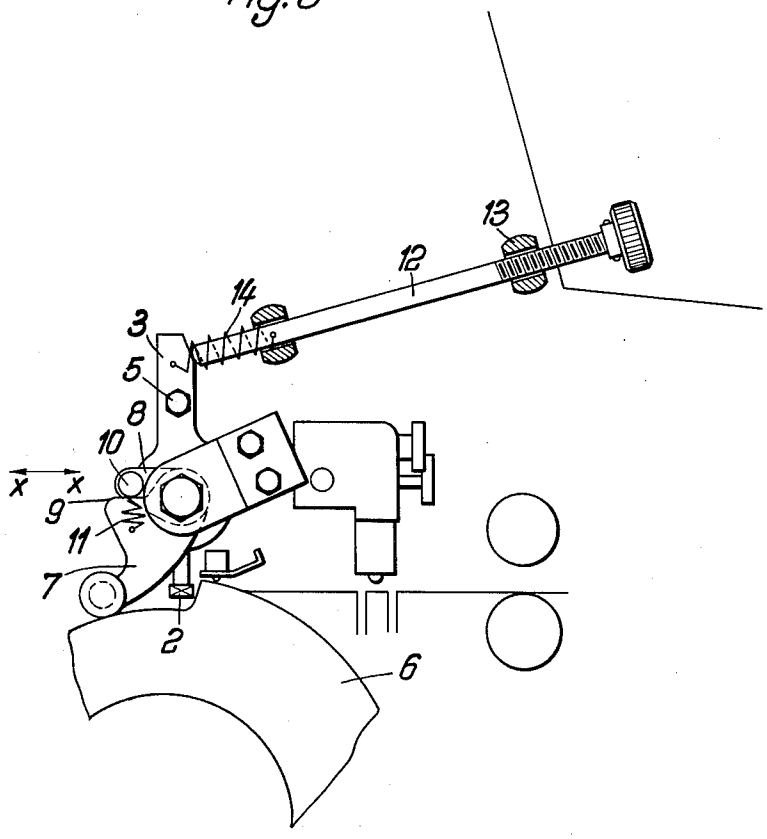
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ERICH GERICKE
Wenderoth, Lind & Ponack
Attys.

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Fig. 3



Inventor:
ERICH GERICKE
Wenderoth, Lind & Ponack
Attys

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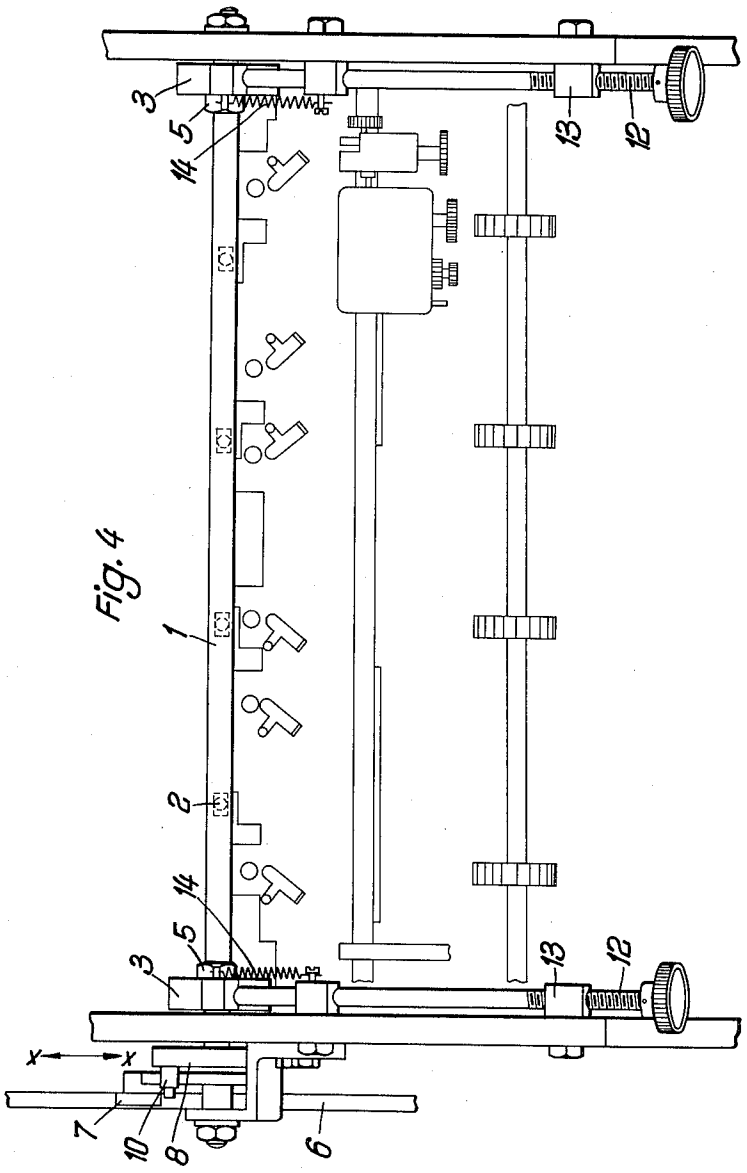


Fig. 4

Inventor:
ERICH GERICKE
Wenderoth, Lind + Ponack
Attys

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PRINTING OR DUPLICATING MACHINES

Erich Gericke, Flemmingstrasse 14, Berlin-Steglitz, Germany

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6 Claims. (Cl. 271—60)

This invention relates to printing or duplicating machines in which a sheet is fed from a stack of paper to a front lay and picked up by grippers on a cylinder immediately the front lay is tilted away from the edge of the sheet, and in which provision is made for the front lay to be set at an angle across the direction of paper feed for the purpose of compensating for any obliquity in the transfer of the impression from the printing plate.

Printing and similar machines must be provided with means for feeding sheets in succession to the lays of the machine. It is important in such machines, especially in printing machines, that each sheet should be accurately registered, and to this end, side and front registers are provided. The side registers may be arranged either to push or draw the paper sheet into position, that is to say they may be arranged either to push or pull the sheet against a fixed lay. However, the front lays are always arranged to make contact with the leading edge of the sheet and to push it back slightly in the direction of feed. In all such machines in which the sheet is brought into register in the manner described, and in which the aligned sheet is then directly picked up by the cylinder grippers, the sheet must be abruptly accelerated to the peripheral speed of the cylinder, a result which is achieved by the cylinder grippers suddenly picking up the sheet and entraining it in passing.

The front lay which is required to hold the sheet until immediately before it is entrained by the cylinder grippers must therefore move away from the sheet very quickly. Furthermore, the front lay should be capable of being set slightly obliquely, that is to say the right or left hand end of the lay should be capable of being slightly advanced or withdrawn in the direction of paper feed in order to compensate for any slightly obliquity in the transfer of the impression.

In known forms of construction the front lay is embodied in a shaft located transversely across the machine to which the actual lay in the form of a fingered edge can be fixed at a small adjustably controllable angle in the manner that has been described. It has now been found that at high printing speeds the inertial weight of the lay prevents it from performing the required oblique or tilting movement with accuracy and that vibrations adversely affect its precision of operation.

It is therefore proposed according to the present invention to support at least one end of the shaft of the front lay in a lever deflectably suspended in the machine frame in such a way that the angle of the shaft across the direction of paper feed can be varied by adjustment of the said deflectable lever. By thus relieving the shaft of the front lay of the weight of the devices otherwise necessary for adjusting the same, the weight of the shaft can be greatly reduced so as to permit the front lay and its shaft to perform the required operational movements with sufficient rapidity and substantially without any vibration, even if the printing speed is considerable, and thus to ensure satisfactory operation of the front lay when it is abruptly tilted out of the way of the paper. According to the invention the deflectable lever mounted in the machine frame is a two-armed lever, one arm of which is deflectable by an adjusting device, whilst the other arm carries the shaft of the lay. It is preferred to support the shaft of the front lay in the deflectable lever in a self-aligning ball bearing.

The invention will now be described with reference to

the accompanying drawings which illustrate a preferred embodiment by way of example and in which:

FIG. 1 is a schematic side elevation of a printing machine equipped with adjusting means for the transverse alignment of the front lay in the manner proposed by the present invention,

FIG. 2 is a schematic front view of the front lay transverse adjusting means according to the invention, shown on a larger scale,

FIG. 3 is a side view of the mechanism shown in FIG. 2, and

FIG. 4 is a plan view of the mechanism shown in FIG. 3.

With reference now to FIG. 1, it will be seen that sheets of paper are fed from a stack of paper, on the right hand side of the machine, to an impression cylinder and after printing are deposited on a delivery tray on the left hand side of the machine.

The top sheet of the stack **16** is maintained at a constant height by a stack feeler device **15** and is separated from the stack by a blower device **17**, gripped by lifting suckers **18**, and conveyed to forwarding rollers **19** which advance it to the front lay **2** and the side lay **20**. The sheet after having thus been brought into register is entrained by grippers on an impression cylinder **22** to undergo the actual process of printing.

The printing process is performed substantially by three cylinders, namely a plate cylinder **23** which carries a printing plate, an offset cylinder **24** which carries a blanket, and the impression cylinder **22** which presses the sheet against the offset cylinder for the transfer of the impression from the blanket to the paper sheet.

An inking system **25** and a damping system **26** provide the plate on the cylinder **23** with ink and with a damping fluid which keeps the un-inked portions of the printing surface in ink-repellent condition. The inked printing plate transfers the print to the offset cylinder **24** which in turn transfers it to the sheet. The sheet is then deflected by delivery rollers **27** on to a paper delivery tray.

In the present invention, the front lay is embodied in a very light tubular shaft **1** which is provided with non-adjustable aluminium fingers **2** (FIGS. 2 and 3). To permit the lay shaft to be adjusted obliquely across the direction of feed of the sheets, the tubular shaft **1** is mounted between the side frames of the machine on deflectable levers **3**. The tubular shaft **1** of the front lay operates in self-aligning ball bearings **4** in the levers **3**. The levers themselves are pendantly suspended at **5** in such manner that by deflection of the levers about their fulcra each end of the front lay shaft **1** can be independently displaced horizontally in the direction marked *x*—*x* (in FIG. 3).

To permit the front lay shaft **1** and its fingers **2** to be tilted at the same instant during each working cycle of the machine, whatever its transverse position, a cam plate **6** is provided on one of the side frames, which by virtue of its shape is adapted to actuate abruptly a lever **7** (FIG. 3). The fulcrum of lever **7** is a fixed point on the machine frame, and is in approximate alignment with the axis of the adjustable front lay shaft **1**. The connection between lever **7** and the tiltable front lay **1** is established by a lever **8** on the front lay shaft **1**. The lever **7** which operates the front lay is formed with a face **9** extending parallel to the surface of the sheet, a pin **10** on lever **8** of the shaft **1** of the front lay bearing on said face.

To ensure that contact between the two levers is permanently and reliably maintained a tension spring **11** is provided between the two levers which urges the two levers into mutual contact.

If the front lay is now adjusted at one or both sides to place it at an oblique angle across the direction of feed of the sheet, the point of contact of pin **10** of lever **8** mounted on shaft **1** of the front lay will be displaced along

the cooperating face 9 of actuating lever 7, parallel with the surface of the paper. In other words, independently of the angularity of adjustment of the front lay, the instant of tilt due to the action of cam 6 and actuating lever 7 will never vary.

The described construction of the front lay has the further advantage that the pendantly suspended adjusting levers can be independently adjusted on either side of the machine whilst the machine is in operation, so that the register of the sheet can be corrected whilst printing proceeds. The correction is made by providing a screw 12 located in an easily accessible position on the side panel of the machine, said screw operating in a nut 13 in such manner that by turning the screw 12 the deflectable lever 3 can be moved to and fro as required. A spring 14 urges the deflectable lever 3 into contact with the end of the adjusting screw 12.

It will be observed that when cam 6 strikes lever 7 the resultant motion is transmitted to shaft 1 and its fingers 2 at all points by direct contact between the cooperating levers and not through interposed springs. The springs merely function to maintain contact between the cooperating components.

I claim:

1. In a printing or duplicating machine in which a sheet from a stack of paper is fed to a front lay having a shaft extending across the direction of feed of the sheet and picked up by grippers on an impression cylinder where it is printed and then removed from the machine, a lever on the frame of the machine for supporting one end of the lay shaft, and means for deflecting said lever so as to adjust the angle which the front lay makes with the direction of feed of the sheet to be printed.

2. In a printing or duplicating machine in which a sheet from a stack of paper is fed to a front lay having a shaft extending across the direction of feed of the sheet and picked up by grippers on an impression cylinder where it is printed and then removed from the machine, levers mounted on the frame of the machine for supporting both ends of the lay shaft, and means for deflecting said levers so as to adjust the angle between the front lay and the direction of feed of the sheet to be printed.

3. In a printing or duplicating machine in which a sheet from a stack of paper is fed to a front lay having a shaft extending across the direction of feed of the sheet and picked up by grippers on an impression cylinder where it is printed and then removed from the machine, a two-armed lever mounted on the frame of the machine, an adjusting device acting on one of said arms to deflect said arm, and a bearing on the other arm for supporting one end of the lay shaft.

4. Means for inclining the front lay of a printing machine comprising a front lay shaft having alignment fingers, a bell crank lever pivotally mounted on the machine frame at each end of said shaft, said front lay shaft having its ends rotatably mounted in one arm of each of said bell crank levers, adjusting means for said bell crank levers, an arm fixed to each end of said front lay shaft, a pin on said arm offset from the axis of said shaft, a driving member for said front lay shaft having a surface on which said pin rests substantially parallel to the feeding direction of the paper to be printed and said pin being capable of sliding on said surface by an adjustment of the front lay shaft by said adjusting means, so that independently of the position of the front lay shaft the alignment fingers of the front lay shaft can maintain their vertical position towards the plane of the paper.

5. Means as set forth in claim 4 wherein said pin is maintained in contact with said surface by means of a spring.

6. Means as set forth in claim 4 wherein the ends of said front lay shaft are rotatably mounted in said bell crank levers by self-aligning bearings.

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