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SUPERVISORY DEVICE FOR SUPERVISING A SHEET STACK OF A SHEET PRINTING PRESS

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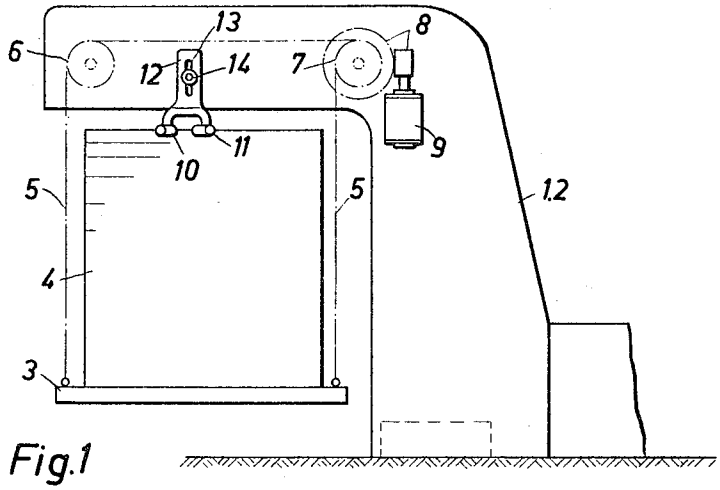


Fig.1

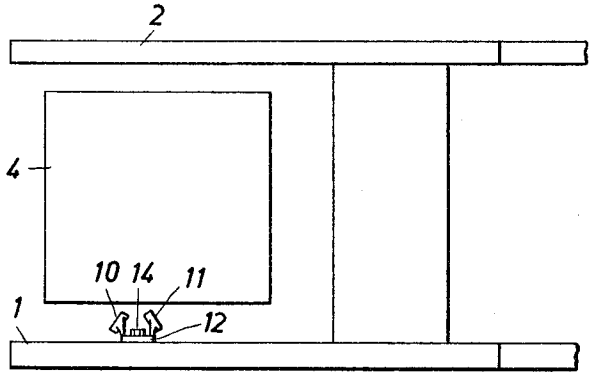


Fig.2

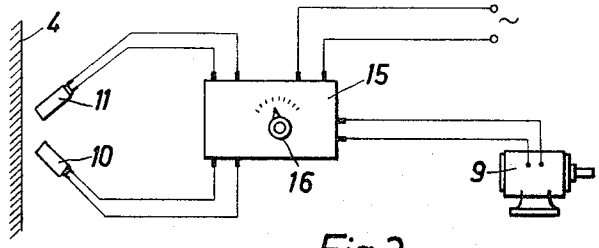


Fig.3

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SUPERVISORY DEVICE FOR SUPERVISING A SHEET STACK OF A SHEET PRINTING PRESS

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2 Claims. (Cl. 271—62)

The present invention relates to a device for supervising the height of a sheet stack in a sheet feeding device for a sheet printing press.

There are known devices for that purpose in which a beam of light is directed upon a light-sensitive receiver such as a suitable photocell. The direction of the beam is so adjusted that the intensity of the light received by the photocell is controlled by the height of the stack and that when the received light departs from a predetermined value, either by being too high (low stack) or too low (high stack), the photocell by means of an amplifier actuates control means which, in turn, initiate suitable control functions.

The principal disadvantage of such light control devices is that they are sensitive to the ambient illumination. Unless they are very carefully shielded—and that is difficult and expensive in practice—stray light, in particular sunlight, may affect the device to such an extent that it becomes unreliable. Furthermore, light-sensitive devices are strongly affected by the color and light-reflecting properties of the stacked sheet material to be supervised. Obviously, a faulty operation of the control system for the press such as a cut-off device may result in damage to the press and in a disturbance of the entire printing operation. Supervisory devices using photocells are also affected by the unavoidable aging of the light bulb used to produce the light beam and the presence of dust on either the light transmitter or the light receiver. Since powdered material is frequently used in connection with the operation of a printing press, sensitivity to dust is an important factor.

It is a broad object of the invention to provide a novel and improved supervisory device of the general kind above referred to which is independent of the ambient light conditions, not subject to aging, rugged in construction and which is not affected by the color or the light-reflecting properties of the sheet material to be supervised.

The afore-pointed out objects, features and advantages and other objects, features and advantages which will be pointed out hereinafter are attained by providing a transmitting ultrasonic sensor which directs an ultrasonic beam upon one side of the stack of sheets and a receiving ultrasonic sensor which receives the sound energy reflected by said side of the stack. The second sensor is connected to a control means which initiates suitable control actions in response to a departure of the reflected sound energy from a predetermined value.

The sensors are positioned in accordance with the desired height of the stack and are preferably mounted on a common holder adjustable as to height which may be supported on a frame portion of the press.

In the accompanying drawing a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a diagrammatic elevational view of the feed device of a sheet printing press equipped with a supervisory device according to the invention.

FIG. 2 is a diagrammatic plan view of FIG. 1, and FIG. 3 shows a circuit diagram of the supervisory device.

Only those components of the feeding device of the press are shown which are essential for the understanding of the invention. The operation of the sheet feeding device other than here described should be visualized as also being conventional.

Referring now in detail to the figures, the side walls **1** and **2** of the frame structure of the sheet feeding device support a feed table or board **3** upon which rests a stack of sheets **4**. Table or board **3** is supported at its four corners by chains **5** guided over pulleys **6** and **7**. Table **3** may be lifted or lowered by a control means shown as a power drive including a worm gearing **8** and a motor **9**.

Ultrasonic sensors **10** and **11** are mounted on a common holder **12**. The holder is secured, adjustable as to height, to side wall **1** by suitable means shown as an elongated slot **13** and a setscrew **14**.

Sensor **10** constitutes a transmitter which directs an ultrasonic beam upon a side wall of stack **4** and sensor **11** constitutes a receiver which receives the sound energy reflected by the side wall. As it is clearly shown in FIG. 2, neither of the two sensors is in contact with the respective side wall of the stack.

Ultrasonic equipment of the kind here involved is well known in the art and generally available in the market. It is marketed for instance by Delavan Manufacturing Company of West Des Moines, Iowa, and described in literature issued by this firm.

The transmitting sensor of such equipment when suitably energized converts electric energy to ultrasonic energy and the receiving sensor, which must of course be matched with the transmitting sensor, converts the received ultrasonic waves to electrical energy.

The sound energy used in equipment of this kind is well above the range of human hearing, such as 35,000 cycles per second and more.

Turning now to FIG. 3, this figure shows a casing **15** which should be visualized as containing a suitable conventional generator supplying the required electric energy to sensor **10** and also a suitable amplifier such as a transistorized amplifier connected to sensor **11**. The energy supplied to sensor **10** and the gain of the amplifier are preferably adjustable, as it is indicated by a knob **16** and a scale.

The output of the amplifier controls the operation of motor **9** and is so adjusted that the motor remains at a standstill when the amplifier output is at a predetermined value, but is started when the output departs from said predetermined value.

As it is evident from the previous description and an examination of FIG. 1, the magnitude of the sound energy received by sensor **11** is controlled by the position of the stack and, more specifically, of its upper edge in relation to the sensors. As it is also evident, the device can be conveniently so set that motor **9** is started when the stack is depleted below a predetermined level. The cut-in point of the motor can also be controlled by varying the height of the sensors in reference to the stack by means of holder **12**.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A device supervising the height of a stack of sheets for use in a sheet printing press, said device comprising an ultrasonic sensor constituting a transmitter for directing an ultrasonic beam upon one side of the stack to be supervised, means for mounting said transmitter adjacent to but spaced apart from said side of the stack, means for supplying electric energy to the sensor, a second ultrasonic sensor constituting a receiver for receiving sound energy reflected by said side of the stack, mounting means for mounting said receiver adjacent to but spaced apart from said side of the stack, amplifying means connected to said second sensor and controlled by the magnitude of the sound energy received by said sensor, and control means connected in circuit with said amplifying means and operated in response to a departure of the magnitude of the reflected sound energy from a predetermined value.

2. A supervisory device according to claim 1, and comprising a common holder supporting said sensors, said holder being attachable to a support base, and adjustment means for adjusting the position of the sensors on the holder.

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