Sept. 13, 1966 O. COOKSEY 3,272,049

WEB SEVERING DEVICE

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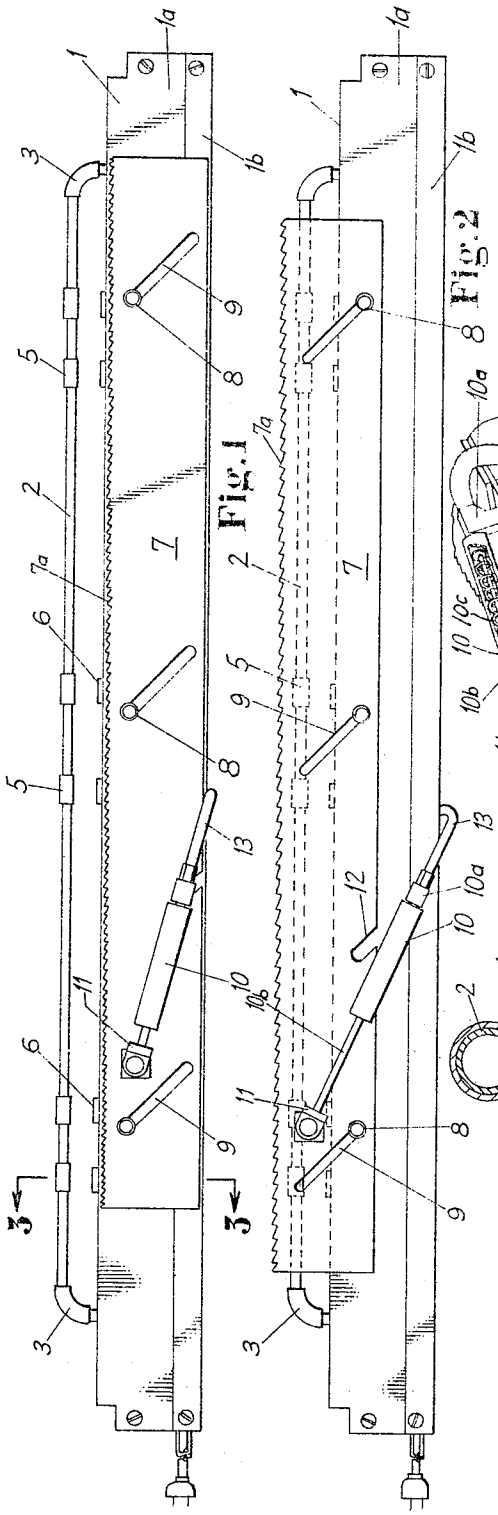


Fig. 1

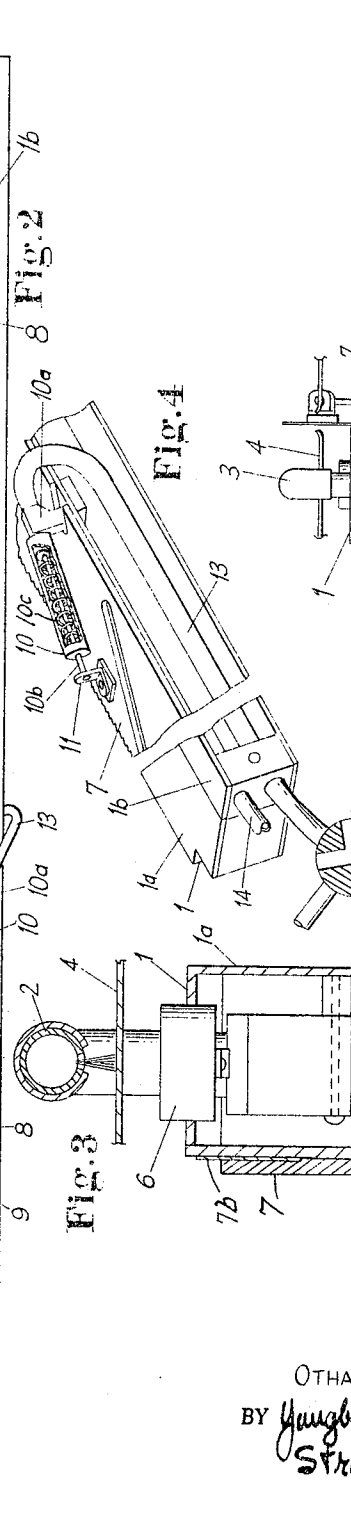


Fig. 2

Fig. 4

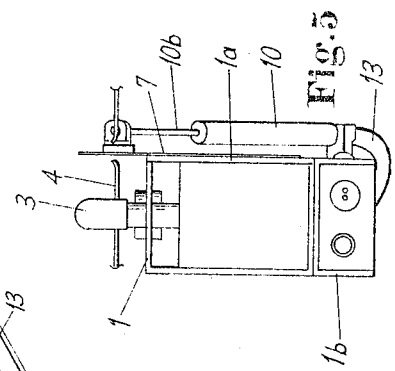


Fig. 5

Fig. 3

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WEB SEVERING DEVICE

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1 Claim. (Cl. 83—371)

This invention has to do with the means for severing webs transversly in continuous web handling equipment. While its utility is not so confined, it is especially useful in high speed multiple printing presses.

In a co-pending application entitled, "Web Break Detector," Serial No. 255,597, filed February 1, 1963, now United States Patent No. 3,178,527 the present inventor has described a means which serves to stop the mechanism of web handling devices if a break occurs or if for any reason the web becomes slack. This mechanism is of a type which will detect a partial break, that is to say, a condition in which the web begins to tear inwardly from one edge without becoming severed across its entire width. In continuous web handling devices, web break detectors may be located at a plurality of points in the machine, i.e., wherever a break or partial break is likely to occur.

In such machines, when a break forms, it is necessary not only to stop the machine rapidly and before folded or torn portions of the web can damage delicate parts, but it is necessary to re-thread the machines before the operation can be resumed. Thus it will be necessary to sever the web as a preliminary to re-threading. This can be done by hand; but it involves difficulties increasing with the width of the web, and the lack of accessibility of the web in various parts of the machine. Moreover, for various reasons including coasting of the machine after the power is turned off, quantities of "broke" may accumulate in different parts of the machine, requiring time for removal.

A principal object of this invention is the provision of a simple and inexpensive means for severing the web.

Another object is the provision of severing means of such character that they can be located in various parts of the machine including parts affording minimal space.

Another object of the invention is the provision of severing means of such simple and inexpensive character that they can be multiplied and used in a plurality of locations throughout the machine.

It is an object of the invention to provide a web severing means which can be employed in connection with the web break detector means hereinabove mentioned in such a way as to be automatically actuated upon the occurrence of a web break so as to sever the web either adjacent the point at which a break is detected or at one or more remote points as desired.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that construction and arrangement of parts of which an exemplary embodiment will now be described. Reference is made to the accompanying drawings wherein:

FIGURE 1 is an elevational view of a device with the severing means in the unactuated position.

FIGURE 2 is a similar view of the device in the actuated position.

FIGURE 3 is a transverse sectional view taken along the line 3—3 of FIGURE 1, and showing another way of mounting the blade means.

FIGURE 4 is a partial perspective view of the underside of the apparatus; and

FIGURE 5 is an end view thereof.

The web severing device hereinafter described may be made as a single unitary structure to be located at any desired position in a continuous web handling machine and to be actuated at the will of the machine operator or automatically or both. However, since a web severing device will ordinary be desired at or adjacent a web break detector, the exemplary embodiment next to be described is a combination of the two devices.

Referring to the figures of the drawing, there is shown a housing **1**, which in this instance is in the shape of a channel structure with a cover or side enclosure plate **1***a*, and adapted to be mounted in a web handling machine in a position transverse to the web. An overhead pipe **2** is mounted above the top of the housing by means including elbows **3** at either end of the web **4**, which is shown in FIGURES 3 and 5, and which normally passes between the pipe **2** and the top of the housing in a tensioned condition and out of contact with the last mentioned elements. The pipe is provided with a plurality of nozzle elements **5** through which jets of low pressure air, say at one and one-half pounds gauge pressure are directed against one side of the web. The pressure of these jets is not sufficient to produce a substantial deflection of the web so long as it is normally tensioned. But, if a break occurs in the web or if the web becomes slack due to some malfunction of the machine, the web will be deflected in the contact with one or more of a group of micro-switch elements **6** which, through an appropriate electrical system, will stop the web handling machine as described in the co-pending application.

In the embodiment of this invention, an element **7** is mounted to the side wall or the cover plate **1***a* of the aforementioned housing (see FIGURES 1and 3) by means of bolts **8** having washers or enlarged heads, the bolt shanks operating in slant-wise disposed slots **9**. These slots are disposed at a substantial angle (preferably 45°) to the longitudinal axis of the element **7** so that this element can move in a direction which has both a vertical and a horizontal component.

The element **7** can be a light metal member having means at its top to receive a relatively narrow saw blade **7***b* (see FIG. 3) or, and preferably as shown in FIGURES 1 and 2, the element **7** may itself consist of a piece of saw blade steel having saw teeth **7***a* on its upper edge. The blade may, for example, be made of steel of a thickness of about thirty-five thousandths of an inch (20 gauge) and the type and character of the teeth **7***a* will be similar to those on the conventional band saw.

If the element **7** is moved from the position shown in FIGURE 1 to the position shown in FIGURE 2 it will exert a slicing action on the web so as to sever the web. Assuming the movement of the element **7** to be sufficiently rapid and sufficiently powerful, severance of the web will occur whether the web is tensioned or not and irrespective of the broken condition of the web adjacent the blade or elsewhere. The severance of the web will be clean and the severed portion will be free of streamers and the like.

For moving the element **7** there is provided a fluid pressure cylinder **10**. One end of this cylinder is pivoted as at **10***a* to the side wall **1***a* of the housing or to an extension **1***b* thereof as hereinafter described. A piston rod **10***b* extends from the other end of the cylinder and carries a bracket **11** which is pivoted to the element **7**. It may be found necessary to notch the element **7** as at **12** to permit it to assume the fully retracted position. This position is one in which the teeth **7***a* lie somewhat below the top of the housing **1** (see FIGURES 1 and 3) so that if the moving web should contact the top of the housing, it would not be torn by the teeth, and no guard means is necessary for safe handling of the severing device.

The extension **1***b* mentioned above may be the side of a channel shaped element attached to the bottom part of the housing **1** and serving as a receiver for a conduit **13** by which air or other fluid is admitted to the cylinder

10, as a housing for an electrical cable 14 connected to the described micro-switches, and as a housing for additional conduit means (not shown) by which air is delivered to the pipe 2. In an exemplary embodiment, the pressure of the fluid delivered to the cylinder 10 may range between fifty and one hundred pounds, preferably seventy-five pounds. With a cylinder having a bore of about three-quarters inch, and about five inches in length, a sufficiently rapid and powerful movement of the element 7 will be produced.

Both the cylinder 10 and the pipe 2 may be fed from the same source of compressed air (not shown), there being a conventional pressure reducing valve (also not shown) between the source and the pipe 2.

The operation of the cylinder 10 may be controlled by a solenoid actuated three-way valve diagrammatically indicated in FIGURE 4 at 15. In one position of this valve air under pressure will be admitted to the cylinder, while in other positions the supply of air under pressure will be cut off and the cylinder will be vented to the atmosphere. The cylinder is preferably provided with a spring return 10c for the piston which makes it possible to use the severing device in any orientation on the web handling machine. The solenoid valve 15 may be arranged for manual actuation and preferably will be so arranged; but it may also be connected into the electrical system controlled by the micro-switches 6 so that severance of the web may occur upon the detection of a web break. Where a plurality of the web severing devices are located on the machine, the electrical system may serve to sever the web at a plurality of places upon the detection of a web break at any point.

The web severing devices of this invention need not be used with the web detector devices or mounted as a part of them. In this event the construction may be the same as generally described excepting for the omission of those parts, such as the pipe 2, the micro-switches and their appurtenances, which function to detect web breaks. A somewhat simpler housing may be used in this event because of the absence of these parts.

Modifications may be made in the invention without departing from the spirit of it. The invention has been described in the aforesaid exemplary embodiment, what is claimed as new and desired to be secured by Letters Patent is:

A web severing device for the purpose described comprising supporting means adapted to be located adjacent to and transverse a traveling web, said supporting means having a surface portion adapted to be at a substantial angle to the plane of the web, knife means having a serrated edge and being mounted for sliding movement upon said surface of said supporting means, said sliding movement having a direction at a substantial angle to the longitudinal axis of said supporting means, means for moving said knife means on said supporting means against said web comprising a fluid pressure cylinder pivoted at one end to said supporting means and having a piston and rod, said piston rod being pivoted to said knife means, control means for introducing fluid under pressure to said cylinder, said control means comprising a three-way valve, a web break detector comprising said supporting means, said detector comprising an air delivery means on one side of the web, an air actuated switch means on the other side of said web, said air delivery means and said switch means being in parallel spaced relationship to each other, said detector device being so located with respect to the web that both said air delivery means and said switch means are out of contact with said web in its normal path of travel, said switch means actuated by air from said air delivery means when said web deviates from its said normal path of travel, said detector functioning to operate said three-way valve when said switch means is actuated, whereby to actuate said cylinder.

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