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K. H. MARTENSSON ET AL  
METHOD AND DEVICE FOR TRIGGERING WORK  
OPERATIONS IN A TRAVELLING WEB

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2 Sheets-Sheet 1

Fig.1

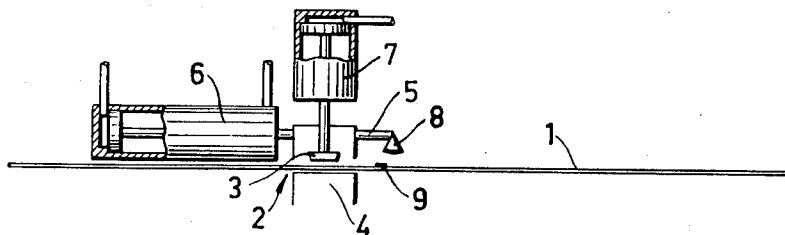


Fig.2

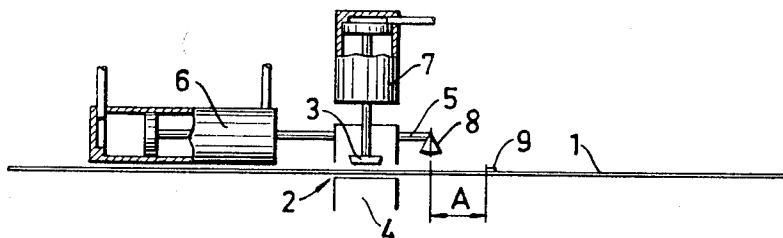
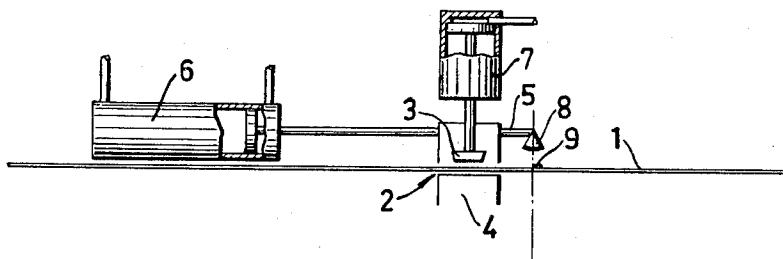


Fig.3



INVENTORS  
KJELL H. MARTENSSON  
BIRGER N.O. NILSSON

BY *Euler R. Mander*  
ATTORNEY

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Fig. 4

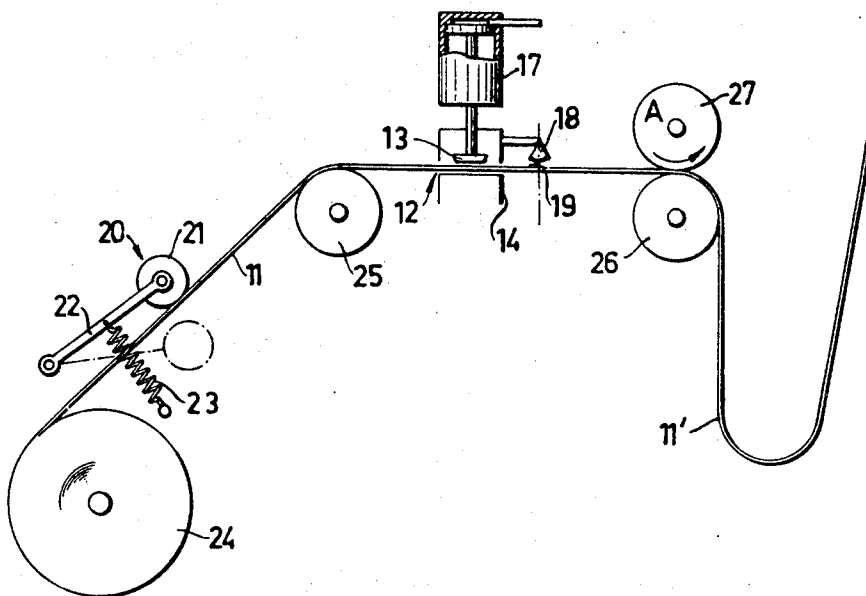
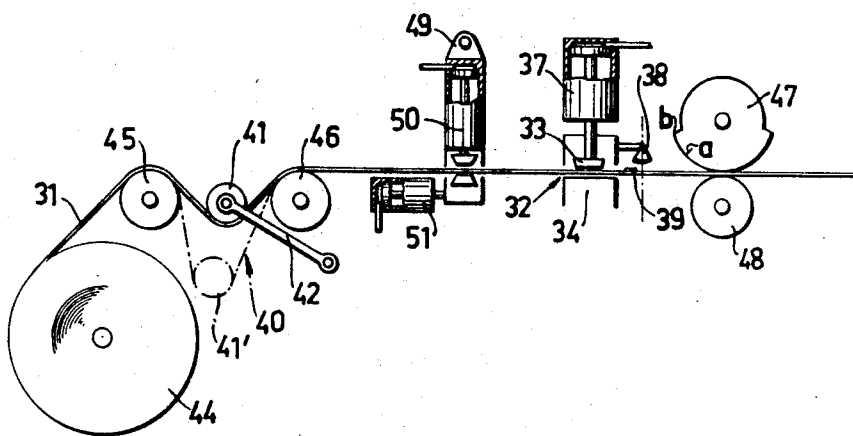


Fig. 5



INVENTORS  
KJELL H. MARTENSSON  
BIRGER N. O. NILSSON

BY  
*Eugene R. Mander*  
ATTORNEY

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3,497,702

## METHOD AND DEVICE FOR TRIGGERING WORK OPERATIONS IN A TRAVELLING WEB

Kjell Halvard Martensson, Malmö O, and Birger Nils Ossián Nilsson, Kvarnby, Sweden, assignors to AB Tetra Pak, Lund, Sweden, a Swedish company

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3 Claims 10

### ABSTRACT OF THE DISCLOSURE

Method and apparatus to sense an indicating mark on a travelling web to vary the relative speed of the web relative to a work tool and secondly to actuate the work tool after the relative speed has been varied.

The present invention refers to a method and a device for triggering work operations in a travelling web which is provided with indicating marks which in cooperation with sensing means trigger the work operations when the web occupies predetermined positions, the method according to the invention being characterized by the fact that for triggering a work operation the position of the web is sensed twice, viz. a first time at a high relative speed between the web on the one hand and said sensing means and working tool on the other hand, and a second time at a low relative speed, said second sensing being caused to trigger the work operation as such.

By the invention it becomes possible to perform work operations in very exact positions in relation to the indicating marks which trigger them, at the same time as the web can be kept at a relatively high average speed.

As will be easily understood, the above-mentioned relative speed can be changed in two principally relatively different ways, i.e. either the web may be braked or the sensing means and work tools used may get a movement in the feed direction of the web. In the last-mentioned case the first sensing may be utilized to give the work tool and the sensing means a higher speed in the feed direction of the web than that of the web, the second sensing, which is obtained when the sensing means catches up the mark already sensed once, is utilized to trigger the work operation as such. In the first-mentioned case the first sensing is instead utilized to trigger a braking of the web and a reverse feed thereof, the second sensing, which is obtained when the mark already sensed once returns to the sensing means, is utilized in the same way to trigger the work operation as such. Alternatively, one may confine oneself to only braking down the speed of the web, i.e. omit the reverse feed. In such case, however, a second sensing means which operates at a reduced web speed, or a second indicating mark which is sensed after braking the web, is required. A further alternative is that the two methods as first mentioned above are combined in such a way that the web is first braked, whereupon the sensing means and the work tool are given a movement in the web feed direction. Now when the sensing means catches up the indicating mark which is stationary due to the braking the work operation as such is triggered.

As has been mentioned, the invention also refers to a device for carrying out the method described above, said device including means for feeding a web which is provided with indicating marks, and sensing means which in response to these marks trigger the work operations when the web occupies predetermined positions. According to the invention, this device is characterized by means for changing the relative speed between the web and said

sensing member after a first sensing of the position of the web, such that a second sensing is obtained at a lower speed, and by means for reducing the speed of the web in relation to the working tool which is to perform the work operations, between said sensing steps.

The invention is illustrated more closely in the following with reference to the accompanying drawings, which by way of example show three different devices according to the same, FIGURES 1-3 showing a first device in three different positions, FIGURE 4 a second device and FIGURE 5 a third device.

In FIGURES 1-3 a travelling web of, for example, paper is designated by 1, in which work operations are to be carried out by means of a tool 2 which in the example shown consists of a creasing stamp 3 and a back-up 4. The stamp and the back-up 4 are mounted on the piston rod 5 of a hydraulic or pneumatic cylinder 6. On the same piston rod there are further mounted a pneumatic or hydraulic cylinder 7 operating the stamp 3, and a photo cell 8. Finally, 9 designates an indicating mark put down on the web 1, for example a printed mark or a hole.

The device according to FIGURES 1-3 operates in the following manner. When the photo cell 8 in the position shown in FIGURE 1 senses the mark 9, the cylinder 6 is activated by means well-known in themselves and therefore not shown, for example a magnetically or a mechanically operating control valve which is provided in the inlet conduit for the working medium of the cylinder 6. The working tool 2 and the photo cell 8 are then given such a movement in the feed direction of the web 1, that the photo cell catches up the mark 9 and again senses it. By this second sensing step the cylinder 7 is activated in the same way by well-known means not shown. Owing to the fact that the web 1 and the tool 2 then have substantially the same speed the work operation is carried out in a very exact position in relation to the mark 9. For example, it has been found possible in practice at a web speed of 245 mm. per second to keep the deviation less than  $\pm 1$  mm.

In the device shown in FIGURE 4 a paper web 11 is fed past a working tool 12, which in the example shown consists of a creasing stamp 13 and a back-up 14, the stamp being operated by means of a hydraulic or pneumatic cylinder 17. Adjacent the tool 12 there is mounted a photo cell 18 which is adapted to sense indicating marks 19 put down on the web 11. The device according to FIGURE 4 differs from the device described above principally by the working tool 12 and the photo cell 18 being mounted stationary. To make possible a change of the relative speed of these members with reference to the web 11 the device has been provided with a spring device 20 which consists of a roller 21 which is mounted on a pivoted arm 22 and is pressed against the web 11 by a spring 23. The web 11 which is drawn from a roll of material 24 is passed across idling deflection rollers 25 and 26. Engaging the last-mentioned of these deflection rollers is a normally driven driving roller 27 which may be disengaged when the photo cell 18 senses an indicating mark 19. By the inertia of the system the mark 19 is however advanced a short distance beyond the photo cell 18 before the web stops. Due to the web 11, after the driving roller 27, being moved in a coil 11' it is made possible for it to spring back under the influence of the spring device 20 a corresponding short distance and slightly more, so that the indicating mark 19 will again return to the sensing position under the photo cell 18. The second sensing step obtained thereby will now trigger the work operation. Due to the fact that the speed of the web then is appreciably lower than during the normal feed a very close register of the position of the work operation and the indicating mark is made possible similarly as above.

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In the device shown in FIGURE 5 a paper web 31 is fed past a working tool 32, which in the example shown consists of a creasing stamp 33 and a back-up 34, the stamp being operated by a hydraulic or pneumatic cylinder 37. Adjacent the tool 32 a photo cell 38 is mounted which is adapted to sense indicating marks 39 put down on the web 31. As in the device shown in FIGURE 4, the working tool 32 and the photo cell 38 are mounted stationary. To make a change of the relative speed of these members with reference to the web 31 possible the device has, inter alia, been provided with a spring device 40 which consists of a roller 41 which is mounted on a pivoted arm 42 and which is pressed against the web 31 by a spring not shown. The web 31 which is drawn from a roll of material 44, is passed across idling deviation rollers 45 and 46, the operation being effected by means of a cam 47 which cooperates with a counter-pressure roller 48. When the point *a* on the cam 47 comes into contact with the web 31 while backed up by the counter-pressure roller 48, a short distance remaining before the web occupies the position desired for a work operation, the web is braked by means of a brake 50 mounted at 49 which is hydraulically or pneumatically locked to the web and is carried along by it against the resistance of a hydraulic or pneumatic cylinder 51. The sensing of the position of the point *a* and thereby the triggering of the brake 50 is effected preferably by a direct mechanical coupling, not shown, between for example the cam 47 or its drive shaft and the triggering means of the brake 50. Then, when the point *b* on the cam 47 loses its contact with the web, the indicating mark 39 will have passed the photo cell 38, the spring device and/or the cylinder 51 causing the web to run back at least the distance the mark has passed beyond the photo cell which is adapted to sense the mark only at this return feed, for example by being connected at intervals only. This sensing, which forms the above-mentioned second sensing step, now triggers the work operation as such.

The invention is obviously not limited to the above-described examples only but may be varied within the scope of the accompanying claims. Thus, for example, the various cylinders may be replaced by other operating means, such as electromagnets or the like. Also in other respects the individual details may of course be replaced by equivalent details with the same function. The essential feature is here the double sensing, i.e. a first sensing step at normal web speed and a second sensing step at a reduced relative speed.

That which is claimed is:

1. A method of triggering work operations on a travelling web which is provided with an indicating mark com-

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prising the steps of: supplying the web at a predetermined speed in relation to a work tool, sensing the indicating mark on the travelling web, and giving the sensing means and the work tool a speed in the direction of travel of said web greater than said predetermined speed upon such initial sensing of the indicating mark, sensing the indicating mark on the travelling web again when said sensing means and said work tool catch up to the indicating mark previously sensed and automatically triggering the work tool to perform a work operation on said web in response to the second sensing of said mark.

2. An apparatus to perform an operation on a travelling web comprising: means to advance a travelling web, said web having at least one indicating mark thereon, a work tool operably associated with said web and a sensing means operably associated with said web to reduce the relative speed between said web and said work tool upon a first sensing of said mark and to actuate said work tool to perform an operation upon said travelling web upon a second sensing of said mark, said sensing means including a photo cell, said working tool and said photo cell being mounted on the piston rod of a fluid actuated cylinder, said cylinder being actuated by said photo cell to cause said photo cell and said working tool to travel in the direction of travel of and faster than said travelling web, said photo cell sensing said indicating mark when said photo cell overtakes said indicating mark to trigger said work tool.

3. The structure of claim 2 wherein said means for advancing said travelling web includes a cam and back-up roller operably associated with one another, said sensing means sensing a portion of said cam to reverse the direction of travel of said travelling web, and said sensing means further including a photo cell which detects said indicating mark when said travel of said web is reversed to actuate said working tool.

#### References Cited

##### UNITED STATES PATENTS

|           |         |                |       |        |
|-----------|---------|----------------|-------|--------|
| 2,188,871 | 1/1940  | Broekhuysen    | ----- | 226—27 |
| 2,737,158 | 3/1956  | Seybold et al. |       |        |
| 3,115,999 | 12/1963 | Wythe.         |       |        |
| 3,270,930 | 9/1966  | Emerson        | ----- | 226—33 |

RALPH G. NILSON, Primary Examiner  
C. M. LEEDOM, Assistant Examiner

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