United States Patent

[11] 3,537,359

[72] Inventor Arno Finke
Lengerich, Westphalia, Germany

[21] Appl. No. 750,389
[22] Filed Aug. 5, 1968
[45] Patented Nov. 3, 1970
[73] Assignee Windmoller & Holscher
Lengerich, Westphalia, Germany
Adele Finke, heir of said Arno Finke
[32] Priority Aug. 30, 1967
[33] Germany
[31] W 44,684

[54] MECHINE FOR MANUFACTURING BAGS FROM PREPRINTED WEBS
4 Claims, 5 Drawing Figs.

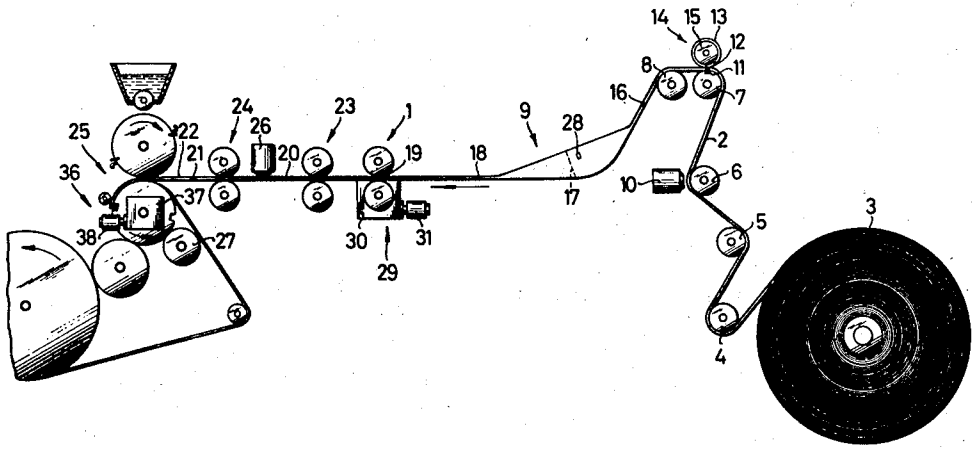
[52] U.S. Cl. 93/8, 93/63
[51] Int. Cl. B31b 1/00
[50] Field of Search 93/8, 27, 62, 63, 20

[56] References Cited
FOREIGN PATENTS

880,041	10/1961	Great Britain	93/8
940,330	3/1956	Germany	93/8

Primary Examiner—Bernard Stickney
Attorney—Fleit, Gipple and Jacobson

ABSTRACT: The machine comprises a perforating unit, which precedes the tube-making unit, a tear-off unit, which succeeds the tube-making unit, a feeding unit and an end-folding and adhering mechanism. A first automatic register control system acts on the web-feeding unit and ensures a formation of registering transverse perforation lines in the preprinted web. A second automatic register control system comprises a sensing head for scanning the web provided with transverse perforation lines, a synchronizing rotary switch, which is in rigid operative connection with the end-folding and adhering mechanism, and a positioning device for changing the phase of the end-folding and adhering mechanism.



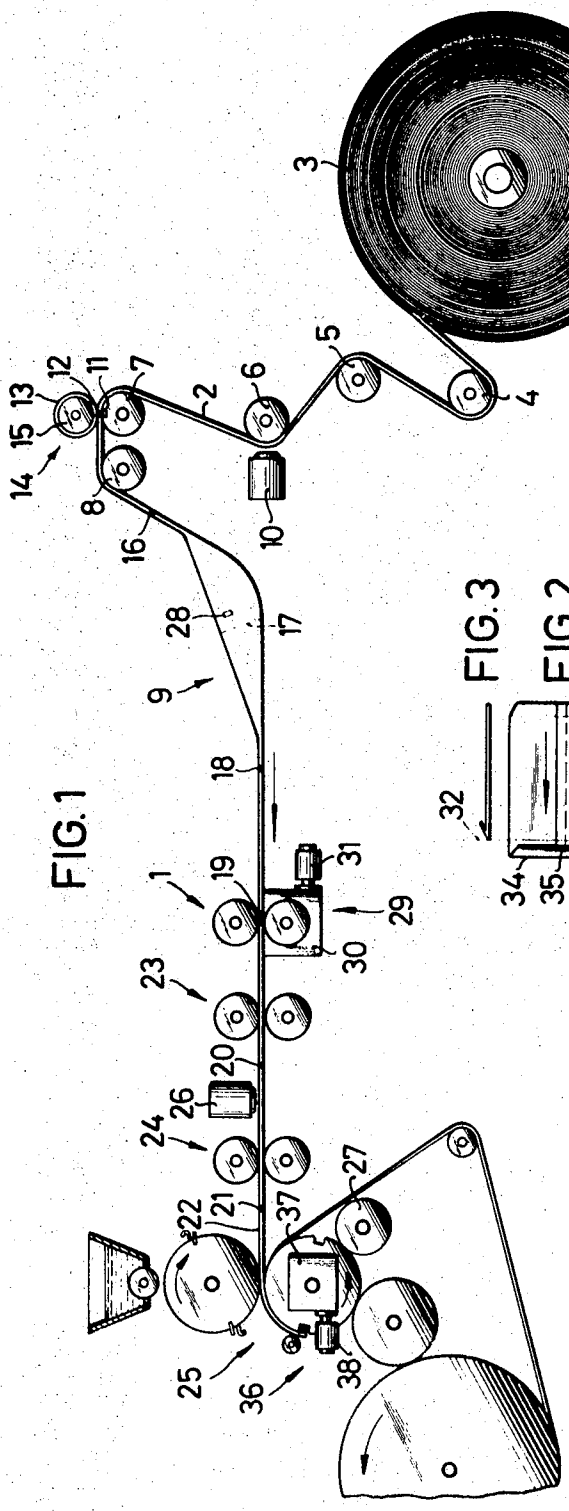


FIG. 1

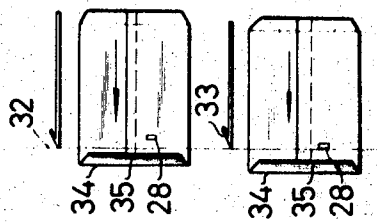


FIG. 3

FIG. 2

FIG. 5

FIG. 4

INVENTOR
Arno FINKE

By Stevens, Davis, Miller & Mosher
ATTORNEYS

MACHINE FOR MANUFACTURING BAGS FROM PREPRINTED WEBS

This invention relates to a machine for manufacturing bags from preprinted webs, such as webs of paper or plastics materials, which machine comprises a perforating unit, which precedes a tube-making unit, a tear-off unit, which succeeds the tube-making unit, a feeding unit and an end-folding and adhering mechanism.

In bag-making machines which are provided with a cutting unit instead of perforating and tear-off units, automatic register of cut control systems have already been employed to ensure a register in the processing of preprinted webs. These known automatic register of cut control systems have a photoelectric sensing head for sensing printed marks on the web, a synchronizing rotary switch, which revolves in synchronism with the cutting mechanism, and a positioning device for controlling the web-feeding speed. The automatic control system acts to adjust the length of the cut sections to the spacing of the printed marks.

If the above-mentioned bag-making machine comprising perforating and tear-off units is to be used to process preprinted webs, the known automatic register of cut control system will be used to drive the synchronizing rotary switch in synchronism with the perforating unit. The web-feeding speed will then be controlled by the automatic control system in such a manner that the transverse perforation lines will be formed in register with the prints on the web.

A machine which is thus equipped cannot yet make satisfactory bags. In contrast to a bag-making machine which comprises a cutting unit, the web sections which have been marked by the transverse perforation lines and are intended to form respective bags will be connected until they are singled by being torn off. When the spacing of the transverse perforations is changed by an automatic control action, the length of the web portion which is provided with transverse perforation lines and extends from the perforating unit to the tear-off unit will be changed as soon as the entire length portion has been provided with perforation lines having the new spacing. If the web has six perforation line spaces between the perforating unit and the tear-off unit, the perforation line disposed in the tear-off unit will be displaced by a distance which is six times the amount by which the length of the workpiece is changed. This displacement may amount to some millimeters. As a result, the torn-off sections of the tubing are supplied in a correspondingly changed position to the end-folding and adhering mechanism so that the reverse folding to form the bag end is not effected at the desired point and rejects are produced.

It is an object of the invention so to develop a machine of the kind which has been described initially hereinbefore that satisfactory bags can be made on it in such a manner that the reverse folding to form the ends will always be effected at the correct position.

In a machine of the kind described hereinbefore, this object is accomplished according to the invention in that a first automatic register control system, which is known per se and acts on the web-feeding device, is used to ensure a formation of registering transverse perforation lines in the preprinted web, and a second automatic register control system is provided, which comprises a sensing head for sensing the web having transverse perforation lines, a synchronizing rotary switch which is in rigid operative connection with the end-folding and adhering mechanism, and a positioning device for changing the phase of the end-folding and adhering mechanism.

Whereas the essential criterion is the position of the transverse perforation lines and of the ends of the tube sections, rather than the position of the prints, the prints or printed marks may be scanned because the first automatic register control system ensures that the transverse perforation lines have the same, predetermined distance from the print so that the position of the prints co-determines the position of the tube section ends. The prints or printed marks can be sensed much more easily than the transverse perforation lines.

The second automatic register control system operates in such a manner that the synchronizing rotary switch, which is in rigid operative connection with the end-folding and adhering mechanism, assumes such a position that the pulse delivered by the sensing head in response to the passage of the printed mark is not transmitted when the end-folding and adhering mechanism is in phase with the leading edge of the workpiece, whereas the synchronizing rotary switch assumes at the time of the arrival of the pulse a position in which said pulse is transmitted to the positioning member in one sense or the other, depending on whether the pulse is advanced or delayed relative to its desired-position occurrence, so as to change the phase of the end-folding and adhering mechanism in one sense or the other, when the end-folding and adhering mechanism is out of phase relative to the leading edge of the workpiece. Because the synchronizing rotary switch is also shifted owing to its rigid operative connection with the end-folding and adhering mechanism, the desired value is adjusted at the same time. When the next tube section arrives in the same position as the foregoing one, the pulse delivered by the sensing head in response to said following workpiece will not be transmitted by the synchronizing rotary switch to the positioning member. This nontransmission is desired in that case.

Whereas the first automatic register control system controls the web by acting on the means which feed the web to the perforating unit, the second automatic register control system controls the phase relation of the end-folding and adhering mechanism to the web. In the first case, the positioning action on the web results in a phase shift thereof relative to the perforating mechanism and relative to the sensing head but another unnecessary automatic control operation without a change of the desired value set at the synchronizing rotary switch is avoided. In the second case, the positioning action must also be applied to the means for setting the desired value at the synchronizing rotary switch.

According to a first proposal, the positioning means for changing the phase of the end-folding and adhering mechanism and the synchronizing rotary switch may consist of an adjustable coupling, which constitutes a differential transmission.

According to a second proposal, the means for driving the end-folding and adhering mechanism may include a pair of helical gears, one of which is axially slidable to effect a peripheral rotation so as to change the phase of the end-folding and adhering mechanism.

An embodiment of the invention will now be described by way of example with reference to the drawing, in which:

FIG. 1 is a diagrammatic side elevation showing a bag-making machine according to the invention.

FIG. 2 is a top plan view showing a workpiece which arrives in proper position.

FIG. 3 is a side elevation showing the workpiece according to FIG. 2 when it has been folded.

FIG. 4 is a top plan view showing an arriving workpiece in an advanced position and

FIG. 5 is a side elevation showing the workpiece according to FIG. 4.

The feeding unit 1 continuously pulls the web 2 from the supply roll 3 and over the rollers 4 to 8 and the tube-making unit 9. At a point which is in register with the roll 5, the web is provided with a longitudinal adhesive band by means which are not shown. A first sensing head 10 is disposed opposite to the roll 6. The roll 7 provided with a groove 11, and the roll 13, which carries a perforating knife, constitute the perforating unit 14. A first synchronizing rotary switch 15 is coaxial to the roll 13. The perforating unit produces the perforation lines 16 to 21 in the web. A workpiece 22 between the pair of restraining rolls 23 and the pair of tear-off rolls 24 rotating at a higher speed has already been separated at the perforation line 21 and has entered the end-folding and adhering mechanism 25. The perforation line 20 has entered between the pairs of restraining and tear-off rolls 23, 24 and will be torn immediately. A second sensing head 26 is arranged

between the pairs of rolls **23** and **24** and has a second synchronizing rotary switch **27** associated with it. The synchronizing rotary switch is in rigid operative connection with the end-folding and adhering mechanism **25**.

The pulses delivered by the first sensing head **10** are transmitted by the first synchronizing rotary switch **15**. If the printed marks **28** on the arriving web **2** are not in register with the perforating unit **14**, these pulses will result in positioning movements of a first positioning device **29**, which is associated with the feeding unit **1** and consists, *e.g.*, of an infinitely adjustable transmission **30** of the means for driving the feeding unit, and an electric motor **31** for adjusting said transmission. The electric motor **31** is energized to rotate in one direction or the other in response to pulses delivered by the sensing head **10**. The first automatic register control system **10,15, 29** ensures that the perforation lines **16** to **21** are produced in register with the printed marks **28**, which have been produced on the web together with the prints. This control is known in connection with bag-making machines provided with a cutting mechanism.

When the bag-making machine has been initially adjusted and started, the spacing of the prints on the web may vary, *e.g.*, as a result of changes in the web tension in the printing machine. In response to such change of the spacing of the prints, the first automatic register control system will effect a corresponding decrease or increase of the spacing of the transverse perforation lines. When the latter spacing is increased, *e.g.*, the increases of all six workpieces associated with the perforation lines **16** to **21** will be accumulated so that the perforation line **21** is displaced toward the end-folding and adhering mechanism by an amount which is six times the amount by which the spacing is changed. When the workpieces have entered the end-folding and adhering mechanism in accordance with FIG. **2** and have been folded in accordance with FIG. **3** along the dash-dot line **32** before the automatic control operation, the workpieces will enter the end-folding and adhering mechanism in an advanced position, as shown in FIG. **4**, and will be formed with a fold line indicated as a dash-dot line **32** in FIG. **5** at a position further to the near when the automatic control operation has been performed. This will result in a nonpermissible shortening of the bag, which is then provided with an excessively long, reversely folded end portion **33**. Such bag must be rejected.

To avoid this, the second sensing head **26** is disposed adjacent to the tear-off unit **23, 24**. The first automatic register control system ensures that the printed marks **28** are always at the same distance from the leading edges **34, 35** of the workpiece. These leading edges are offset owing to the configuration of the transverse perforation lines in the upper and lower plies of the workpiece. The second sensing head **26** senses the position of these leading edges of the workpiece with the aid of the printed marks **28**. During the initial adjustment of the bag-making machine, the second synchronizing rotary switch **27** was adjusted so that the pulses delivered by the sensing head in response to a printed mark **28** on a workpiece which is positioned as shown in FIG. **2** will not be transmitted. If a subsequent automatic control operation of the first automatic register control system causes the workpieces to arrive at the end-folding and adhering device in a position as shown in FIG. **4**, the printed mark **28** will also arrive in a changed position and the pulses delivered in response thereto will be transmitted by the synchronizing rotary switch **27** to a positioning device **36**, which adjusts the end-folding and adhering unit **25** in such a sense that in the case which is illustrated the infolding is effected at an earlier time so that a workpiece which arrives in the position shown in FIG. **4** is infolded as shown in FIG. **2**. If the workpieces would lag behind because the spacing of the transverse perforation lines is reduced, the phase of the end-folding and adhering mechanism will be retarded accordingly.

The positioning device **36** consists of a differential transmission **37**, which is included in the means for driving the end-folding and adhering mechanism and constitutes an adjustable clutch. The third member of said differential transmission **37** is acted upon by a positioning motor **38** in one sense of rotation or the other in response to the position of the synchronizing rotary switch **27**.

The adjustment of the end-folding and adhering mechanism will also adjust the synchronizing rotary switch **27**, which is directly driven by said mechanism. When the adjustment has been effected, the synchronizing rotary switch is adjusted too so that a succeeding pulse, which has been derived, *e.g.*, from a printed mark in the position shown in FIG. **4**, is no longer transmitted and further positioning movements will not be effected until the workpieces have been shifted again.

I claim:

1. A machine for manufacturing bags from preprinted webs, such as webs of paper or plastics materials, which machine comprises a perforating unit, which precedes a tube-making unit, a tear-off unit, which succeeds the tube-making unit, a feeding unit and an end-folding and adhering mechanism, characterized by a first automatic register control system, known per se, which acts on the web-feeding unit and ensures a formation of registering transverse perforation lines in the preprinted web, and a second automatic register control system comprising a sensing head for scanning the web provided with transverse perforation lines, a synchronizing rotary switch, which is in rigid operative connection with the end-folding and adhering mechanism, and a positioning device for changing the phase of the end-folding and adhering mechanism.

2. A machine according to claim **1**, characterized in that the sensing head of the second automatic register control system is disposed adjacent to the tear-off unit between a pair of restraining rolls and a pair of tear-off rolls having a higher speed.

3. A machine according to claim **1**, characterized in that the positioning device for changing the phase of the end-folding and adhering mechanism and of the synchronizing rotary switch consists of an adjustable clutch in the form of a differential transmission.

4. A machine according to claim **1**, characterized in that the positioning device for changing the phase of the end-folding and adhering mechanism and of the synchronizing rotary switch is a pair of helical gears, which are included in the means for driving the end-folding and adhering mechanism and comprise an axially displaceable helical gear.