

[54] LABELLING MACHINE

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[58] Field of Search 156/351, 353-355, 156/361-364, 510, 521, 566, DIG. 45, DIG. 46; 235/61.12 R; 209/111.7, DIG. 1

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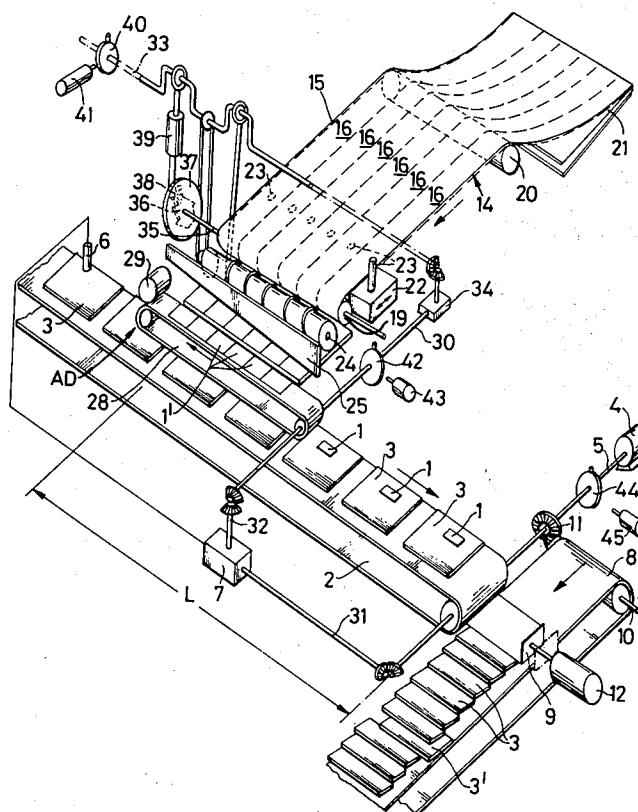
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[57] ABSTRACT

In a labelling machine connected labels in form of a strip having respective series of labels each arranged according to different postal codes and each having a first label provided with a characterizing mark, are advanced to a cutting station where the labels are cut apart, and thereupon the labels are supplied to an applying station at which they are applied to respective objects. An arrangement is provided for detecting the presence or absence of the characterizing mark on the respective labels upstream of the cutting station, and a further arrangement distinguishes the object to which a label having been identified as being provided with the characterizing mark, has been applied, from the remaining objects carrying the other labels of the series with which the label having the characterizing mark is associated.

6 Claims, 3 Drawing Figures



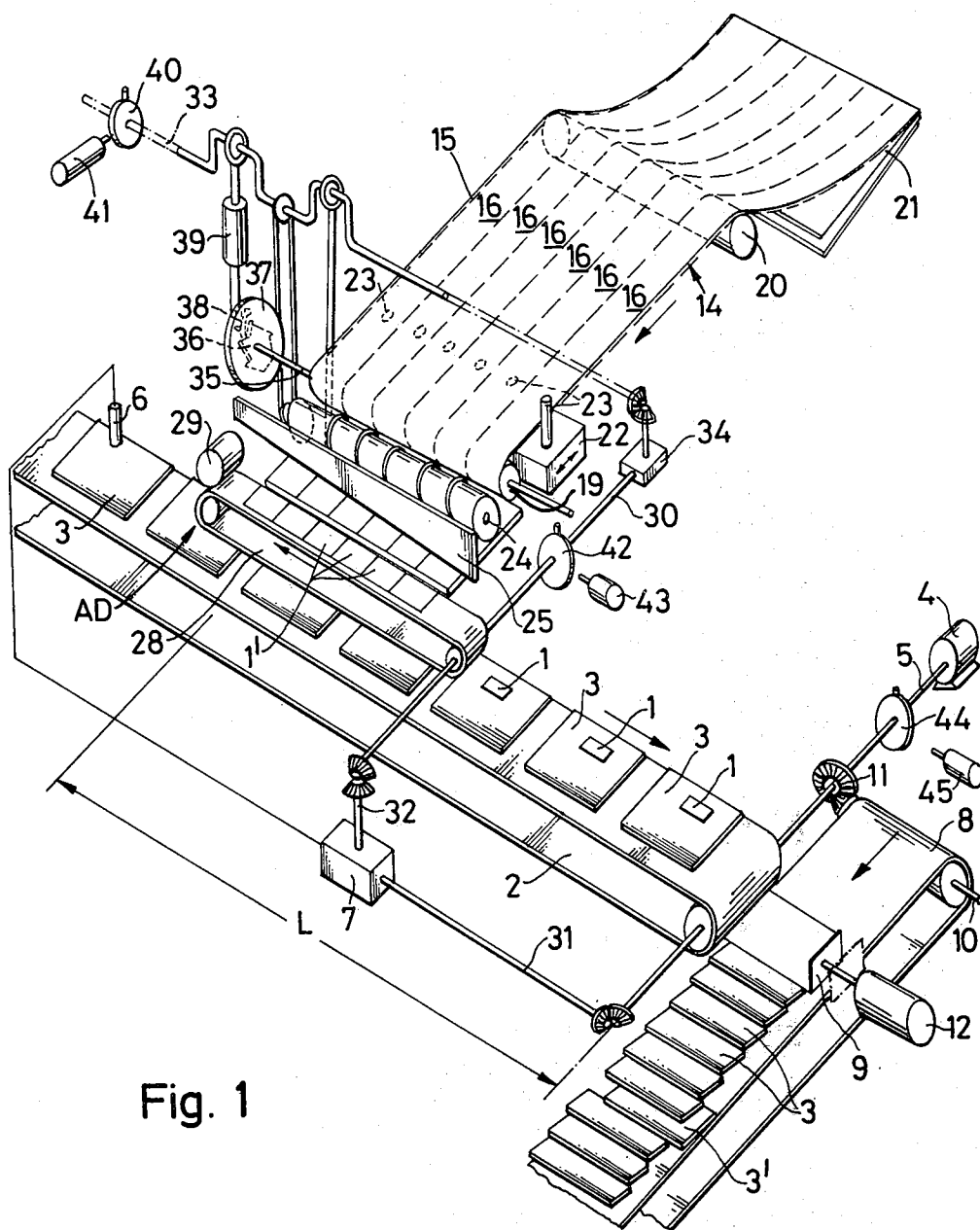
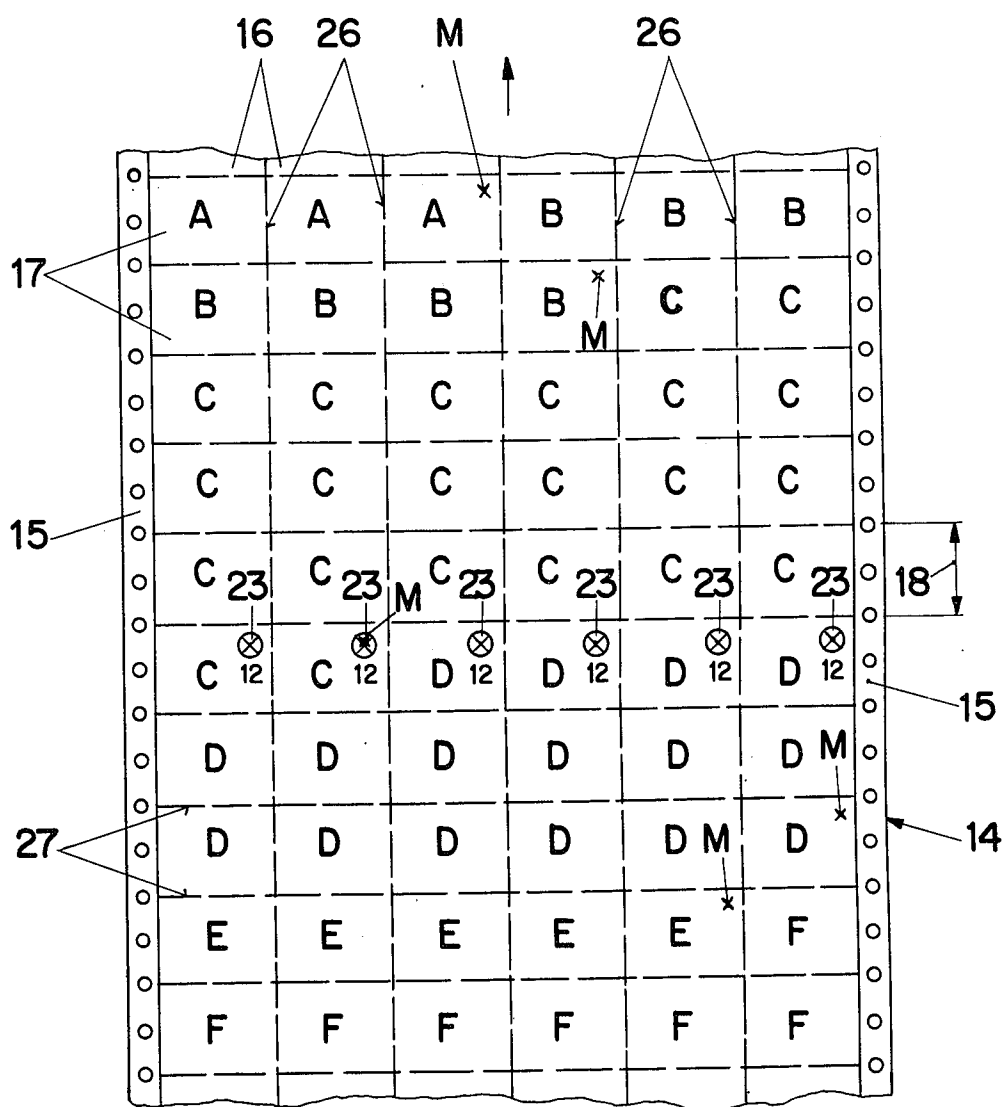
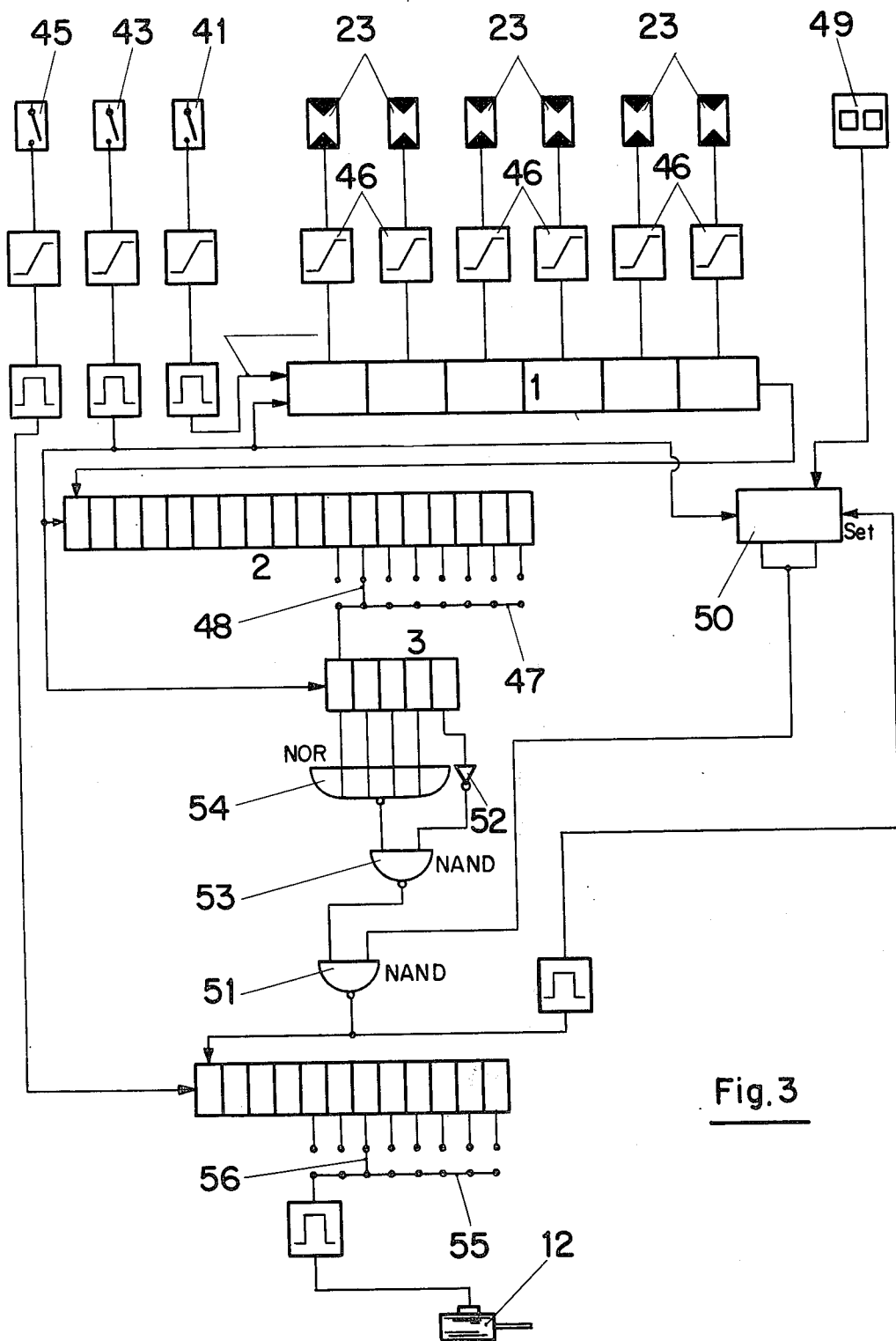


Fig. 1

Fig. 2





LABELLING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates generally to a labelling machine, and more particularly to a labelling machine in which labelled objects are distinguished from other labelled objects in dependence upon different postal codes.

Labelling machines per se, wherein labels are applied to various objects, for instance magazines, letters or the like, are already known per se. (See Swiss Pat. No. 497927 corresponding to U.S. application Ser. No. 460796 from June 2, 1965). As a general rule, the labels are supplied in such machines in form of elongated strips wherein the labels are all connected, for instance by being printed upon the strip. In order to facilitate subsequent handling of labelled objects, and particularly to assure that all labelled objects which are marked with an identical postal code will be packed together or otherwise kept together for mailing, the labels carrying the same postal code are provided in form of connected series on the strip of labels. The first or the last label of such a series is provided with a characterizing mark so that when this label is applied to an object, it should be possible to identify the object as the first or last in a series of objects which belong together, all being intended to be sent to postal addresses having the same postal code.

For this purpose, the known labelling machines are provided with detecting arrangements which detect the presence or absence of these characterizing marks. However, these detecting arrangements are located downstream of the cutting station at which the machine cuts apart the strip so as to separate the individual labels from one another. This means that by the time the labels reach the detecting arrangement, they are all loose and separated from one another. This has certain disadvantages, including the fact that labels might become lost, or might shift around and become overlapped, thereby making it difficult or impossible to properly detect the presence of the characterizing mark. Again, at the very least, however, it is necessary to make the characterizing mark rather large, to assure that it can be properly detected even though the label may have shifted out of its intended position. This means that the labels must be unnecessarily large in order to be able to accommodate such a large characterizing mark, and even this does not always avoid the other disadvantages which have been outlined.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved labelling machine which is not possessed of the aforementioned disadvantages.

More particularly, it is an object of the invention to provide such an improved labelling machine in which the characterizing mark will always be detected with great reliability, even if the characterizing mark is relatively small.

Another object of the invention is to provide such a labelling machine which is capable of clearly distinguishing an object carrying a label having the characterizing mark, from other objects carrying the remaining labels of the series preceding and/or following the label having the characterizing mark.

In keeping with the above objects, and with others which will become apparent hereafter, one feature of

the invention resides in a labelling machine in which connected labels which are arranged in series according to different postal codes and of which the first label in each series carries a characterizing mark, are advanced to a cutting station where the labels are cut apart, and are thereupon supplied to an applying station at which the successive labels are applied to respective objects. In such a machine the present invention provides an improvement according to which first means is provided for detecting the presence of the characterizing mark on a respective first label of a series upstream of the cutting station, and a second means for distinguishing of the object carrying the thus-identified first label from other objects carrying the remaining labels of the respective series.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view illustrating the essential details of a labelling machine according to the present invention;

FIG. 2 is a fragmentary bottom-plan view of a strip of labels prior to cutting-apart; and

FIG. 3 is a circuit diagram illustrating the electrical controls for the operation of the part of FIG. 1 which embodies the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Referring firstly to FIG. 1 it will be seen that 1 have illustrated the parts of a labelling machine which are important for an understanding of the invention. Other parts which are not necessary for an understanding of the invention, and entirely conventional and within the skill of the art, have been omitted. Reference numeral 1 identifies labels which are to be individually affixed to objects 3, such as magazines, envelopes or the like that are advanced individually on a conveyor 2. The conveyor 2 is driven via a motor 4 by a shaft 5. Each complete rotation of the shaft 5, which will hereafter be identified as an operating cycle, causes a new object 3 to be supplied to an applying station AD where at a label 1 is applied to the object 3 in a manner still to be described.

A photoelectric cell 6 is provided which supervises the presence or absence of objects 3 at the station AD. The operation of such photoelectric cells is well known in the art and requires no detailed discussion, other than to point out that if the photoelectric cell 6 determines that there is no object 3 located at the station AD, it will operate a clutch 7 (also known from the art) which will interrupt for that particular operating cycle the supply of a label to the station AD since there is no object 3 present at the station to which the label could be affixed.

After the labels 1 have been affixed to the individual objects 3, each object 3 with the affixed label travels on the conveyor 2 from the station AD by a distance L to the terminal or discharge end of the conveyor 2. Adjacent this discharge end of the conveyor 2 travels a fur-

ther conveyor 8 which advances transversely of the elongation of the conveyor 2 and onto which each of the objects 3 is deposited as it is discharged from the discharge end of the conveyor 2. The conveyor 8 is driven by a shaft 10 which in turn receives motion via a stepdown drive 11 from the shaft 5. It is important that the conveyor 8 operate at a lesser speed than the conveyor 2, so that the objects 3 which are deposited on the conveyor 2 will form an overlapping stream of objects, that is as seen in the direction of advancement of the conveyor 8 (compare the arrow associated with it) the leading end of each object 3 overlies the trailing end of the preceding object 3.

As each object 3 is discharged from the discharge end of the conveyor 2 it is pushed or thrown against an abutment 9 located opposite the discharge end of the conveyor 2; the abutment 9 can be moved between the full-line position and the broken-line position shown in FIG. 1, being connected with a solenoid 12 which, depending upon its state of energization, moves the abutment 9 between the aforementioned two positions. If the abutment 9 is in the full-line position, then the various deposited objects 3 will have on the conveyor 8 the orientation which is shown for all but one of them, namely the object 3'. In order to obtain this other orientation of the object 3', wherein the object 3' conspicuously extends laterally of the stream of overlapping objects 3, the abutment 9 is retracted to the broken line position so that the next object 3 which is discharged onto the conveyor 8 after the abutment 9 has been so retracted, will assume the orientation shown with respect to the object 3'. Thereupon, the abutment 9 is returned to its full line position. This arrangement makes it possible to provide two types of indications, namely to use the laterally displaced object 3' to mark the beginning of a series of objects the labels of which are all marked with identical postal codes, and it is also possible to use the object 3' to mark the beginning of a series of objects which are to be joined in a single bundle, stack or the like.

The labels 1 are supplied in form of a continuous strip 14 which is provided with marginal perforations 15 and which is folded to form a stack 21. In FIG. 1 the labels are printed on the downwardly facing side of the strip 14, which is the side that is shown fragmentarily in a bottom-plan view of FIG. 2. It will be seen from FIG. 2 that the strip 14 is provided with a plurality of columns 16 of labels, these columns all extending longitudinally of the strip 14 and being arranged laterally adjacent one another across the width of the strip. The latter is further subdivided into a plurality of transversely extending rows 17, the width of the rows 17 corresponding to the height 18 of a respective label 1. In the example shown in FIG. 2, the letter groups A-F designate address groups or series having the same postal codes. In other words, all labels of the series A will have the same postal code, all labels of the series B will have the same postal code, and so on.

The machine of FIG. 1 has a guide roller 20 over which the strip 14 is withdrawn from the stack 22 by means of a transport roller 19 which has (non-illustrated) teeth engaging in the perforations 15 of the strip to draw the latter off the stack 21. Intermediate the rollers 19 and 20 the strip passes over or past an optical reading arrangement 22 having six reading heads or detectors 23 each of which is associated with one of the columns 16. A non-illustrated set screw is advantageously provided by means of which the entire arrangement 22 can be shifted in the direction of its associated double-headed arrow, to provide a fine adjustment. After passing the arrangement 22 and the transport roller 19, the strip 14 travels beneath a cutting roller 24 which cuts it along the lines subdividing the individual columns 16. Subsequently, the strip then travels under a cutting blade 25 which cuts it along the lines subdividing the individual rows 17, so that now the labels 1 are all separated from one another. The cutting by means of which the labels are separated along the columns 16 takes place along the line 26, whereas the cutting by means of which the rows 17 are separated takes place along the lines 27. This means that each time the blade 25 effects a cut along one of the lines 27, six separate labels 1' will be available on the conveyor belt 28 which is located immediately downstream of the blade 25.

The labels 1' then travel on the belt 28 beneath a glue applying roller 29 and continue to travel so as to be applied to the successive objects 3 which travel on the conveyor 2 through the applying station AD.

The conveyor 28 is driven by a shaft 30 which is driven in turn by a shaft 31, the clutch 7 and the shaft 32 from the shaft 5. This means that with each operating cycle (i.e. complete rotation) of the shaft 5, the conveyor 28 will travel a further increment in the direction of the indicated arrow to apply another one of the six labels 1' to that particular object 3 that is located at the station AD. This continues until all of the labels 1' on the conveyor 28 have been used up, that is applied to the respective objects 3. During this time the strip 14 is stationary, that is the strip 14 does not advance towards the blade 25 while the labels 1' on the conveyor 28 are being used up.

The transport roller 19, the cutting roller 24 and the blade 25 are all operated by a crank shaft 33 which in turn is driven by the shaft 30 via a stepdown drive 34. The stepdown ratio provided by the drive 34 is 1:6 in the illustrated embodiment, that is in the ratio of 1 to the number of columns 16 that are present on the strip 14. Since it is evident that the number of columns may be changed, the stepdown ratio would change accordingly. The stepping down is necessary since the crank shaft 33 must perform only one turn during the time period during which the shaft 30 performs 6 turns, in order to assure that all six of the labels 1' on the conveyor 28 will be applied to six successive ones of the objects 3.

Since the strip 14 is incrementally advanced, a drive must be provided for it which, is here illustrated as a ratchet drive using a ratchet wheel 36 that is fixedly mounted on the shaft 35 of the transport roller 19, and a disc turnable on the shaft and provided with the pawl 38. The disc 37 is further provided with an eccentric pin (not visible in the drawing) which is engaged by a crank rod 39 that can be adjusted in its length in conventional manner and which during each turn of the crank shaft 33 will displace the disc 37 through a predetermined angle, thus turning the ratchet wheel 36 through the same angular increment, since the pawl 38 engages the wheel 36.

FIG. 3 shows the control which is associated with the apparatus of FIG. 1 and which assures the lateral displacement of certain of the labelled objects (namely the objects 3') for the purpose of identifying those of the objects which are to be combined in a package and

all of which bear labels having the same postal code. The control arrangement comprises a cam disc 40 mounted on the shaft 33 and cooperating with a switch 41, a cam disc 42 mounted on the shaft 30 and cooperating with a switch 43, and a cam disc 44 mounted on the shaft 5 and cooperating with a switch 45.

FIG. 3 shows the six reading heads or detectors 23. The binary information received by them is transferred via respectively associated amplifiers 46 to a first shift register SR1 which is ordered to "read" the labels of a respective row 17 for the characterizing mark at the time when the strip 14 is stationary and a row 17 is located above the detectors 23. From the time of "reading" of the address on a label to its transference from the conveyor 2 (in a condition in which it is already applied to an object 3) to the conveyor 8 the shaft 30 will always perform the same number n of revolutions or operating cycles. This number n of revolutions is composed of the number u of revolutions which are necessary to shift the label after reading onto the belt 28, the number v which is required to transport the labels on the conveyor 28 to the station AD, and the number w of revolutions which is required for transporting the label affixed to a respective object 3 along the distance L to the output end of the conveyor 2. Thus, the number n of revolutions $= u + v + w$. During the number n of revolutions the binary information is to be supplied to the solenoid 12 to control the operation of the same. For this purpose, the first shift register SR1 is controlled by the cam disc 40 via the switch 41, so that the binary information stored in it is successively supplied during each revolution of the shaft 30 to the second shift register SR2. Since the beginning of a series of labels having the same postal code is characterized by the characterizing mark M which is printed on the first of these labels, the information which is picked up in form of a binary signal by the heads 23 will be a yes or positive signal for the first label of the series, whereas for all other labels of the same series it will be a no or negative signal. The cam disc 42 cooperates with the switch 43 to supply the first shift register SR1 with the order to transfer the binary information stored in it successively to the second shift register SR2. It further supplies a signal to a fourth shift register SR4 which controls the operation of the solenoid 12 and which receives its own transfer signals covering the supplying of information to the solenoid 12, from the cam disc 44 and the switch 43. If a yes signal is present, the shift register SR4 energizes the solenoid 12 for the duration of one revolution. The number of storage locations in the shift registers SR1, SR2 and SR4 is so selected that a yes signal or information of the first reading head 23 (which is the one at the right side of FIG. 3) will trigger a corresponding signal which is issued from the shift register SR4 to the solenoid 12 after n revolutions have been completed. The third shift register SR3 is connected with the second shift register SR2 via a contact rail 47 and a sliding contact 48. The sliding contact 48 makes it possible to select at will the outputs of the terminal storage locations of the shift register SR2, and to thereby vary the number n of revolutions which must be completed between the reading of an item of information and an energizing signal to the solenoid 12. When this is done, the number of revolutions u is changed, because this depends upon the height 18 of the labels. The slide contact 48 therefore permits the control to be roughly accommodated in stages to the

height of the address labels 18, whereas the fine adjustment is carried out, as previously mentioned, by the non-illustrated set screw for the device 22.

A counter arrangement is provided, employing a pre-selector switch 49 and a counter 50. The purpose of this arrangement is to make it possible for the operator to select the number of objects 3 which are to be included in a particular package or stack, for instance 10 per package. With each signal generated by the switch 43 the counter 50 counts down from the preselected number, for instance 10, to zero; on reaching zero, it will issue a signal to NAND-gate 51. If for instance a minimum number (such as 5) of object 3 is required for a package, then any remaining 1-4 objects are supplied to the last package of 10. In other words, if 10 objects 3 are desired per package, but the minimum number per package that is acceptable is five, and if after making a number of packages (each containing ten objects) from the objects of a series, somewhere between one and four objects of the series are left, then these last objects numbering between one and four will be added to the last package having normally 10 objects, so that this last package will have between eleven and fourteen objects. To make this possible, the third shift register SR3 is provided which has as many storage locations or stages as the minimum number of objects that is acceptable per package. The last storage location or stage of the shift register SR3 is connected via a nut NOT element or inverter 52 with a NAND-gate 53. The other stages of the third shift register SR3 are connected with the NAND-gate 53 via a NOR-gate 54.

At the beginning of each series of labels constituting part of the strip 14 and all having the same postal code there will always be located one label having the characterizing mark M which is detected by the device 22. That being so, the reading head or detector 23 which detects this mark will produce a yes signal which indicates the beginning of a new label series having a new postal code. Assuming that before the beginning of a new label series and after the last set of previous labels for ten objects 3 has been withdrawn via the roller 24 and the blade 25, but four labels of the previous series are still present on the strip, then the elements 54, 52, 51 and 53 suppress the signal from the counter 50 and supply a control signal to the shift register SR4 only after four further revolutions have taken place. This control signal is subsequently supplied after a further delay controlled by the signals emanating from the cam disc 44, to the solenoid 12. A contact rail 55 having a sliding contact 56 is located intermediate the fourth shift register SR4 and the solenoid 12; the purpose of the contact 56 is to make it possible to select the outputs of the terminal stages of the shift register SR4. Depending upon the setting of the contact 56 this means that the operation of the control arrangement can be accommodated to the length L , that is the distance which must be traversed by the labelled objects 3 between the station AD and the terminal discharge end of the conveyor 2.

The operation of the device will now be described with reference to the illustrated example. As FIG. 2 shows, the strip 14 carries 22 address labels having the postal code C. The characterizing mark M which designates the beginning of this series of labels is read in FIGS. 1 and 2 by the second detector 23 from the left, which is the second detector 23 from the right in FIG. 3. This detector will produce a yes signal which is ap-

plied via the first shift register SR1 to the second shift register SR2 and from there to the third shift register SR3. From the register SR3 it travels via the element 54 and element 52 to the gate 53. During this time period the strip 14 is advanced sufficiently for the address labels with the postal code C to be cut apart and sequentially pasted onto the objects 3 which travel on the conveyor 2. These 22 objects 3 which are thus labelled with labels having the identical postal code C are, let it be assumed, to be bundled in a package of 10 objects and a further package of twelve objects. This means that the abutment 9 must distinguish (by permitting a lateral displacement) the first object carrying one of the labels having the C postal code, the eleventh object carrying such a label, and the first object carrying a label having the B postal code. Ten revolutions or operating cycles after the first label having the postal code C and the characterizing mark M has been detected, the counter 50 supplies a signal to the gate 51. At this time, the shift register SR3 contains only binary no signals, no yes signals, so that the gate 51 receives no signal from the gate 53, and that latter supplies a signal to the fourth shift register SR4 which signal simultaneously returns the counter from zero to the present number, that is 10 in the particular example. After the counter 50 has proceeded to count the next 10 objects and labels, it will again produce a signal which is supplied to the gate 51. At this time, the two terminal stages of the shift register SR3 contain two no signals, whereas the center stage contains a yes signal that is stored therein and is produced by the detection of the characterizing mark M indicative of the first of the labels carrying the B postal code. The gates 54, 52 and 53 now produce at the gate 51 a signal which suppresses the signal derived from the counter 50. After two further operating cycles the gate 51 receives a signal from the gate 53, whereas the signal previously produced by the counter 50 has disappeared. As a result, the gate 51 supplies a signal to the shift register SR4 and at the same time returns the counter 50 to the present number, that is 10 in this example. This means that the solenoid 12 is energized not after ten revolutions but only after twelve of them, so that the last package or bundle of objects 3 carrying labels with the C postal code will be composed of twelve of these objects, rather than ten of them. A detailed description of NAND, NOR, AND and NOT gates is not believed to be necessary since these are entirely conventional designations in electronic control circuits.

It will be seen that the machine according to the present invention thus is capable of affording the dual benefits of a reliable reading of the characterizing mark M and of providing a clear indication of those objects which have been labelled with labels all of which belong to one and the same series, that is all of which carry the same postal code.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a labelling machine, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can be applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

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

1. In a labelling machine in which connected labels arranged on a strip in form of columns which extend longitudinally of the strip and are adjacent one another in direction transverse to the strip, and in which said labels are arranged in series according to different postal codes and of which the first label of each series carries a characterizing mark, are advanced in the longitudinal direction of said strip to a cutting station where the labels are cut apart, and are thereupon supplied to an applying station at which the successive labels are applied to respective objects, the improvement comprising first means comprising a plurality of detectors each associated with one of said columns for detecting the presence of said characterizing mark on a respective first label of a series upstream of said cutting station, each of said detectors being operative for producing a binary signal indicative of the presence or absence of said mark on the respective label; second means for distinguishing between the objects carrying the thus identified first label from other objects carrying the remaining labels of the respective series, control means for supplying said binary signals to said second means, said control means comprising a counter for counting a predetermined number of objects having labels of a series affixed thereto for operating said second means when said number has been counted; and selecting means for preselecting the predetermined number to be counted.

2. A machine as defined in claim 1, and further comprising means for suppressing a signal to said second means from a series supply of the final binary signals which are indicative of the absence of said mark when the number of said final binary signals in said series is smaller than the predetermined number selected by said selecting means.

3. A machine as defined in claim 1, further comprising means for advancing said connected labels stepwise toward said cutting station.

4. A machine as defined in claim 3; and further comprising means for activating said first means only intermediate the stepwise advancement of the connected labels.

5. A labelling machine for use with a strip of connected labels on which the labels are arranged in form of columns which extend longitudinally of said strip and adjacent one another in direction transverse of said strip and in which the labels are arranged in series according to different postal codes with the first label of each series carrying a characterizing mark, said machine comprising transporting means for stepwise transporting said strip in longitudinal direction; first cutting means downstream of the transporting means for cutting said strip in longitudinal direction to separate said columns from each other; second cutting means downstream of said first cutting means for cutting said columns in transverse direction for producing

during each operation a row of separated labels; first conveyor means for receiving said row of separated labels and for transporting said separated labels in the direction of said row; second conveyor means below and substantially parallel to said first conveyor means for transporting a plurality of objects to which labels are to be applied; label applying means at one end of said first conveyor means for applying labels from said row serially to said object transported on said second conveyor means; third conveyor means at one end of said second conveyor means for transporting said objects with the labels applied thereto in a direction transverse to the direction at which said objects are transported by said second conveyor means; a single motor and transmission means for operating said first, said second and said third conveyor means, said transporting means and said first and second cutting means; first means including a plurality of detectors, one for each column, arranged upstream of said first cutting means for detecting the presence of said characterizing mark on respective first label of a series, each of said detectors being operated for producing a binary signal indicative of the presence or absence of said mark on the respective label; second means for distinguishing between the objects carrying the thus identified first label from other objects carrying the remaining labels of the respective series, said second means comprising abutment means located on said third conveyor means shiftable in a direction trans-

verse to the latter and a solenoid for shifting said abutment means in said transverse direction; control means for supplying said binary signals to said second means, said control means comprising a counter for counting a predetermined number of objects having labels of a series affixed thereto for operating said solenoid to shift said abutment means in transverse direction when said predetermined number has been counted; selecting means cooperating with said counter for preselecting the predetermined number to be counted; and means for suppressing a signal to said second means from a series supply of the final binary signals which are indicative of the absence of said mark when the number of said final binary signals is smaller than the number selected by said selecting means.

6. A machine as defined in claim 5, wherein said transporting means comprises a roller, and wherein said transmission means comprises drive shaft means connected to said motor, a crank shaft, a step-down transmission between said drive shaft means and said crank shaft for reducing the speed of said crank shaft at a ratio of 1 divided by the number of columns, and ratchet means between said crank shaft and said roller for stepwise turning the latter each time all the labels on said first conveyor means have been applied to said objects on said second conveyor means.

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