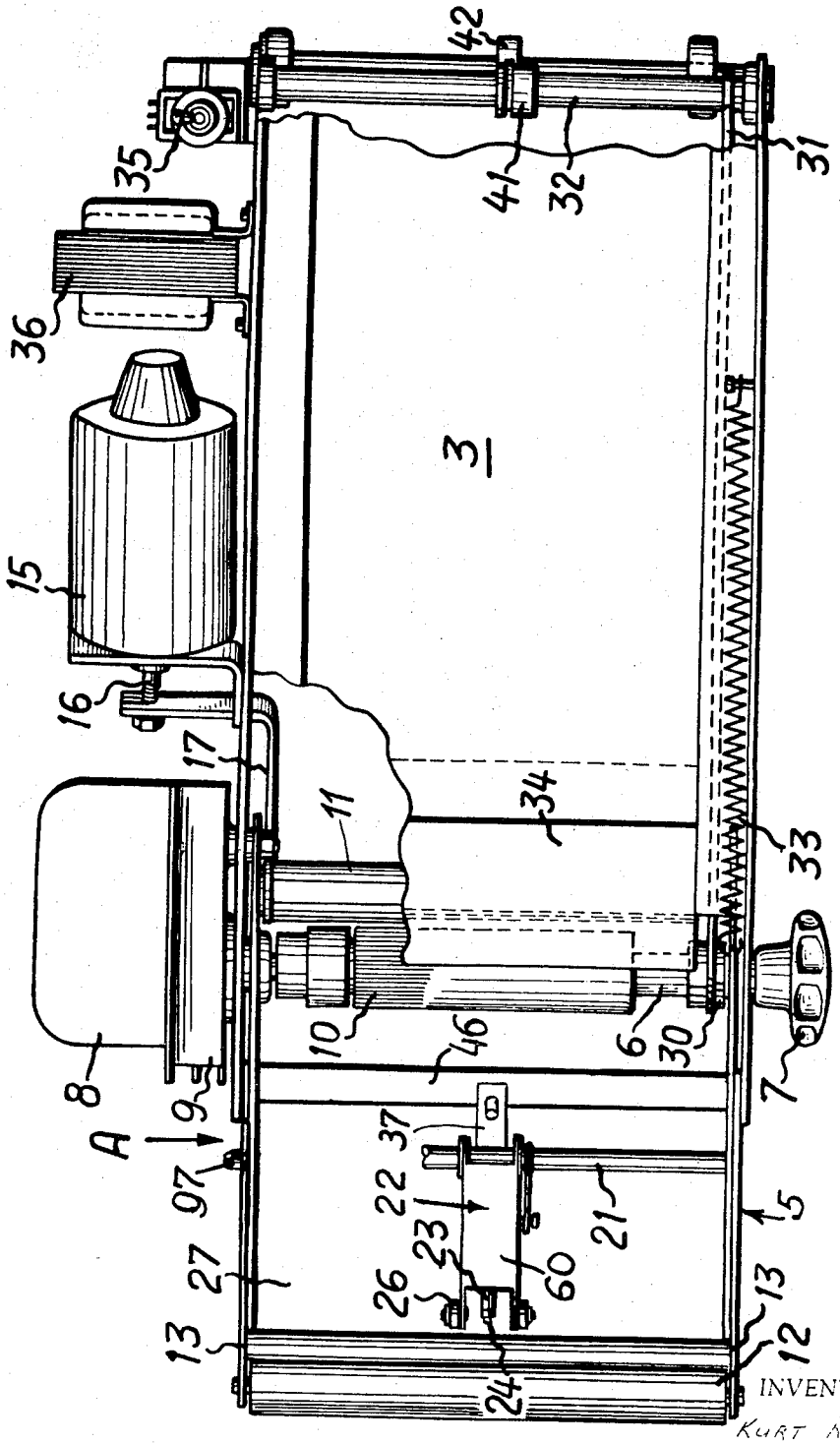
Sept. 12, 1972 K. RÜNZI 3,690,996

APPARATUS FOR THE APPLICATION OF SELF-ADHERING LABELS OR THE LIKE

Filed July 27, 1970

4 Sheets-Sheet 1

Fig. 1



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4 Sheets-Sheet 2

Fig. 2

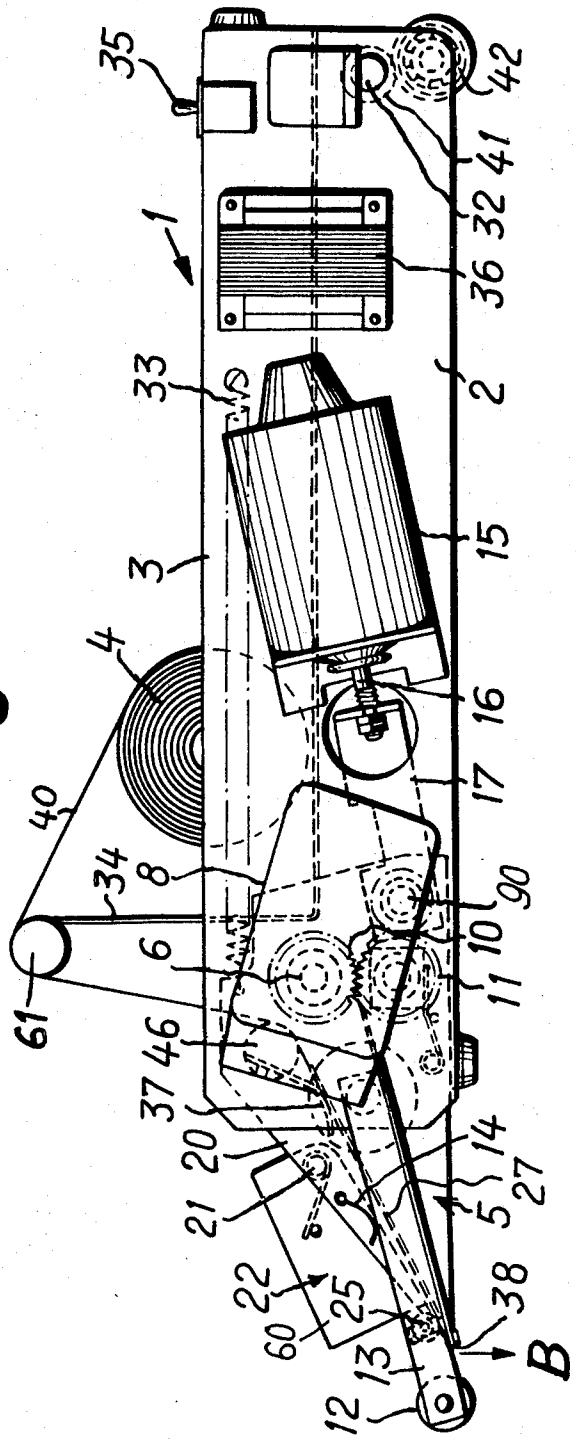
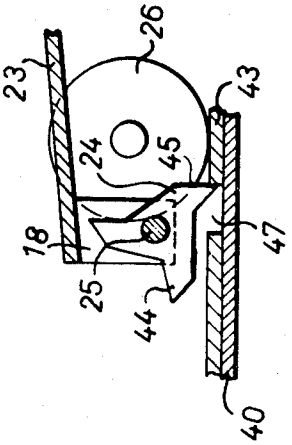


Fig. 3



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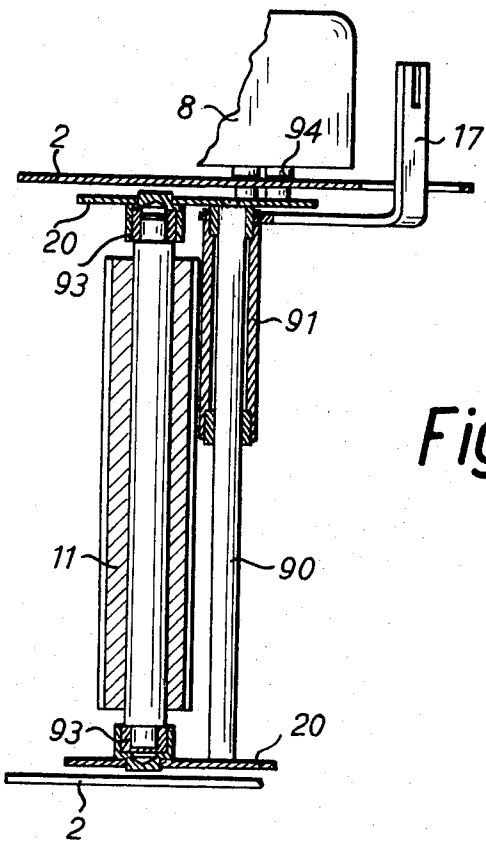

Fig. 4

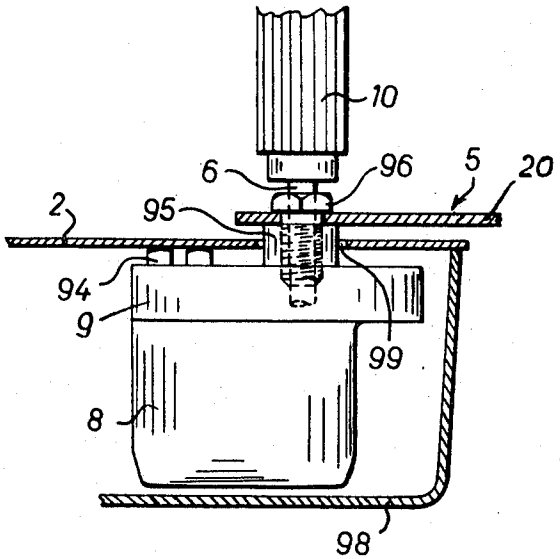

Fig. 9

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Sept. 12, 1972 K. RÜNZI 3,690,996
APPARATUS FOR THE APPLICATION OF SELF-ADHERING LABELS OR THE LIKE
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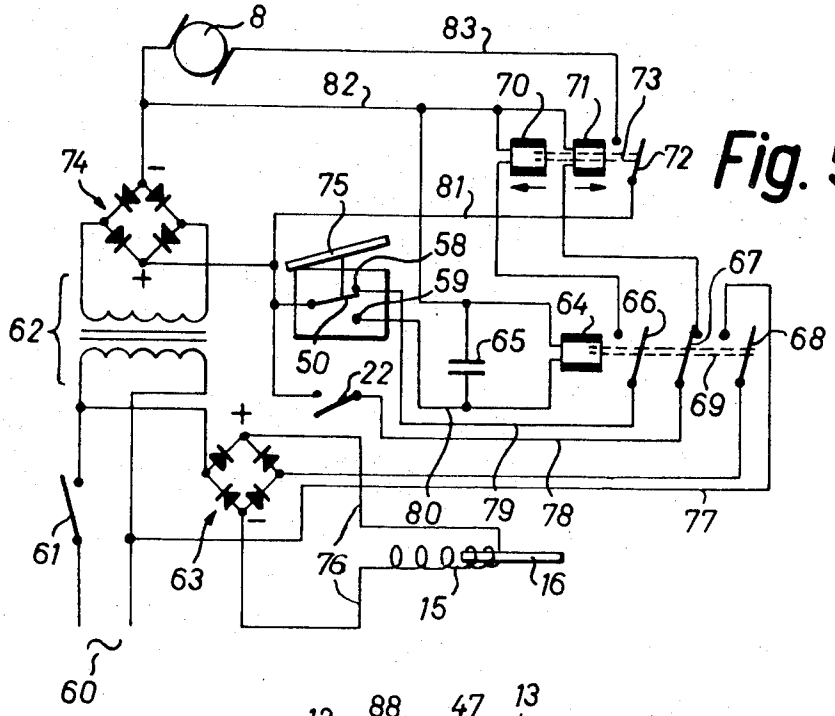

Fig. 5

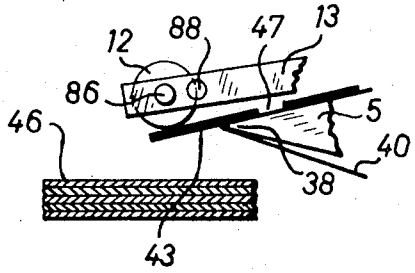

Fig. 6

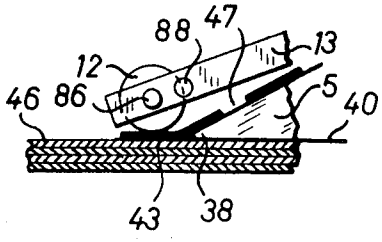

Fig. 7

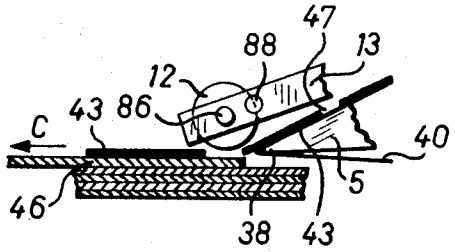

Fig. 8

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United States Patent Office 3,690,996
Patented Sept. 12, 1972

3,690,996

APPARATUS FOR THE APPLICATION OF SELF-ADHERING LABELS OR THE LIKE

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Continuation-in-part of application Ser. No. 708,682, Feb. 27, 1968. This application July 27, 1970, Ser. No. 58,519
Claims priority, application Switzerland, Mar. 1, 1967, 2,984/67
Int. Cl. B65c 9/18, 9/42
U.S. Cl. 156—542 6 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for applying self-adhering pressure sensitive labels or the like to articles comprising a carrier band for detachably supporting the labels, and deflecting edge means about which the carrier band is guided in order to free the labels from such carrier band. A pivotably mounted table means cooperates with the carrier band, and the deflecting edge means is disposed at an outer end of such pivotably mounted table means. Additionally, motor-driven transport means are provided for advancing the carrier band, and control means serve to stop the motor-driven transport means as a function of the feed position of a label.

BACKGROUND OF THE INVENTION

The present invention relates to an improved apparatus for the application of self-adhering labels or the like to substantially flat objects or articles, wherein the carrier band detachably carrying or supporting the labels is guided about a deflecting edge in order to release or free the labels from the carrier band.

The present application is a continuation-in-part application of my patent application, Ser. No. 708,682, filed Feb. 27, 1968, now abandoned.

It is already known to the art to print upon self-adhering labels, which are located upon a carrier band and detachable from the latter, by means of a suitable printing device, for instance by means of a high-speed printer which is operably associated with a computer. In this manner it is possible to print addresses, for instance, on the labels. The labels must subsequently be freed from the carrier band and applied to an article which is to be labeled, for instance an envelope. It has already been proposed to guide the carrier band about a sharp edge in order to facilitate release of the individual labels, so that these labels can be easily drawn off of the carrier band.

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide an improved apparatus of the mentioned type which enables the labels to be adhesively applied in large quantities and in an extremely quick and rational manner to flat articles or objects.

Another, more specific object of the present invention relates to an improved apparatus for quickly, reliably, efficiently and cleanly applying labels or the like to articles.

Yet a further noteworthy object of the present invention relates to an improved apparatus for the application of self-adhering labels or the like to articles in an efficient and economical manner, capable of operating at relatively high performance speeds, and wherein the apparatus structure itself is extremely efficient and reliable, easy to use, and constructed as a transportable unit.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive apparatus incorporates a table which can be positively pivoted and with the deflecting edge being located at the outermost end of such table. Additionally, there is provided a motor-driven transport means for feeding the carrier band for the labels, which motion is independent from the motion of the table. The invention further contemplates control means for interrupting the rotational movement of the band feed-drive motor as a function of the feed position of the labels.

Owing to the inventive apparatus it is possible to reliably remove self-adhering labels or the like from a carrier band with relatively simple means and to apply such to a flat object or article, preferably envelopes, newspapers, or other printed matter, shipping bags, or the like. Furthermore, the inventive apparatus is capable of working at a high hourly output.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood, and objects other than those set forth above, will become apparent, when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings, wherein:

FIG. 1 is a top plan view of a preferred embodiment of inventive apparatus;

FIG. 2 is a side view of the apparatus shown in FIG. 1, viewed in the direction of the arrow A of FIG. 1, the table being in its lowered position;

FIG. 3 is a fragmentary view showing a detail of a feeler wheel cooperating with a microswitch;

FIG. 4 is a fragmentary, partially sectional plan view showing a detail of one of the transport rollers;

FIG. 5 is a schematic circuit diagram of the apparatus;

FIG. 6 is a view of the front portion of the pivotal table member used in the apparatus structure of FIG. 1, shown in conjunction with the operably associated carrier band and the label; which can be removed from such carrier band, the table member being in rest position;

FIG. 7 is a view similar to FIG. 6, but the table member being lowered upon the supply stack so that the labels can be pressed onto the uppermost sheet or the like;

FIG. 8 is a view similar to FIG. 7, showing how the upermost sheet together with the label is pulled away; and

FIG. 9 is a horizontal sectional view showing details of the motor mounting.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Describing now the drawings, the inventive apparatus shown by way of example in FIGS. 1 to 9 incorporates a frame member **1** provided with two lateral sheet metal plate members **2** between which there is formed a receiving compartment **3**. This receiving compartment **3** is shown to possess a substantially rectangular cross-sectional configuration and serves to house the label material **4** which is to be processed and which may be in roll- or stack-like configuration, as such will be explained more fully hereinafter. At the front end of the inventive apparatus there is arranged a pivotable table member **5** or rocker which is mounted for pivotal movement about a shaft member **6** relative to the frame member **1**. A handwheel **7** is seated at one end of this shaft member **6** and the opposite shaft end is operably associated with a suitable electric drive motor **8** as shown in FIG. 9. This drive motor **8** is equipped with a speed-reduction gear unit **9** and thus can transmit rotational movement to the shaft member **6**.

A transport roller **10** is rigidly connected for rotation with the shaft member **6**. This transport roller **10** coacts or meshes like gear wheels with a further transport

roller 11 which is located beneath the roller 10. Additionally, the pivotal table member 5 is provided with a pressure roller 12 in front position, which, in turn, is pivotably mounted by two lateral arm members 13, so that this pressure roller 12 can rock about a transverse axis in addition and independently to the movement of the pivotal table member 5. The pressure roller 12 serves to press each label into contact with the uppermost envelope or other article following separation from the carrier band 40. The pressure roller 12 is pressed downwardly by a spring 14 against a stop 97 arranged on the side wall of the table member 5. The pressure roller 12 is mounted in overhanging fashion with respect to the table member 5 and is adjustable in the direction of feed of the carrier band means in such manner that the roller 12 can either be fixed in the opening 86 or in the opening 88. After disconnecting the motor 8 the next label is lying directly under the pressure roller 12 as shown in FIG. 6 and is still supported along a small strip by the carrier band 40.

Furthermore, it should be understood that an electromagnet 15 or solenoid is operably associated with the pivotal table member 5. This electromagnet 15 incorporates an armature or plunger 16 which engages with the pivotal table member 5 through the agency of an angled connection piece 17.

The angled connection piece 17 engages with a sleeve member 91 which is piercingly penetrated by a rod 90. This rod 90 is rigidly connected to both lateral sheet metal support walls 20 of the table member 5. The bearings 93 of the transport roller 11 are also affixed to the same metal support walls 20. Thus the point of application of the force of the connection piece 17 is radially spaced from the pivot axis of the table member 5. Consequently, when the electromagnet 15 is energized, the pivotal table member 5 carries out a rocking or pivotal movement in the direction of the arrow B of FIG. 2.

Additionally, a transverse shaft member 21 is supported at the two side walls 20 of the pivotal table member 5. This transverse shaft member 21 serves for mounting the housing 60 of a microswitch 22. This microswitch 22 includes an operating lever 23 which carries at its front end a feeler wheel 24, as best shown by referring to FIG. 3. This feeler wheel 24 is rotatable about a pin member 25 and possesses an essentially triangular configuration which includes three radially extending projections or arms 44, as shown. The pin member 25 is supported by two tongues 18 extending from the operating lever 23. The front end of the housing 60 of the microswitch 22 is supported near the feeler wheel 24 by two rollers 26 which bear upon the labels 43 carried by the carrier band 40 which is supported by the surface of the table plate 27. In the context of this application, it is to be understood that the term "labels" is used in its broader sense, and therefore also encompasses paper sheets, cards or the like which can be applied to an article in the manner under consideration.

FIG. 6 illustrates the table member 5 in the rest position in which the forward portion of a label 43 is disposed beneath the roller 12 and is only retained by means of its rearmost portion at the carrier band 40. The foremost label 43 is extending to the region of the pressure roller 12. The feeler wheel 24 is just pushing against the edge of the following label.

In FIG. 7 the table member 5 has been lowered upon the supply stack 46, so that the labels 43 can be pressed by means of the roller 12 onto the uppermost sheet or the like.

FIG. 8 illustrates the manner in which the uppermost sheet together with the adhesively bonded label 33 is manually pulled away in the direction of the arrow C, after it has been loosened from the carrier band 40, by virtue of the advancing movement thereof. Thereafter, the table means 5 again raises under the action of spring member 33 since the electromagnet 15 is deenergized. The advance of the carrier band 40, in the meantime continues further until the motor 8 has been switched off by the microswitch 22.

FIG. 9 illustrates a section through the mounting means of the motor 8. The motor 8 partakes in the movements of the table member 5 in order to prevent additional movement being transmitted to the transport roller 10, and thereby to the feed of the labels when the table member 5 moves up or down. The shaft 6, on the one hand, is rotatably connected with the transport roller 10, and on the other hand, with the motor 8 and the transmission or gears 9. Between the housing of the transmission 9 and the sheet metal support wall 20 there is located a ring-shaped intermediate spacing member 95 which is pierced by a hollow screw 96. By means of this screw 96, the sheet metal support wall 20 and the transmission housing are pressed together so that the motor 8 with the transmission 9 and the table member 5 forms a composite unit as far as movement is concerned. A slot or opening 99 is provided in the plate member 2, this opening being larger than the external diameter of the intermediate member 5. Pin members 94 are provided for the additional support of the transmission housing 9. These pin members 94 are loosely bearing against the plate member 2 and sliding along such. The motor 8, the electromagnet 15 as well as the further elements are covered by a suitable covering or hood 98.

Continuing, it will be recognized that a pulley 30 is additionally seated upon the shaft member 6 about which rocks the pivotal table member 5. An endless rubber belt 31 is trained about this pulley 30 and the belt 31 is driving a transport shaft 32 at the rear end of the apparatus. A tension spring 33 serves to hold the pivotal table member 5 in its upper terminal or rest position.

Deflecting element 34 extends vertically upwards from the front region of the receiving compartment 3. The top portion of this deflecting element 34 is provided with a rounded portion 61 about which is guided the carrier band 40 together with the labels 43 supported by such carrier band.

As part of the electrical equipment for the inventive apparatus there is still to be mentioned the on-off switch 35, the transformer 36, a foot-actuated switch, as well as further conventional electrical components such as relays, fuses and the like.

Individual pressure sensitive labels 43 are arranged along the carrier band 40 at a distance of about two millimeters from one another. These labels 43 can be provided with printing or the like, for instance with addresses which have been printed by a line printer or computer. The thickness of the carrier band 40 and the labels 43 has been exaggerated in FIGS. 3 and 6 to 8 in order to improve the comprehensibility of the illustration. The side of each label 43 which confronts the carrier band 40 is provided with a suitable self-adhering adhesive layer which slightly adheres to the upper surface of the carrier band 40 in such a manner that it can be easily removed. This carrier band 40 is advantageously rolled into a supply roll 4 or else it can be folded into a substantially zig-zag-shaped stack and placed in the receiving or reception compartment 3. At the front end of the inventive apparatus these labels 43 are removed from the carrier band 40 and applied to a flat article or object, for example in the form of an envelope 46.

For this purpose, the carrier band 40, together with the labels 43 carried thereby, is initially guided about a deflecting member 34, which has the form of a sheet metal member, and from this location is then guided beneath a shaft member 46 and the flat or blade spring means 37. Thus, the carrier band 40 now extends substantially parallel to the surface of the table plate 27 of the pivotably mounted table member 5. The carrier band 40 is sharply deflected about the transversely extending edge 38 of the pivotal table member 5. The thus deflected carrier band 40 then extends between both of the transport rollers 10 and 11 and is positively gripped by these

rollers. At the rear end of the apparatus this carrier band 40 is engaged by two coacting rollers 41 and 42 and is conveyed rearwardly away. It should be apparent that during the feed or advancement of the carrier band 40 there occurs an automatic release of the forwardmost label 43 from the carrier band 40 at the region of the deflecting edge 38. This is because the labels 43 do not undertake the pronounced deflection about the deflecting edge, rather tend to move further in linear direction and, thus, separate from the surface of the carrier band 40, as such has been shown in FIG. 6.

After switching in the switch 35 the apparatus is placed into operation by means of a foot pedal or a manually operated switch.

FIG. 5 illustrates the circuit diagram of the apparatus of the invention. A transformer 62 is coupled to the alternating-current supply network 60, the current being capable of being switched-in and switched-out by means of a main switch 61. Additionally, a rectifier arrangement 63 is electrically coupled with the supply network 60. Current is supplied to the rectifier arrangement 63 when the switch 68 is closed across the conductors 77, so that thereafter the electromagnet 15 is energized via the conductors 76. Hence, the plunger or armature 16 is drawn into the coil or solenoid and the table member 5 is pivoted.

At the low-voltage side of the transformer 62 there is coupled a further rectifier arrangement 74. The switch 50 of the foot pedal 75 is connected with the positive pole of the rectifier arrangement 74, as shown. In the rest condition, the switch 50 bears against the contact 58. On the other hand, if the foot pedal 75 is depressed, then contact 59 is closed. In the illustrated rest condition the switch 50 is coupled via the contact 58 and the conductor 79 with an open switch 66. When this switch 66 is closed by the associated relay 64, then, current is supplied to the relay 70 so that the current circuit to the rectifier arrangement 74 is closed via the conductor 82. The switches 66, 67 and 68 are mechanically connected by a coupling means 69.

On the other hand, when the foot pedal 75 is depressed, then there is provided a current circuit starting at one pole of the rectified arrangement 74 which then leads to the switch 50, and through the contact 59, the conductor 80, to the relay 64 and via the conductor 82 back to the other pole of the rectifier arrangement 74.

A further current path is provided when the microswitch 22 is closed owing to rotation of the feeler wheel 24. Then the current flows from the positive pole of the rectifier arrangement 74, thrc ugh the microswitch 22, the conductor 78, the switch 76 actuated by the relay 64, through the relay 71 and the conductor 82 to the negative pole of the rectifier arrangement. Both relays 70 and 71 act upon a common mechanical actuaction element 73 by means of which the contact 72 can be opened or closed. The one relay 70 displaces the actuation element in the one direction and the other relay 71 in the other direction, as such has been indicated in FIG. 5 by arrows. The actuation element 73 and, therefore, the contact 72 remains in the last assumed position since no return spring is provided. When the contact 72 is closed—that is as soon as the relay 70 is energized—then the current circuit for the motor 8 is closed via the conductor 83.

The mode of operation of the system heretofore described is as follows: as soon as the foot pedal 75 has been depressed, the relay 64 is supplied with current via the switch 50, the contact 59, the conductor 80 and the conductor 82. As a result, the contacts 66 and 68 associated with this relay are closed by means of the common actuation element 69 and the contact 67 as opened.

The rectifier arrangement 63 is supplied with current by virture of the now closed contact 68 and the electromagnet 15 is energized so that the table member 5 is moved in the direction of the arrow B (FIG. 2). Now, as soon as the foot pedal 75 has returned back into the rest position illustrated in FIG. 5, then there is provided a current circuit from the positive pole of the rectifier, throught the switch 50, the contact 58, the now closed contact 66 to the relay 70, and via the conductor 82 back to the negative pole of the rectifier arrangement. The switch 22 is closed only during a short time because the motor 8 is running down and the switch 22 is again opened during this movement.

Deenergization of the relay 64 is delayed by means of the capacitor 65. Due to energization of the relay 70, the contact 72 is closed, and only then does the motor 8 begin to rotate, which then brings about advance of the labels 43. Motor 8 rotates—independently of the movement of the table member 5—for such length of time until the feeler wheel 24 closes the microswitch 22 and thereby places the relay 71 under current via the conductor 78 and the contact 67 which, in turn, opens the contact 72 and thus interrupts further rotation of the motor 8. During a brief moment, the electro-magnet 15 is under current so that the table means 5 is lowered and the motor 8 is simultaneously in operation. Stopping of the motor 8 is independent of the electromagnet and the position assumed by the table means 5 and is only controlled by the feed or advanced position of the labels by means of feeler wheel 24.

Instead of using two different relays 70 and 71, it would also be possible to employ a single polarized relay having two different oppositely acting windings.

The carrier band 40 is pulled between and with the aid of the transport rollers 10 and 11 and a label 43 begins to release itself from the carrier band 40. As soon as the feeler wheel member 24 drops into the intermediate space 47 between two neighboring labels 43, then one of the projections 44 of the feeler wheel 24 which is located in the intermediate space 43 abuts against the edge 45 of the subsequent or trailing label 43 during further transport or conveying of these labels and is thus entrained. The resulting partial rotation of the feeler wheel 24 through about one third of a revolution causes a raising or lifting of the actuation spring lever 23 of the microswitch 22, thereby causing this microswitch 22 to be thrown, whereby the drive motor 8 and thus the feed of the carrier band 40 is interrupted, so that an increment advance of the tape is effected. This feeler wheel 24 therefore serves to increase the actuation stroke since the thickness of the label material is relatively small and is generally not sufficient to bring about actuation of the microswitch 22.

The inventive apparatus is advantageously constructed as a complete separable unit which can be readily removed from its associated support surface and can then be transported to and mounted at any randomly selected new location.

It is believed evident that by providing a label-applying apparatus as described above, all of the objects set forth at the outset of the specification have been successfully fulfilled.

Accordingly, what is claimed is:

1. An apparatus for the application of self-adhering labels or the like to substantially flat objects, comprising a carrier band means for supporting the labels with an intermediate space between each two neighboring labels, deflecting edge means about which said carrier band means is guided and thence rearwardly directed in order to separate the labels from said carrier band means, table means pivotable about a transverse axis terminating in said transverse deflecting edge means, said deflecting edge means being disposed at the region of the outer end of said pivotably mounted table means, transport roller means, drive motor means for at least some of said transport roller means, said transport roller means cooperating with a portion of said carrier band means which has been freed of labels for advancing said carrier band means, at least part of said transport roller means being arranged in the region of the axis of said pivotably mounted table means, control means for stopping said transport roller means as a function of the feed position of said labels, electro-

magnet means for positive pivoting said table means about pivot shaft means in downward direction towards each of said flat objects, first switching means, said control means being disposed on said pivotably mounted table means and including means coacting with the labels and said intermediate space and cooperating with said first switching means, said first switching means controlling the rotation of said transport roller means, second switching means controlling said electro-magnet means, the first and second switching means allowing independent movement of said table means and said transport roller means, pressure roller means supported by said table means and arranged forward of said deflecting edge means for pressing a label into contact with the object to which it is to be applied, said control means controlling operation of said first switching means controlling the rotation of said transport roller means in order to stop said carrier band means when the next label following the label applied to the object is lying directly beneath said pressure roller means and is still supported along a small strip by said carrier band means, said apparatus being portable as a unit.

2. An apparatus for the application of self-adhering labels or the like to substantially flat objects, comprising a carrier band means for supporting the labels with an intermediate space between each two neighboring labels, deflecting edge means about which said carrier band means is guided and thence rearwardly directed in order to separate the labels from said carrier band means, table means pivotable about a transverse axis terminating in said transverse deflecting edge means, said deflecting edge means being disposed at the region of the outer end of said pivotably mounted table means, transport roller means, drive motor means for transport roller means, said transport roller means cooperating with a portion of said carrier band means which has been freed of labels for advancing said carrier band means, at least part of said transport roller means being arranged in the region of the axis of said pivotably mounted table means, control means for stopping said transport roller means as a function of the feed position of said labels, electro-magnet means for positive pivoting said table means about pivot shaft means towards each of said flat objects, first switching means, said control means being disposed on said pivotably mounted table means and including means coacting with the labels and said intermediate space and cooperating with said first switching means, said first switching means controlling the rotation of said transport roller means, second switching means controlling said electro-magnet means, the first and second switching means allowing independent movement of said table means and said transport roller means, pressure roller means supported by said table means and arranged forward of said deflecting edge means for pressing a label into contact with the object to which it is to be applied, said apparatus being portable as a unit, and wherein said transport roller means comprise a pair of cooperating toothed rollers supported by said table means and engaging said carrier band means therebetween, one of said toothed rollers defining the pivotal axis of said table means.

3. An apparatus for the application of self-adhering labels or the like to substantially flat objects, comprising a carrier band means for supporting the labels with an intermediate space between each two neighboring labels, deflecting edge means about which said carrier band means is guided and thence rearwardly directed in order to separate the labels from said carrier band means, table means pivotable about a transverse axis terminating in said transverse deflecting edge means, said deflecting edge means being disposed at the region of the outer end of said pivotably mounted table means, transport roller means, drive motor means for at least some of said transport roller means, said transport roller means cooperating with a portion of said carrier band means which has been freed of labels for advancing said carrier band means, at least part of said transport roller means being arranged in the region of the axis of said pivotably mounted table means, control means for stopping said transport roller means as a function of the feed position of said labels, electro-magnet means for positive pivoting said table means about pivot shaft means towards each of said flat objects, first switching means, said control means being disposed on said pivotably mounted table means and including means coacting with the labels and said intermediate space and cooperating with said first switching means, said first switching means controlling the rotation of said transport roller means, second switching means controlling said electro-magnet means, the first and second switching means allowing independent movement of said table means and said transport roller means, pressure roller means supported by said table means and arranged forward of said deflecting edge means for pressing a label into contact with the object to which it is to be applied, said apparatus being portable as a unit, a reduction gear for said drive motor means, and wherein said drive motor means and the reduction gear are seated upon said pivot shaft means, a housing for said drive motor means and reduction gear, and the housing of said drive motor means and reduction gear is rockable together with said table means.

4. An apparatus for the application of self-adhering labels or the like to substantially flat objects as defined in claim 1, wherein said first switching means being in the circuit of said drive motor means for interrupting the supply of current of said drive motor means when said first switching means are opened, the open position of said first switching means being reached as soon as the foremost label extends under the pressure roller means, said control means coacting with the leading edge of the neighboring label behind said foremost label.

5. An apparatus for the application of self-adhering labels or the like to substantially flat objects as defined in claim 1, further including lever means, said electro-magnet means including a solenoid cooperating with said lever means, said lever means being connected to said table means at a point which is radially spaced from the pivot axis of said table means, and spring means for urging said table means into a rest position in which the deflecting edge is spaced from a stack of said flat objects.

6. An apparatus for the application of self-adhering labels or the like to substantially flat objects, comprising a carrier band means for supporting the labels with an intermediate space between each two neighboring labels, deflecting edge means about which said carrier band means is guided and thence rearwardly directed in order to separate the labels from said carrier band means, table means pivotable about a transverse axis terminating in said transverse deflecting edge means, said deflecting edge means being disposed at the region of the outer end of said pivotably mounted table means, transport roller means, drive motor means for at least some of said transport roller means, said transport roller means cooperating with a portion of said carrier band means which has been freed of labels for advancing said carrier band means, at least part of said transport roller means being arranged in the region of the axis of said pivotably mounted table means, control means for stopping said transport roller means as a function of the feed position of said labels, electro-magnet means for positive pivoting said table means about pivot shaft means towards each of said flat objects, first switching means, said control means being disposed on said pivotably mounted table means and including means coacting with the labels and said intermediate space and cooperating with said first switching means, said first switching means controlling the rotation of said transport roller means, second switching means controlling said electro-magnet means, the first and second switching means allowing independent movement of said table means and said transport roller means, pressure roller means supported by said table means and arranged forward of said deflecting edge means for pressing a label into contact

with the object to which it is to be applied, said apparatus being portable as a unit, first relay means, a manually operated switch, and wherein said manually operated switch is electrically connected to said first relay means, said first relay means having contacts, at least one of said contacts of said first relay means being in the circuit of said electro-magnet means, a second relay, at least one further contact of said first relay means being in the circuit of said second relay, said second relay having a switch lying in the circuit of said drive motor means, said first switching means and said switch of said second relay being arranged in series, the arrangement being such that said drive motor means can rotate over a period of time independently of the energized period of said electro-magnet means.

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U.S. Cl. X.R.

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