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[54] **LABELING MACHINE**

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[51] **Int. Cl.** **B44c 1/00;** B65c 9/14

[58] **Field of Search** ..... 156/540, 541, 542, 556, 156/574, DIG. 15–DIG. 16, DIG. 31, DIG. 12, 566, 569, 571, 572, 567

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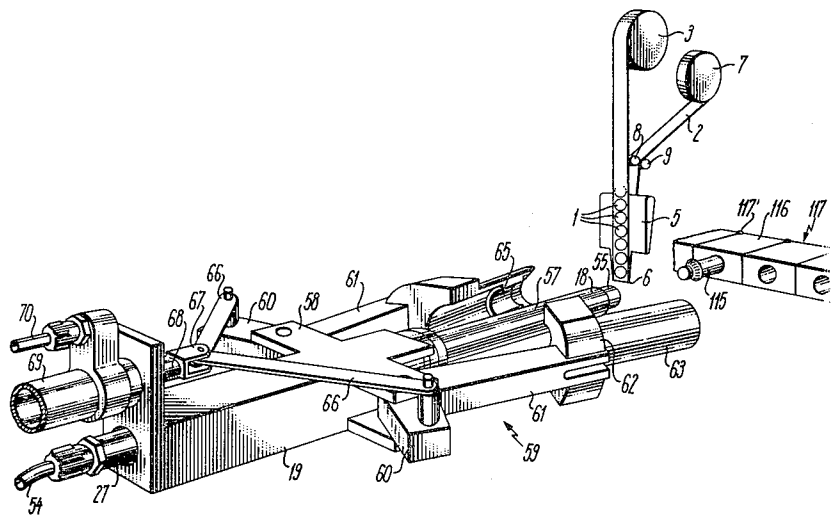
[57] **ABSTRACT**

A labeling machine for applying labels to successively presented objects has a label holder which includes a label supporting face on which the label is carried to the object and subsequently applied thereto. With the label holder there is connected an aligning mechanism which, by engaging the label edges that protrude beyond the outline of the supporting face, shifts the label in its plane on the supporting face to center the label with respect to the supporting face. The aligning mechanism is movable towards and away from the supporting face in a direction approximately parallel to the supporting face.

12 Claims, 2 Drawing Figures



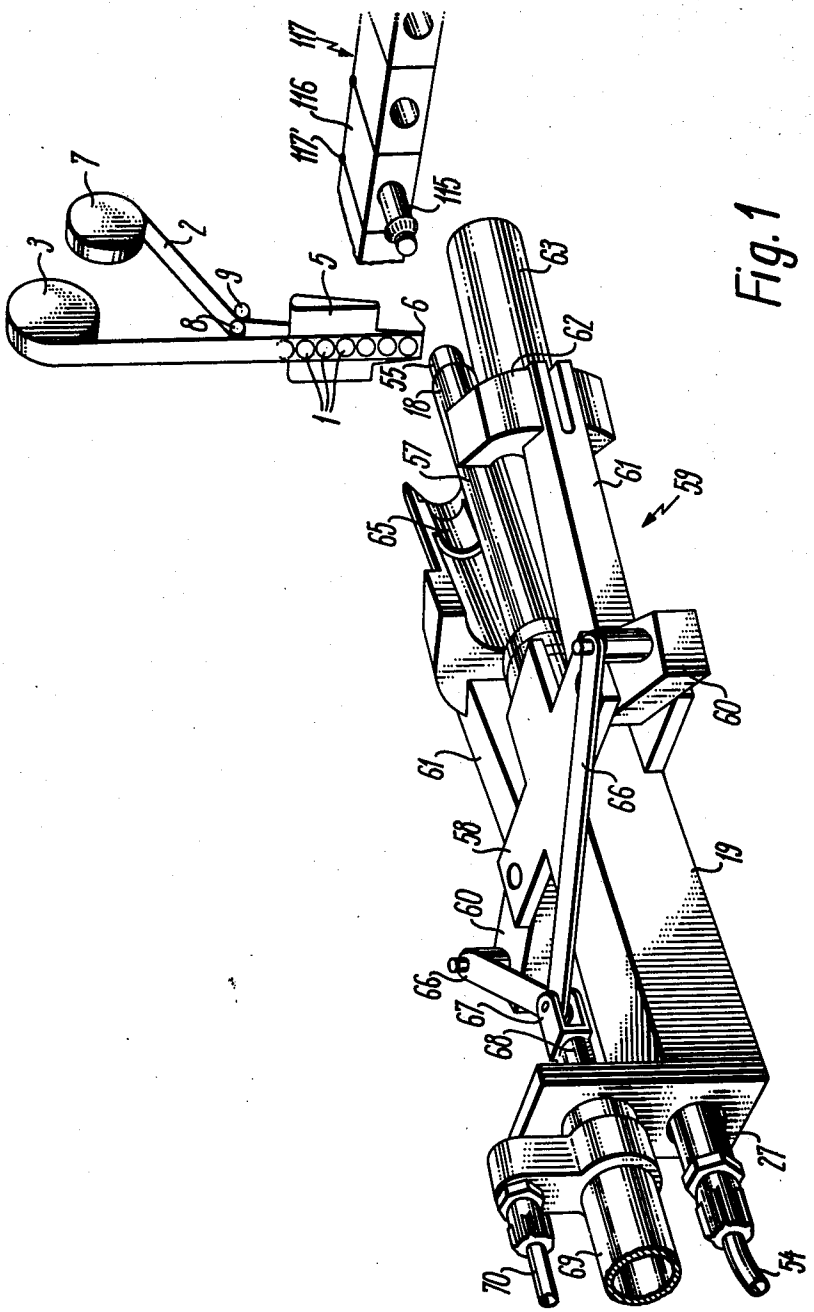

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Fig. 1

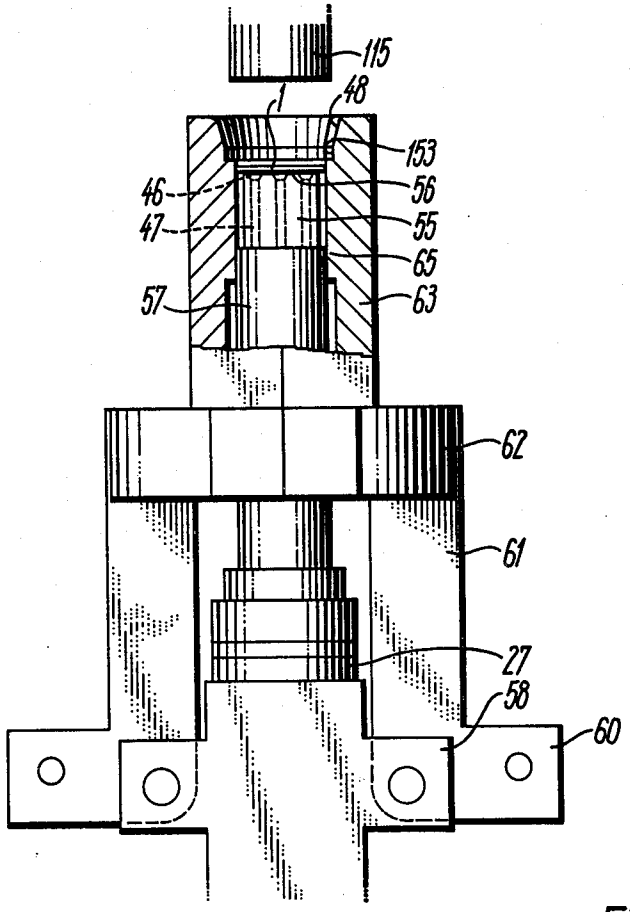

Fig. 2

LABELING MACHINE

The present invention relates to a labeling machine for applying pressure-sensitive labels which are detachably disposed on a carrier tape to objects located in a labeling station, comprising a carrier type feeding device and a deflecting edge around which the carrier tape is passed for detaching the labels, comprising further a label holder which guides the label toward the object to be labeled and which applies it to the surface of said object with the adhesive surface of the label facing toward said object in perpendicular relation to its plane, the label, which at that point has already been detached from the carrier tape at least partially, being received and retained with a non-positive by the label holder which is located in front of the deflecting edge and provided with projections which urge the detached label into a defined position with respect to the label holder, and guide members being provided which ensure a defined position of the object to be labeled with respect to the label holder.

In a known device, which processes heat-sealing labels, the labels are removed from a label stack, where they are accurately held in the proper position, by means of a label holder and transferred to a carrier plate. The labels are held to the label holder by means of appropriate projections. With the aid of further projections, the object to be labeled is held in the proper position within a holding device provided for the purpose. This holding device is additionally provided with guides for the label holder so that the labels which are accurately removed from the stack and held to the label holder by means of non-positive suction grippers can be accurately applied to the object to be labeled in the proper position. However, this known device is not capable of processing pressure-sensitive labels which are detached from a carrier tape, because an accurate transfer of the label to the label holder is not possible in this case, since the label moves transversely to its plane while it is being detached from the carrier tape so that its position in relation to the label holder cannot be so accurately defined as that of a label transferred from a label stack held by means of guides.

Also known in the art is a device whereby labels are detached from a carrier tape and received by a label holder, to which they are held by non-positive suction grippers and which transfers them to the object to be labeled. However, accurate positioning is not ensured with this device either, because neither is the label accurately fixed with respect to the label holder nor the object with respect to the label holder.

In another known device, the label holder is provided with guides which position the label with respect to the label holder. These guides are rigidly connected to the label holder and provided with chamfers tapering toward the label supporting surface of the label holder. It is true that minor positioning inaccuracies of the labels on the carrier tape, which cannot be avoided in production, can be compensated thereby and it is also possible to achieve an unchanging position of the labels with respect to the label holder, thus also enabling the labels to be accurately applied to the object to be labeled which is also held in a defined position. However, with large-size labels or labels having a large extension in one direction as well as labels disposed in a grossly inaccurate position on the carrier tape or not always constant feed of the carrier tape it may happen that not every label reaches the desired position on the label holder, especially if a label is not sufficiently stiff in itself.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a device eliminating the aforementioned drawbacks which detaches labels from a carrier tape, takes these labels and applies them with positional accuracy to the objects to be labeled, in such a manner that positional inaccuracies of the label on the carrier tape or dispensing irregularities which may occur while the label is being detached from the carrier tape will not adversely affect the accuracy of the position of the label on the object to be labeled.

In accordance with the invention, this object is accomplished in that the projections which bring the label into the desired position with respect to the label holder are disposed so as to be movable substantially parallel to the plane of the label, that the supporting surface on which the label rests against the label holder is completely covered by the label at least within the range of said projections and that the gripping elements holding the label with a non-positive connection exert a force under the influence of which the label can be shifted on the label holder within its plane by means of said movable projections.

With the device in accordance with the present invention, the label is first dispensed from the carrier tape at the deflecting edge and held to the label holder by the action of the non-positive gripping elements which are preferably designed as suction nozzles. Then the projections are moved in the plane of the label, shifting the label into the desired position with respect to the label holder. This is made possible by the fact that the label projects beyond the supporting surface or at least reaches up to the edge of the label holder in those areas in which the projections act upon the label. The non-positive gripping elements prevent the label from dropping, but not from being shifted within its plane. Even large labels or labels having a large extension in one direction as well as labels which are very inaccurately positioned on the carrier tape can thus be applied to the object to be labeled with positional accuracy.

The label holder may take various different forms and may be driven in a number of different ways. According to one preferred embodiment of the invention, the label holder takes the form of a punch or ram which is movable in a direction perpendicular to the plane of the label and driven in the direction of its longitudinal axis for applying the label to the object to be labeled. This obviates the need for transverse shifting motions and the slide ways which would be required therefor. As the objects to be labeled must be transported to, and away from, the labeling station in any case, it is thus possible to use a label holder with no transverse motion and thereby simplify the design of the machine in accordance with the invention.

One embodiment of the present invention serves to apply circular labels. Accordingly, the projections take the form of half shells which can be approached to, and retracted from, the label holder in the direction of the label plane. The shifting motions of the half shells may be produced by any one of a number of possible means, such as mechanical linkages or small pneumatic or hydraulic power cylinders, and the motion of the projections may be derived from the motion of the label

holder when this moves toward the object to be labeled. Thus, the projections may be actuated by means of control arms sliding on cam plates, for example. Such an embodiment has the advantage that the time which the label holder needs to traverse the distance up to the object to be labeled is utilized for aligning the label and that, moreover, no separate drive is required for the motion of the projections. A separate control of the motion of the projections is also unnecessary. The paths along which the projections move may be either straight or curved. According to a preferred embodiment of the invention, the projections take the form of semi-tubular sections which may be swiveled about an axis perpendicular to the longutidinal axis of the label holder. This means that the semi-tubular sections forming the projections move along the arc of a circle, with the swivel axis being preferably disposed so that at least the final phase of the motion of the projections has no, or only a very small, component perpendicular to the plane of the label. Thus, according to preferred embodiments of the invention, the projections are attached to bell cranks which may be moved by a common working member. This common working member may be a hydraulic or pneumatic power cylinder which is operatively connected to the bell cranks by means of appropriate linkages.

According to preferred embodiments of the invention, the label supporting surface of the label holder is smaller than the surface area of the label and the label projects beyond the outline of the supporting surface of the label holder at least in the range in which the projections are provided. With these embodiments, arrangements are preferred in which stops are provided for the projections against which these bear when they reach the desired position, still spaced at a distance from the label holder in the range of the label plane.

The guide members for ensuring a defined position of the object to be labeled are generally associated with the transportation means feeding the objects to be labeled to the labeling station and removing them after labeling. The transporting device may, for instance, be designed so that it will positively grip the object to be labeled and that the fixture holding the object will engage catches or stops in the labeling station. However, according to preferred embodiments of the invention, the guide members for ensuring the defined position of the object to be labeled are provided on the projections. The design of a device in accordance with the invention is substantially simplified thereby inasmuch as accurate feeding by the transporting device is then no longer required. Instead, it is sufficient that the transporting device loosely holds the object to be labeled so that it is still able to move slightly and that it feeds it to the labeling station in a position which need only be approximately that required for labeling. The guide members on the projections will then center the object in relation to the label holder and thus ensure the desired accurate positioning of the labels on the object to be labeled. The guide members preferably employed in accordance with a further development of the invention take the form of bevels provided on the projections with diminishing clearance toward the label holder. These bevels provide the desired centering of the objects to be labeled. For round objects, such as cans or glasses which are to be labeled at their circular ends, their configuration corresponds to that of the lateral area of a truncated cone. However, any other shape of tapered guiding surface is also within the scope of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a labeling device in accordance with the invention, limited to the essential components and with the feeding mechanism for the carrier tape as well as the transporting device for the objects to be labeled shown only schematically, and

FIG. **2** is a longitudinal section through a label holder in accordance with the invention with swivable projections in a simplified representation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to FIG. **1**, a carrier tape **2** provided with self-adherent or pressure-sensitive labels **1** passes from a magazine roll **3** to a deflecting tongue **5** with a deflecting edge **6.** About the deflecting edge **6,** the carrier tape is guided at an acute angle, the carrier tape being deflected almost 180° about a very small radius. From the deflecting edge **6,** the carrier tape **2** passes to a pair of rollers comprised of a drive roller **8** and a pressure roller **9.** The drive roller **8** is driven by a step-to-step mechanism (not shown). The stepping action is such that each step corresponds to the spacing of successive labels on the carrier **2.** Between the rollers **8** and **9,** the carrier tape **2** is driven by means of friction. The step-by-step action of the drive roller **8** is controlled by means of scanners (not shown) sensing the position of the most forward label at any point in time. From the pair of rollers **8, 9,** the carrier tape **2** passes to a take-up reel **7** on which it is wound up. The deflecting tongue **5** with its deflecting edge **6** serves to detach the self-adherent labels **1** from the carrier tape **2** in a manner known per se since the self-adherent labels **1,** owing to their stiffness, do not follow the forced sharp bending motion of the carrier tape **2,** with the result that they are detached from the carrier tape **2** at the deflecting edge **6,** projecting beyond the deflecting edge **6** of the deflecting tongue **5** in the feeding plane of the carrier tape while the rear end of the label still sticks to the carrier tape at one edge.

The labels have a circular form and are provided with imprints (not shown). The labels are to be applied to the ends of cylindrical cans **115,** which are the objects to be labeled. Each can **115** is retained in a holder **116** which may, for instance, have the shape of a box provided with a recess conforming approximately to the shape of the can, such that the can is retained in the holder **116** with a certain amount of play. The holders **116** are assembled into a conveyor belt **117** by means of hinges **117'** along one edge for connecting the individual holders to form a chain. The conveyor belt **117** is advanced in steps and stopped whenever a can **115** reaches the labeling station. A label holder **18** picks up the label in front of the deflecting edge **6,** moves it to the labeling station and there applies it to the end of the can **115** located in the labeling station at that time. The label holder **18** is disposed for longitudinal movement in a machine frame **19.** It has the form of a cylindrical punch which is mounted in the machine frame **19** so as to be movable in the axial direction. For this purpose, the end of the label holder **18** facing away from the deflecting edge **6** has attached to it the piston rod of a power cylinder **27** which is secured to the machine frame **19** and supplied with compressed air or hydraulic fluid through a line **54.** The free end of the label holder **18** serves as supporting surface **56** for the self-adherent

labels 1. Referring now to FIG. 2, at its front end, the label holder 18 is provided with a cylindrical section 55 followed by a section 57 of increased diameter in the direction toward the machine frame 19. The section 57 is the piston or piston rod of the powder cylinder 27 or connected to the piston of the power cylinder 27 in a manner which permits it to be reciprocated by that piston. The cylindrical section 55 incorporates axially parallel bores 47, ending in orifices 46 at its end, which are connected to a vacuum generating system in a manner not shown and through which the air is sucked in.

The machine frame 19 is provided with lateral arms 58 on either side with one swivel-mounted bell crank 59 each. The bell cranks 59 comprises a short arm 60 and a long arm 61 disposed at a right angle to the short arm 60. The long arm 61, which in one final swiveled position is approximately parallel to the longitudinal axis of the section 57, is provided with a semi-circular ring section shoulder 62 at its free end, followed by a semi-tubular section 63. In the final swiveled position, in which the long arm 61 is parallel to the section 57, the shoulders 62 form a ring and the semi-tubular sections 63 form an approximately closed tube. On the inside, the semi-tubular sections 63 are provided with integral semi-circular ring section inserts 65 whose inside diameter is approximately equal to the outside diameter of the section 57. Thus, when the semi-tubular sections 63 contact each other to form a closed tube, the inserts 65 bear against each other and against the section 57. The free end of the semi-tubular sections incorporates a centering rim 153 and bevels 48 which are tapered so that their clearance increases toward the outside. The diameter of the centering rim 153 corresponds to the diameter of a can 115 to be labeled, allowing for a small amount of play, and the tapered bevel 48 forms an intake funnel which guides the can 115 into the centering rim 153. In the other final swivel position, the two long arms 61 and the semi-tubular sections 63 include an angle of approximately 20° to 40°.

Turning once again to FIG. 1, for swiveling the bell cranks 59, the free ends of the short arms 60 have each hinged to it a link 66, while the other ends of these links are swivelably held together in a fork 67 provided at the end of a connecting rod 68 of a power cylinder 69. The power cylinder 69 is secured to the machine frame 19 and supplied with working fluid — compressed air or hydraulic fluid — through a line 70.

To label a can 115, the can is brought into the position shown in FIG. 1, in which it is located in the labeling station. In this position, the conveyor belt 117 is stopped. A label is dispensed at the deflecting edge 6 by advancing the drive roller 8 one angular step, which results in a corresponding feeding motion of the carrier tape 2, and picked up by the label holder 18, assisted by the suction effect of the bores 47, while the semi-tubular sections 63 are in the swiveled-out position shown in the drawing. Since the supporting surface 56 is located directly in front of the deflecting edge, the label is picked up in a very short time so that it cannot turn about any axes perpendicular to its surface, with the result that an imprint, if any, is retained in the proper position. Next, the piston rod 68 is extended by operating the power cylinder 69, causing the semi-tubular sections 63 to be swiveled toward each other until they contact each other and the inserts 65 bear against the section 57. The self-adherent label 1 is aligned with the center of the supporting surface 56 in the process, because the vacuum maintained in the bores 47 in the range of the orifices 46 is rated so that the label, which generally weighs much less than 1 gram, will be safely held, but still be movable within its plane. Then the label holder 18 is advanced by operating the power cylinder 27 and the can 115 held in readiness enters into the centering rim 153, guided by the tapered bevels 48. Next, the label holder 18 is advanced with respect to the machine frame 19 until the label clinging to the supporting surface 56 at its end is pressed against the end of the can 115 to be labeled. Then the assembly is retracted and is ready for the next operation after the labeled can 115 has been removed from, and a new can fed to, the labeling station by further movement of the conveyor belt 117.

Thus, the machine frame 19 as a whole performs a movement in the longitudinal direction of the label holder 18. In addition, the label holder 18 performs a relative movement with respect to the machine frame 19 and the semi-tubular sections 63 and, finally, the semi-tubular sections 63, together with the bell cranks 59 are swiveled about the axis of the bell crank 59.

In difficult cases, in which the deflecting edge 6 must be located very close to the supporting surface 56, the machine frame 19 may be additionally disposed so as to be shiftable or swivelable in perpendicular relation to its longitudinal direction to enable the semi-tubular sections 63 to be freely passed through under the deflecting edge 6, although the deflecting edge is located in the immediate vicinity of the supporting surface 56 of the label holder 18 while a self-adherent label is being detached. It shall be understood that the present invention is not limited to the embodiment shown by way of example, but that modifications of the same are within the scope of the invention. In particular, it shall be understood that any of the features of this invention may be employed either individually or jointly in combinations of a plurality of said features.

What is claimed is:

1. In a labeling machine for applying labels to sequentially presented objects, including means for sequentially presenting the labels; a label holder for carrying the presented label toward and applying it to the surface of the object to be labeled; guide means for guiding the object to be labeled into a defined position with respect to the label holder, the improvement comprising

a. a supporting face forming part of said label holder, said supporting face having an outline and being disposed perpendicularly to the direction in which said label holder carries and applies the label to the object to be labeled;

b. gripping means for attaching the label to and retaining it on said supporting face in a face-to-face relationship therewith, said gripping means being arranged for allowing displacement of the label in its plane on said supporting face;

c. aligning means for engaging edge portions of the label projecting beyond said outline of said supporting face for shifting the label in its plane on said supporting face into a defined position with respect to said supporting face;

d. means for movably supporting said aligning means; and

e. means for moving said aligning means towards and away from said supporting face in a direction at

least approximately parallel to the plane of said supporting face.

2. A labeling machine as defined in claim **1,** wherein said gripping means is constituted by an air suction device including means defining at least one suction opening in said supporting face.

3. A labeling machine as defined in claim **1,** wherein said guide means for guiding the object to be labeled is carried by said aligning means.

4. A labeling machine as defined in claim **1,** further comprising stop means for arresting said aligning means at a predetermined distance from the outline of said supporting face.

5. A labeling machine as defined in claim **4,** wherein said stop means constitutes cooperating abutment faces on said aligning means and said label holder.

6. A labeling machine as defined in claim **1,** wherein said label holder is constituted by a ram having a longitudinal axis and a radial terminal face constituting said supporting face; the improvement further comprising means for driving said ram along its longitudinal axis.

7. A labeling machine as defined in claim **6,** wherein said aligning means includes two half shells situated radially adjacent said ram at diametrically opposite sides thereof, said half shells having a closed position in which they closely surround, with inner wall faces, said supporting face for aligning the label on said support face, the half shells further having an open position in which they are situated remote from said supporting face; said means for moving said aligning means including a mechanism for moving said half shells towards one another into their closed position and away from one another in their open position in a direction at least approximately parallel to the plane of said supporting face.

8. A labeling machine as defined in claim **7,** wherein each said half shell has the shape of a semi-tubular section.

9. A labeling machine as defined in claim **7,** wherein said inner wall faces of said half shells are provided with bevels that taper in the direction of said supporting face when said half shells are in their said closed position, said bevels constitute said guide means for guiding the object to be labeled.

10. A labeling machine as defined in claim **7,** said means for movably supporting said aligning means including pivot means for holding said half shells swivelably about an axis perpendicular to the longitudinal axis of said label holder.

11. A labeling machine as defined in claim **10,** wherein said means for movably supporting said aligning means further comprising two bell cranks swingable about said pivot means, each said bell cranks carrying one of said half shells; the improvement further comprising linkage means connecting said bell cranks to a common power means, said power means constituting said means for moving said aligning means.

12. In a labeling machine for applying adhesive labels to sequentially presented objects, including a feeding device for advancing a carrier tape on which the labels are sequentially and detachably arranged, the feeding device includes a deflecting edge about which the carrier tape is passed for sequentially detaching the labels; a label holder for carrying the label toward and applying it to the surface of the object to be labeled; means operatively connected with the label holder for sequentially picking up the labels from the carrier tape and placing them on the label holder with the adhesive label face oriented outwardly; guide means for guiding the object to be labeled into a defined position with respect to the label holder, the improvement comprising

a. a supporting face forming part of said label holder, said supporting face having an outline and being disposed perpendicularly to the direction in which said label holder carries and applies the label to the object to be labeled;

b. gripping means for attaching the label to and retaining it on said supporting face in a face-to-face relationship therewith, said gripping means being arranged for allowing displacement of the label in its plane on said supporting face;

c. aligning means for engaging edge portions of the label projecting beyond said outline of said supporting face for shifting the label in its plane on said supporting face into a defined position with respect to said supporting face;

d. means for movably supporting said aligning means; and

e. means for moving said aligning means towards and away from said supporting face in a direction at least approximately parallel to the plane of said supporting face.

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