Dec. 13, 1966 D. S. SILVER 3,291,483

MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

Filed June 22, 1964 7 Sheets-Sheet 1

FIG. 1

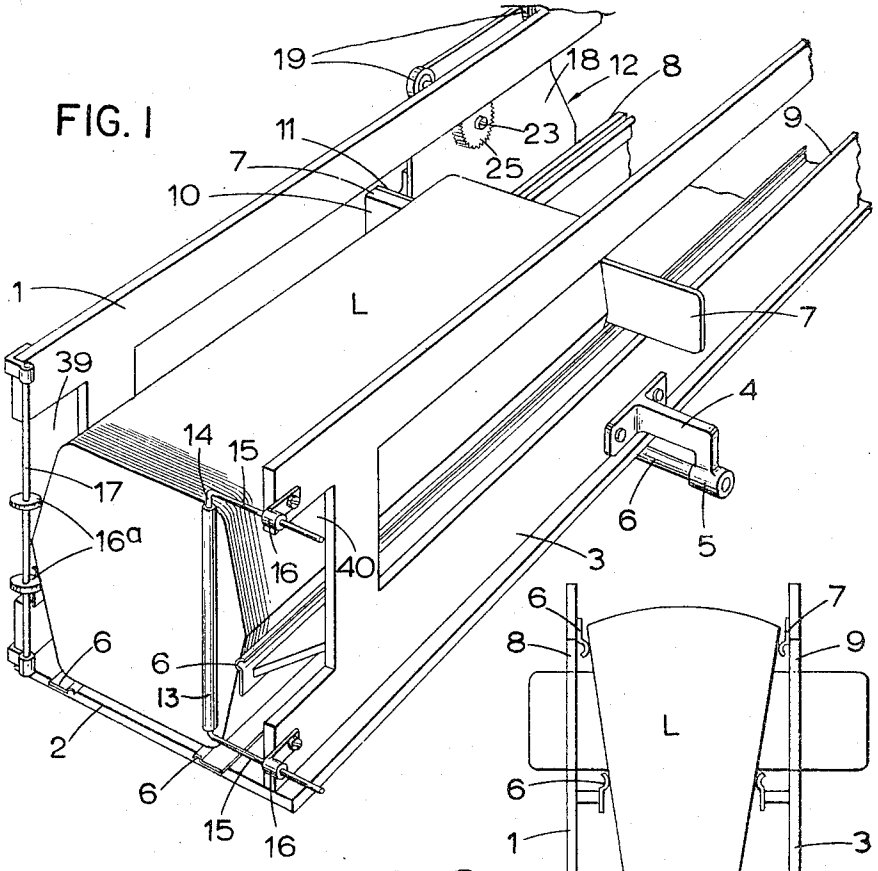


FIG. 4.

FIG. 3.

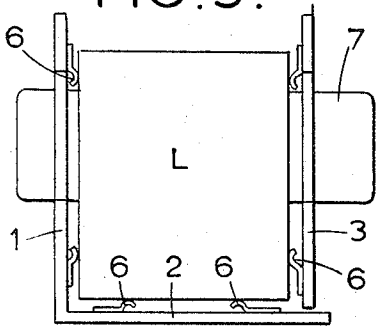
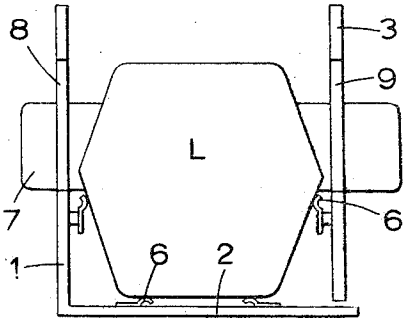


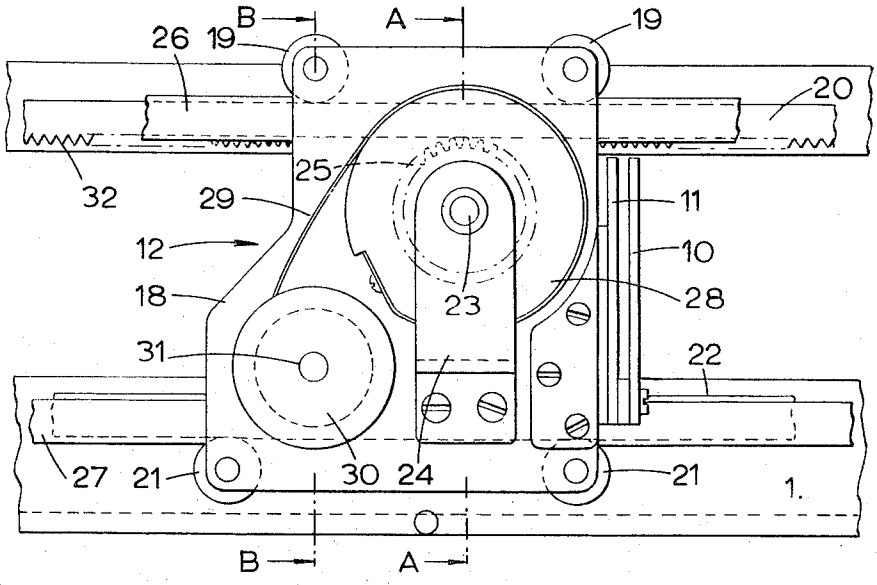
FIG. 2.



MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

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FIG. 5.



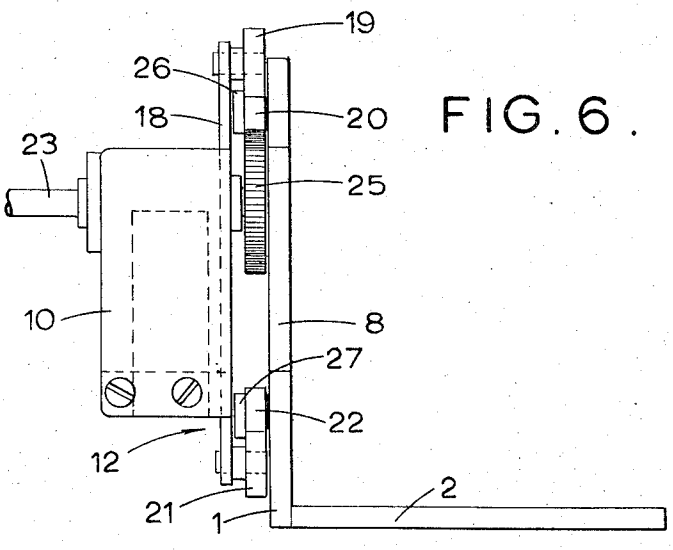


FIG. 6.

MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

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FIG. 7

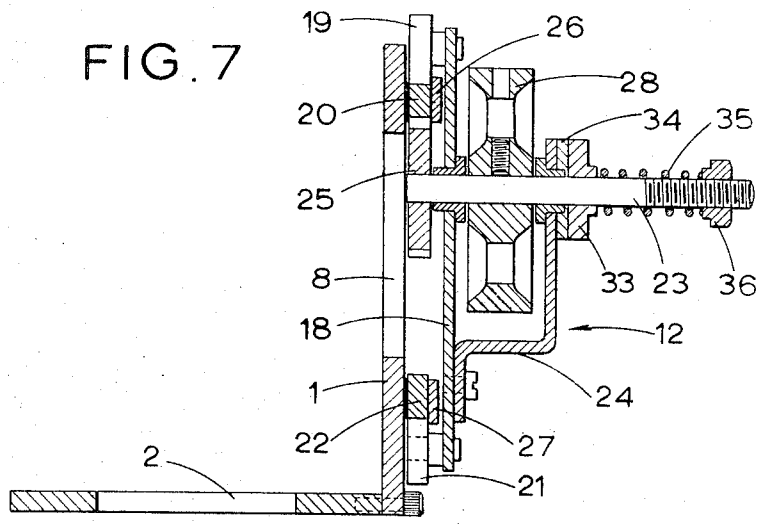
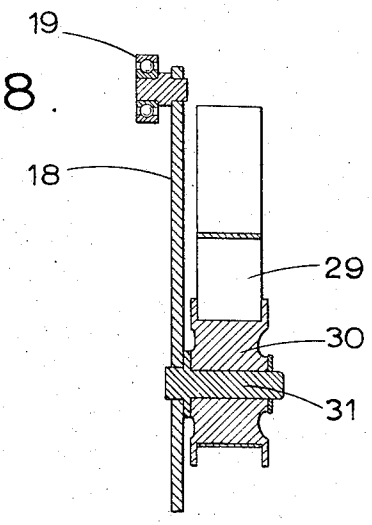


FIG. 8.



MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

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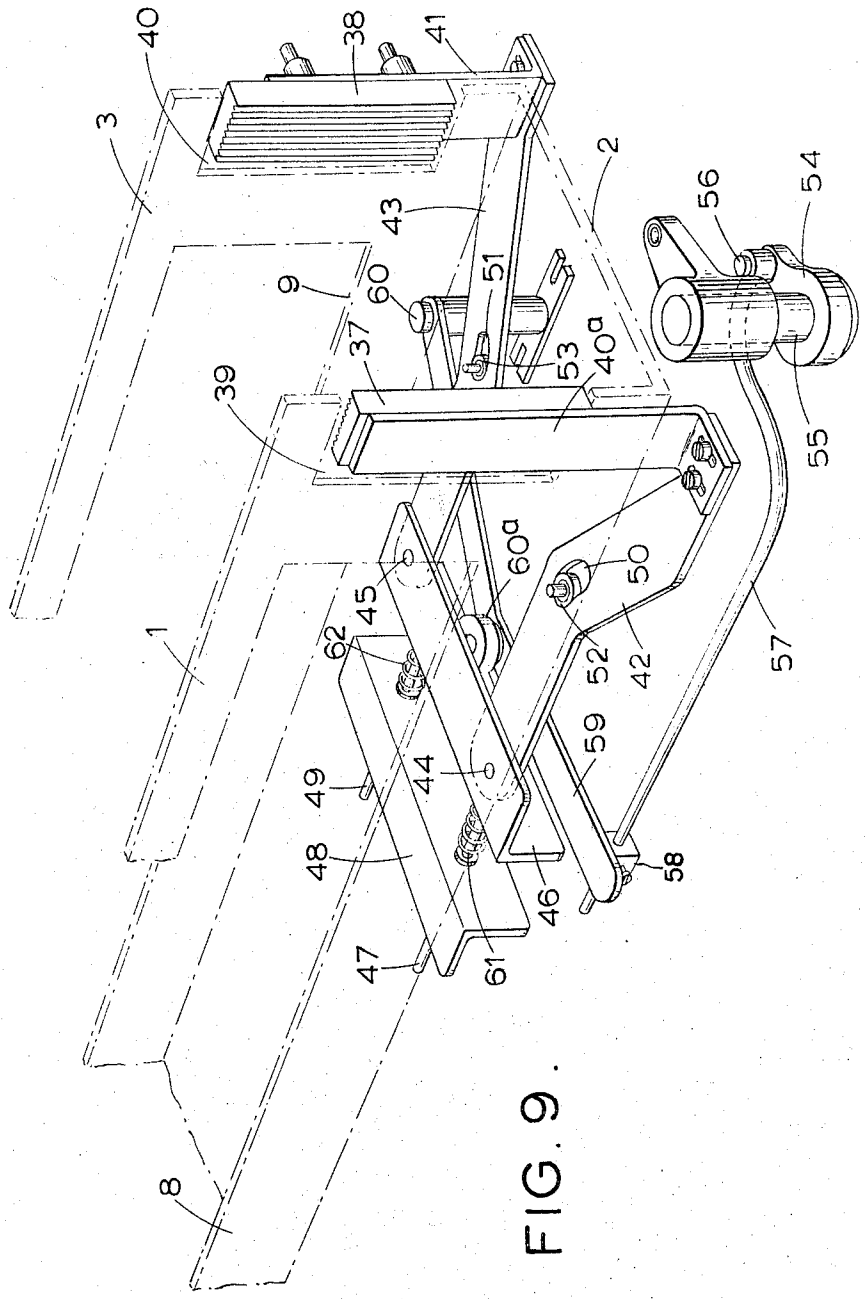
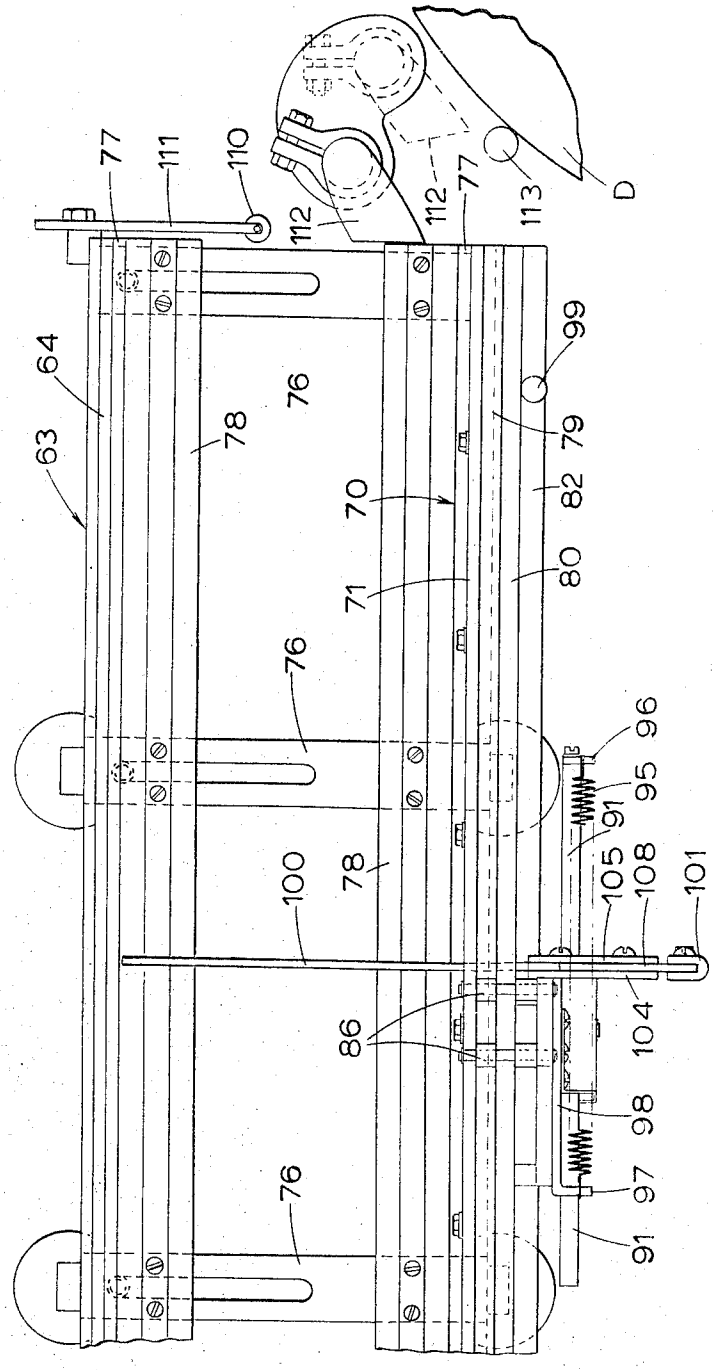


FIG. 9.

MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

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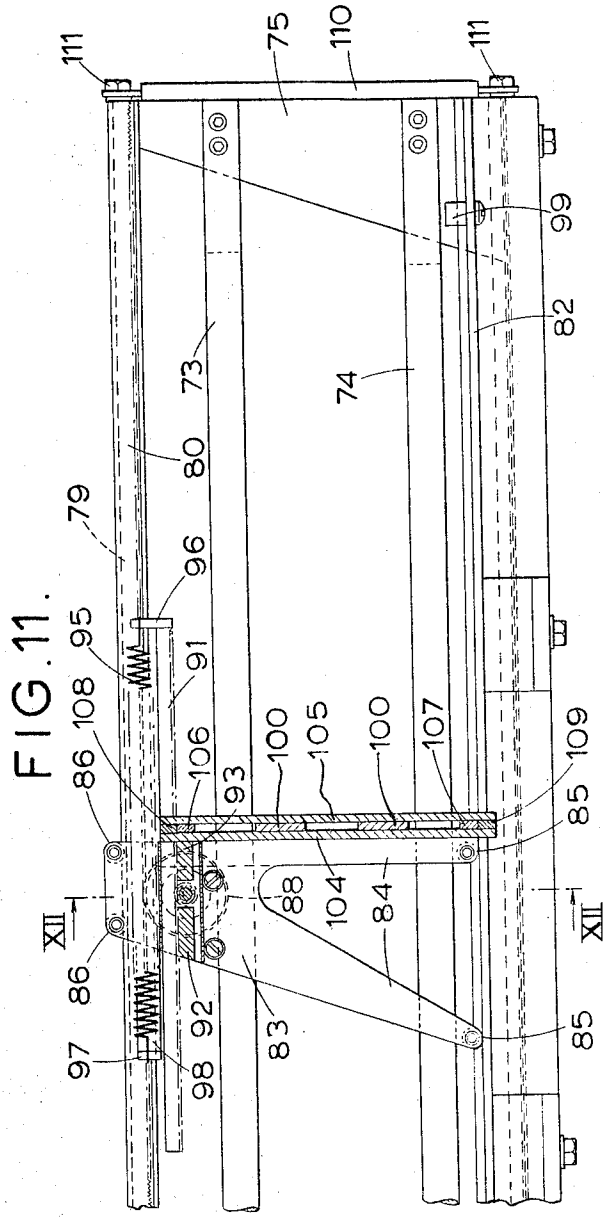
FIG. 10.



MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

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FIG. 11.

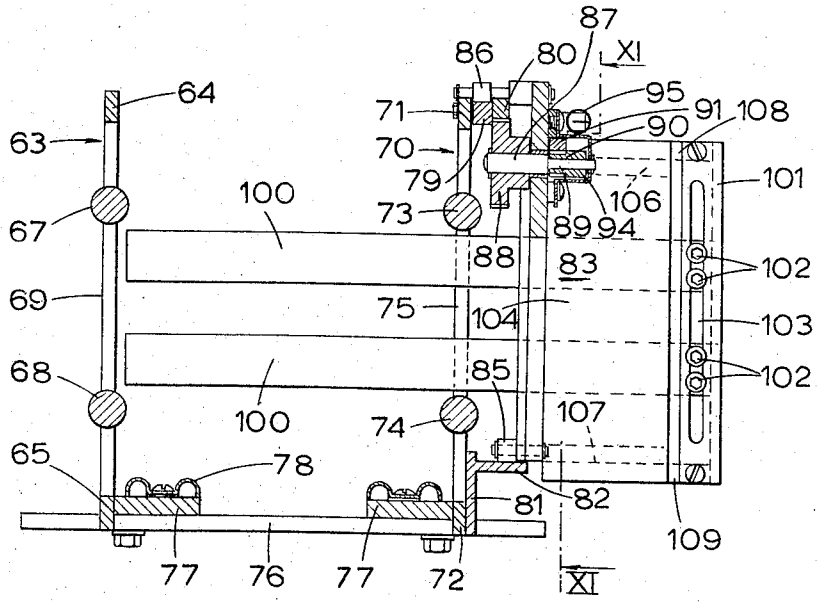


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MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

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FIG. 12.



United States Patent Office 3,291,483 Patented Dec. 13, 1966

3,291,483

MAGAZINES FOR HOLDING PACKS OF SHEET MATERIAL

Dennis Stanley Silver, London, England, assignor to Purdy Machinery Company Limited, London, England

Filed June 22, 1964, Ser. No. 376,963
Claims priority, application Great Britain, July 5, 1963, 26,730/63
13 Claims. (Cl. 271—62)

This invention relates to magazines for holding packs of sheet material, such as labels to be delivered in series to a location at which they are to be applied; for example, to bottles. In such magazines, pressure is applied to the back of the pack so that the foremost sheet is always in a predetermined position, in which it is picked from the magazine to be delivered to the point at which it is required.

Modern developments have led to the necessity for picking labels from these magazines at a higher speed than has hitherto been necessary. It is, therefore, one object of the invention to provide means whereby these magazines can easily be replenished with sheets without interrupting the picking operations. A further object is to provide means for applying pressure to the back of the pack which means are particularly usefully employed in magazines accommodating larger packs than have hitherto generally been used.

According to the invention, a magazine as aforesaid includes an elongated container for the pack of sheets arranged so that the said predetermined position is located substantially at one end of the container, a pressure member for exerting a thrust on the end of the pack remote from the predetermined position, a carriage mounted to travel along one face of the container, and loading means for urging the carriage towards the said end of the container, the pressure member being detachably mounted on the carriage so that a new pack of labels can be placed in the container behind the pressure member, and the pressure member then removed, enabling the carriage to be pushed back to enable the pressure member to be mounted thereon behind the new pack. Advantageously, the said loading means are constituted by a self-contained motor unit mounted on the carriage itself and comprising spring mechanism.

High speed picking of labels has also been found to lead to difficulties due to the inability of the ambient air to find its way quickly behind the sheet being picked, with the result that a partial vacuum is created behind the sheet, and this tends to cause more than one sheet to be drawn from the magazine at each picking operation. One object of the invention is to provide means whereby this disadvantage is overcome.

According to a further feature of the invention, therefore, means are provided for periodically gripping the pack of sheets in a magazine, at or near the forward end to the pack, and withdrawing these sheets towards the rear of the magazine in timed relationship with the picking of the label at the front of the pack. This enables the front label to be picked while the withdrawal of the labels at or near its rear face breaks the partial vacuum that would otherwise prevent the proper operation of the picking mechanism at comparatively high speeds. The means for gripping the pack may very conveniently include gripper plates carried by mechanism arranged to move the plates towards one another, to grip the pack, while the plates move towards the back of the magazine, and to cause the plates to separate during the return, idle stroke.

In order that the invention may be clearly understood and readily carried into effect, apparatus in accordance

therewith will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a label magazine assembly for use in a bottle labelling machine;

FIGURE 2 is a diagrammatic cross-section showing some of the parts of the assembly of FIGURE 1;

FIGURES 3 and 4 show modifications of the arrangement of FIGURE 2;

FIGURE 5 is a side elevation showing details of the assembly of FIGURE 1;

FIGURE 6 is an end view of the assembly of FIGURE 5, as viewed in the direction of the arrow C;

FIGURE 7 is a cross-section on the line A—A in FIGURE 5;

FIGURE 8 is a cross-section on the line B—B in FIGURE 5;

FIGURE 9 is a perspective view showing mechanism used in addition to that appearing in FIGURE 1;

FIGURE 10 is a plan of a portion of a further magazine assembly;

FIGURE 11 is a sectional elevation of the portion of the magazine appearing in FIGURE 10, the section being on the line XI—XI in FIGURE 12; and

FIGURE 12 is a cross-section on the line XII—XII in FIGURE 11.

The magazine comprises an elongated, trough-shaped frame arranged to be mounted in a stationary position in a bottle labelling machine. The frame consists of a side wall **1** fixed to a base **2**, and a side wall **3** fixed to the base **2** in such a way as to enable the separation between the walls **1**, **3** to be adjusted. Thus, the side wall **3** is furnished with brackets **4**, one of which appears in FIGURE 1. Each bracket **4** is formed with a bush **5** mounted to slide on a rod **6** to which it can be locked by a set-screw (not shown).

The labels L are inserted as a pack in the magazine with their edges engaging parallel rails **6** extending along the magazine from end-to-end thereof. The arrangement of the rails depends on the shape of the labels being accommodated, as is clear from FIGURES 2 to 4.

Continuous forward pressure is maintained on the back of the pack by a transverse bar **7** that projects through and rests on the lower edges of elongated slots **8**, **9** respectively in the side walls **1**, **3**. One end of the bar **7** fits between spaced plates **10**, **11** mounted on a spring-driven carriage **12** that travels along the wall **1** in the way described below.

Forward movement of the pack of labels L is limited by stops. One of these consists of a roller **13** carried by a spindle **14** on arms **15** adjustably mounted in bushes **16** fixed to the adjustable side wall **3**. The other stops consist of two discs **16***a* fixed to a rod **17** mounted on the fixed side wall **1**.

The carriage **12** will now be described with reference to FIGURES 5 to 8, from which it will be seen that the carriage inculdes a plate **18** carried by two rollers **19** that run on an upper rail **20** extending along the outside surface of the wall **1**. The carriage is steadied by two lower rollers **21** and that run beneath a lower rail **22**, which also extends along the outside surface of the wall **1**. A spindle **23** is mounted in the plate **18** and in a bracket **24** fixed thereto, and a pinion **25**, fixed to the spindle **23**, meshes with rack teeth **32** extending along the lower edge of the rail **20**. Long plates **26**, **27** are fixed along the outer faces of the rails **20**, **22** so as to maintain the rollers **19**, **21** and the pinion **25** properly positioned in the direction of their axes.

Also fixed to the spindle **23** is a drum **28** to the periphery of which is attached one end of a spring **29** of the kind known under the trademark "Tensator." The other end of the spring **29** is attached to the periphery of a

smaller drum **30** which is freely rotatable on a spindle **31** mounted on the plate **18**. The spring **29** is formed from stainless steel in such a way that it tends always to curl up into a spiral.

The action of the spring **29** will be appreciated when considering the steps, now to be described, that are taken in replenishing the magazine with labels. To do this, the new pack of labels is placed in the magazine. Then the bar **7** is withdrawn from the magazine and from between the plates **10**, **11**, and a new pack of labels is placed at the front of the magazine, or behind any labels remaining in the magazine. Substantially simultaneously, the carriage **12** is manually pushed back toward the rear of the magazine, while the rack teeth **32** cause the pinion **25** to rotate the larger drum **28** in a direction such as to wind up the spring **29** while it is withdrawn from the smaller drum **30**. As soon as the plates **10**, **11** have been brought behind the new pack of labels, the bar **7** is replaced and the carriage **12** is released. This enables the spring **29** to start curling up on the smaller drum **30** while un-winding from the larger drum **28** and causing the latter to rotate the pinion **25** in a direction such as to make it travel along the rack teeth **32** until the bar **7** is stopped by the back or the label pack.

The reason that the spring **29** automatically un-winds from the larger drum **28** to the smaller one **30** is that the potential energy of the coil of larger diameter is greater than the potential energy of the coil of smaller diameter, it being remembered that the spring **29** is continuosly trying to wind itself up into a tight spiral. The arrangement is such that the thrust exerted by the carriage **12** remains substantially constant throughout its entire range of movement. However, means are provided for varying the thrust, and these means include a disc **33** which is constrained to rotate with, but can slide along the spindle **23**. The disc **33** is maintained in contact with a fixed friction disc **34** by a helical spring **35** which bears, at its remote end, against a nut **36**. By adjusting the position of the nut **36** along the spindle **23**, the frictional restraint on the rotation of the spindle **23** is varied.

In practice, a cover for the spring mechanism is mounted on the carriage.

When the magazine is mounted in a bottle labelling machine having picking mechanism as described in the specification of our co-pending United States patent application No. 376,961 filed June 22, 1964, an oscillating picking head approaches the front label in the magazine which adheres to the head as a result of suction therein. The head than swings ot a position in which one edge of the label is taken between a rotary drum and a pinch roll, and is withdrawn from the picking head. This results in the label being wrapped on a comparatively small portion of the drum surface to which it is secured by suction. The label is then carried through a position in which adhesive is applied to its exposed surface by mechanism as described in the specification of our co-pending United States patent application No. 385,417 filed July 27, 1964, and through a position in which the label is transferred to a bottle by mechanism as described in the specification of our co-pending United States patent application No. 383,642 filed July 20, 1964. Where a neck label is also to be applied to each bottle, a second magazine and picking mechanism is employed.

It has been found that when a labelling machine as aforesaid is run at high speed, it is possible for difficulties to arise as a result of the partial vacuum that arises behind each label as it is withdrawn from the pack. In order to avoid this, the mechanism shown in FIGURE 9 is provided. This mechanism includes a pair of gripper plates **37**, **38**, which are located respectively in recesses **39**, **40** in the forward ends of the side walls **1**, **3**. The gripper plates **37**, **38** are respectively carried by brackets **40***a*, **41** fixed to arms **42**, **43** pivoted at **44**, **45** to an angle bracket **46** carried by two rods **47**, **49** reciprocably mounted in a fixed angle bracket **8**. The gripper plate **37** is fixed rigidly to the bracket **40**, but the gripper plate **38** is mounted resiliently on the bracket **41** with a little clearance between the plate **38** and the bracket **41**, so that the plate **38** can yield towards the bracket **41** when the pack of labels is gripped as described below.

The arms **42**, **43** are formed with slots **50**, **51** containing rollers **52**, **53** mounted to rotate about fixed axes. The slots **50**, **51** are so located that when the angle bracket **46** is withdrawn so that the arms **42**, **43** are moved towards the rear of the magazine, the action of the rollers **52**, **53** is to cause the forward ends of the arms **42**, **43** to approach one another, thereby causing the gripper plates **37**, **38** to grip the sides of the pack of labels, just behind the forward label, and to move the labels, so engaged, backwards a short distance. This occurs at the moment when the picking head has engaged the foremost label and is beginning to withdraw it from the magazine. The result is that the effect of the atmospheric pressure tending to hold the labels in contact with one another is overcome by allowing air to find its way to the back of the label being withdrawn, to break the partial vacuum that would otherwise impede the withdrawal. The gripper plates do not necessarily grip every label, except the front one, at the forward end of the pack, but the few labels between the front label and the ones being drawn backwards separate from one another sufficiently to avoid the suction effect that would impede the withdrawal of the front label. Air at atmospheric pressure is permitted to enter spaces between these few labels. The faces of the gripper plates **37**, **38** that are presented towards the pack of labels are serrated as shown in FIGURE 9.

The mechanism for withdrawing the labels includes a crank arm **54** which oscillates continuously about the axis of a vertical shaft **55** during the operation of the machine. A crank pin **56** on the arm **54** is connected by a connecting rod **57** to a block **58** pivoted to an arm **59** mounted to swing to-and-fro about an axis **60**. The position of the block **58** along the rod **57** is adjustable. The arm **59** carries a roller **60***a* that bears on the vertical flange of the angle bracket **46**, so that, when the arm **59** swings backwards, the bracket **46** is pressed backwards against the action of compression springs **61**, **62** that return the arms **42**, **43** to their forward and separated positions when the arm **59** swings forwards.

In the case of long magazines, say eighteen inches long, a very considerable weight of labels can be carried and this weight varies considerably between the state when the magazine is full and that in which it is substantially empty. In this case, in order to overcome the consequent variation in frictional resistance, it is preferable to provide a carriage that produces a varying thrust along the length of the magazine. This can be effected by a spring and, in order to accommodate the substantial length of travel of the carriage, it is desirable for the spring to act through gearing. Moreover, it is very convenient for the spring mechanism to be mounted as a self-contained motor unit on the carriage itself. Such a construction is shown in FIGURES 10 to 12.

Referring to FIGURES 10 to 12, it will be seen that the magazine comprises a side wall **63** composed of top and bottom bars **64**, **65** and longitudinal, round-section rods **67**, **68** all supported at their ends by uprights, such as **69**. Similarly the other side wall **70** is made up of bars **71**, **72**, rods **73**, **74** and uprights, such as **75**. The side walls **63**, **70** are spaced from one another by transverse members **76** carrying longitudinal members **77** supporting rail members **78**, on which the pack of labels rests.

A rail **79** is fixed along the outside of the bar **71** with its top surface just below the top edge of the bar **71**, and a rack rail **80** is fixed along the outside of the rail **79** with its top surface just above the top of the rail **79**. A plate **81** is fixed along the outside of the lower portion of the side wall **70** and carries a horizontal flange **82**.

The carriage comprises a frame member **83** having limbs **84** carrying rollers **85** that run on the flange **82**. The top of the frame member **83** carries two rollers **86** that run on the rail **79**, axial movement of these rollers being prevented by the tops of the bar **71** and of the rack rail **80**. Journalled in the frame member **83** is a horizontal spindle having a thicker portion **87** to which is fixed a pinion **88** in mesh with rack teeth beneath the rack rail **80**. The spindle has a thinner portion **89** to which is fixed a comparatively small diameter pinion **90** in mesh with rack teeth beneath a rack rail **91**, carried by the carriage but free to slide longitudinally relatively thereto on plates **92, 93**. The rack rail **91** is prevented from moving substantially in the direction of the axis of the pinion **90** by the frame member **83** and by a cylindrical portion **94** on the pinion **90**.

A horizontal tension spring **95** is anchored between a lug **96** at the forward end of the rack rail **91** and a lug **97** on a bracket **98** fixed to the frame member **83**. Therefore, when the carriage is moved towards the back of the magazine, i.e. to the left as viewed in FIGURES 10 and 11, the pinion **88** rotates on the rack rail **80** in such a direction as to cause the pinion **90** to make the lugs **96, 97** separate from one another, extending the spring **95**. Then, when the carriage is released, it will be run back to the right to the extent permitted by the labels in the magazine. When all the labels in the magazine are used up, the movement of the carriage is arrested by a rubber buffer **99**. The difference in diameter of the pinions **88, 90** means that the spring **95** is only stretched or relaxed by a fraction of the travel of the carriage. Thus, if the ratio of the diameters of the pinions is four to one, the spring is only stretched or relaxed by one quarter of the carriage travel. This enables a spring having a practical rate to be used, and a variety of alternative springs to be used for labels of different sizes, shapes and weights.

Forward movement of the pack as a whole is prevented by a roller **110** carried by a bracket **111**, fixed to the side wall **63**. In withdrawing the foremost label a picking head **112** pulls the label round the roller **110** which rotates on the label surface. The label adheres to the picking head **1** as a result of suction in the picking head **112**. The picking head moves to-and-fro between the full and broken line positions of FIGURE 10 and presents the label between a drum D and a pinch roll **113**, the label is taken from the head **112** as a result of the uniform rotation of the drum D while the pinch roll **113** rotates idly. This results in the label being wrapped on a comparatively small portion of the drum D to which it is secured by suction.

The pressure is transferred from the carriage to the back of the pack of labels by a pressure member including a pair of parallel bars **100** secured together at their outer ends by a vertical junction member **101**, having parallel flanges between which the said ends lie. Each bar **100** is secured to the junction member **101** by two screws **102** that pass through a vertical slot **103** in one of the flanges. The slot **103** enables the vertical positions of the bars **40** to be adjusted. The bars **100** are a longitudinal sliding fit between two vertical plates **104, 105** carried by the carriage. The plate **104** has a flange **106** secured to the frame member **83**. The plate **105** is secured to the plate **104** with intervening horizontal bars **106, 107** respectively located fairly close to the top and bottom edges of the plates **104, 105**. These bars **106, 107** serve to support the junction member **101** and locate it vertically. Thus, the junction member **101** carries prongs **108, 109** respectively at its top and bottom ends, between its flanges, and these prongs are a neat sliding fit between the plates **104, 105** and respectively on the upper surface of the bar **106** and on the lower surface of the bar **107**.

When the labelling machine is in operation, and the labels in the magazine are nearly all used up, a new pack of labels is placed in the magazine behind the bars

100. The unit consisting of the bears **100** and junction member **101** is then withdrawn, and the carriage pushed back to a location enabling the said unit to be replaced with the bars **100** behind the pack. Finally, the carriage is released to enable the bars **100** to bear on the pack.

I claim:

1. A magazine for holding packs of sheet material and wherein pressure is applied to the back of the pack so that the foremost sheet is always in a predetermined position, in which it can be picked from the magazine to be delivered to a point at which it is required, the magazine including an elongated container for the pack of sheets arranged so that the said predetermined position is located substantially at one end of the container, a pressure member for exerting a thrust on the end of the pack remote from the predetermined position, a carriage mounted to travel along one face of the container, the pressure member being detachably mounted on the carriage so that a new pack of labels can be placed in the container behind the pressure member, and the pressure member then removed, enabling the carriage to be pushed back to enable the pressure member to be mounted thereon behind the new pack, and a loading means for urging the carriage towards the said end of the container, said loading means comprising a spring biased motor unit mounted to be self-contained on the carriage itself.

2. A magazine according to claim **1**, in which the container provides a trough, open at the top, for the pack, and in which the carriage is arranged to travel along one side of the trough.

3. A magazine according to claim **1** in which the pressure member comprises a bar projecting into the container from the carriage through guides from which it can withdrawn longitudinally from the carriage.

4. A magazine according to claim **1**, in which the said predetermined position is located by a roller against which the forward end of the pack of sheets bears.

5. A magazine according to claim **1**, in which the spring mechanism includes a spring that tends always to curl up into a spiral and in so doing to pass from a drum of larger diameter to a drum of smaller diameter, a pinion being associated with one of the drums and in mesh with a rack extending along the container, whereby the passage of the spring from the larger to the smaller drum causes the carriage to travel along the container.

6. A magazine according to claim **1**, in which the spring mechanism includes a spring arranged to act between a point fixed with respect to the carriage and a point which is movable with respect to the carriage on a member which is connected to rotate a pinion rotatable about an axis on the carriage and in mesh with a rack fixed along the container.

7. A magazine according to claim **6**, in which the movable member is a further rack mounted to move longitudinally on the carriage and in mesh with a further pinion co-axial with and smaller in diameter than the first-mentioned pinion.

8. A magazine according to claim **1**, provided with means for periodically gripping a pack of sheets in the magazine, at or near the forward end of the pack, and withdrawing these sheets towards the rear of the magazine, enabling the front label to be picked while the withdrwal of the labels at or near its rear face prevents any partial vacuum from arising behind the front label.

9. A magazine for holding packs of sheet material and wherein perssure is applied to the back of the pack so that the foremost sheet is always in a predetermined position, in which it can be picked from the magazine to be delivered to a point at which it is required, the magazine including an elongated container for the pack of sheets arranged so that the said predetermined position is located substantially at one end of the container, a pressure member for exerting a thrust on the end of the pack remote from the predetermined position, means for causing the pressure member to exert the said thrust,

and means for periodically gripping a pack of sheets in the magazine, at or near the forward end of the pack, and withdrawing these sheets towards the rear of the magazine, enabling the front label to be picked while the withdrawal of the labels at or near its rear face prevents any partial vacuum from arising behind the front label.

10. A magazine according to claim **9**, in which the means for gripping the pack include a pair of gripper plates mounted to move to-and-fro in such a way as to move towards one another, to grip the pack between them, while the plates move towards the back of the magazine and to separate from one another during the return, idle stroke, and mechanism for causing the gripper plates so to move to-and-fro.

11. A magazine according to claim **2** in which the pressure member comprises a bar projecting into the container from the carriage through guides from which it an be withdrawn longitudinally from the carriage.

12. A magazine according to claim **11** in which the said predetermined position is located by a roller against which the forward end of the pack of sheets bears.

13. A magazine according to claim **8**, in which the means for gripping the pack include a pair of gripper plates mounted to move to-and-fro in such a way as to move towards one another, to grip the pack between them, while the plates move towards the back of the magazine and to separate from one another during the return, idle stroke, and mechanism for causing the gripper plates to move to-and-fro.

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