

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO LABELLING MACHINES

(71) We, KABUSHIKI KAISHA SATO KENKYUSHO, a Japanese Company of 21-23, 3-chome, Kamititazawa, Setagaya-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

10 This invention relates to a labelling machine.

A label strip comprises a backing strip and a plurality of label pieces which are temporarily secured by an adhesive layer on their rear surfaces in a side-by-side array on the backing strip. There are feed perforations formed in the label strip and located so as to bridge across the borders between adjoining label pieces. The feed perforations are engaged by feed pins that are formed around a feed wheel in the labelling machine. When a hand lever is operated, the feed wheel is intermittently rotated through a certain angle to move the label strip that is in engagement with the feed pins forward through the machine a predetermined distance. Each label piece is moved by the feed wheel onto an imprinting platen. The label piece is printed on the platen.

30 During feeding, the layered label strip is fitted against the upper surface of the feed wheel and with the feed pins formed on the feed wheel. Feed lips or lugs are bent up at the feed perforations as they are engaged by the feed pins on the feed wheel. The feed lips at the rear side of each label piece are bent perpendicularly upwardly since the feed wheel pins apply the force to push and move the label strip from the rear of each label strip. In previously proposed labelling machines, the feed lips remain bent upright as the label pieces are transferred onto the platen.

45 Upright feed lips interfere with clear and complete imprinting on the platen. When label pieces with upright feed lips are printed, the feed lips are refolded down on the label pieces. The printed characters are, however, not completely printed. Further, 50 the bent feed lips turn up and flutter so that

the type faces of the printing head label surfaces on the platen are liable to become unparallel (skew). As a result, blurred or indistinct printing occurs.

Furthermore, when label pieces with 55 upstanding feed lips are applied to articles, the applied labels have an unattractive appearance because they are partially bent up. In addition, the applied labels sometimes peel off at the bent portions and this 60 spoils the appearance of the labelled articles.

After printing, in a narrow space in front of the platen, the backing strip is peeled from the printed label pieces by the backing 65 strips being bent sharply downwardly and rearwardly, forming a loop of the backing strip. The separated backing strip is led under the feed wheel and is again brought into engagement with the feed pins of the 70 feed wheel so that the backing strip is delivered toward the rear of the machine body.

The invention provides a labelling machine for printing labels, comprising: 75 label strip feed means including feed pins for engaging and moving a label strip to feed the label strip over a platen; which pins tend in use to raise feed lips on the label strip as the feed pins engage and move the label strip; a printing head includes types oppos- 80 able to the platen for imprinting label pieces of the label strip; means for moving the printing head and the platen together and apart from one another, to imprint a label piece then on the platen; and a label- 85 arranging device comprising an arranging member having an arranging surface for engaging and flattening the upraised feed lips of the label strip as the label strip is moved past the arranging surface by the 90 feed means. The arranging member is advantageously positioned on the locus formed by the turning movement of the type faces of the printing head about a pivotal shaft. The arranging member is advantage- 95 ously located upstream with respect to the movement of the label strip relative to the position of the type faces in the printing position. The arranging member is simultaneously operated during label printing. 100

One form of labelling machine constructed in accordance with the invention and including a label-arranging device will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a cross-sectional side elevational view of the machine, in which the machine frame on the viewing side is removed, and the machine is in its stationary position;

Fig. 2 is the same type of view as Fig. 1, with the machine in the printing position and the label-arranging device in operation;

Fig. 3 is an exploded perspective view of the label-arranging device and a perspective view of a label strip;

Fig. 4 is a cross-sectional view from the side of the elements shown in Fig. 3;

Fig. 5 is a cross-sectional view from the front of the elements shown in Fig. 3;

Fig. 6 is an enlarged side view of a label strip which is being moved forward by, and is in engagement with, the feed pins of a feed wheel;

Fig. 7 is a perspective view of a label piece which has been operated upon by the label-arranging device; and

Fig. 8 is a perspective view of a label piece which has been processed by the conventional method and not by a device or machine constructed in accordance with the invention.

Referring to Fig. 1 of the accompanying drawings, the labelling machine is provided with a label-arranging device. The labelling machine comprises a pair of spaced apart, parallel, rigid frames 9, including a hand grip 1 at the rear (right hand as seen in Fig. 1) portion. A hand lever 2 is pivotally secured to the frames at a pivot shaft 3. A return spring 6 acts in tension between a spring holding member 4 formed on the hand lever 2 and another spring holding member 5 formed in the hand grip 1. When the hand lever 2 is squeezed towards the hand grip 1, the return spring 6 is stretched. When the hand lever 2 is released, the hand lever is returned to the original stationary position by the force of the return spring 6.

The forwardly elongated portions of the hand lever 2 in front of the shaft 3 comprise a pair of operation levers 2A, which are comprised of a print section 2a further from shaft 3 and a drive section 2b nearer the shaft. The print section 2a at the forward end of the operating levers 2A is equipped with a printing head 7 carrying a plurality of printing wheels 8. Each printing wheel 8 is provided with a plurality of imprintable types 8a on its exterior periphery. The types can be selected by rotating the printing wheel 8. The drive section 2b of the levers 2A is provided with driving members for intermittently rotating a feed wheel 11, which is described further below.

As shown in Figs. 3 to 5, the printing head 7 rigidly supports a label-arranging member 40 having an L-shaped vertical cross-section, as seen in Fig. 4. The bottom leg of the L comprises a planar arranging surface 41 at the rear portion and on the bottom surface of the member 40. The planar arranging surface 41 beneath the member 40 is positioned at the local plane formed by the faces of type 8a that is at the printing position and is against the surface of a platen 20. The member 40 is positioned beneath a pair of side frames 7a that define the printing head 7 and at the lower rear portion of the printing wheels 8 in the lower rear part of the printing head. Fixing ridges 42 formed on both sides of the arranging member 40 are inserted into fixing grooves 7b that are defined in the inside faces of the side walls of the frames 7a.

The precise configuration and position of the arranging member 40 described above is not essential. Any configuration and position that is able to flatten the bent feed lips 45a and 45b of label pieces La may be used.

Returning to Fig. 1, the feed wheel 11 that is driven by the drive section 2b of the operating lever 2A, is pivotally secured to a main shaft 10 that is fitted between the pair of machine frames 9. The feed wheel 11 is intermittently rotated when the hand lever 2 is released after it has been squeezed. The peripheral surface of the feed wheel 11 has a plurality of feed pins 12 attached around it at regular intervals.

As shown in Fig. 3, the label strip L with which the device of the present invention is used has a laminated structure comprising a plurality of label pieces La-1, La-2, La-3, La-4, etc. which are temporarily fastened in a side-by-side series on a backing strip W. The undersides of the label pieces have adhesive layers for attaching them to the backing strip W and, after label printing, for attaching them to the surfaces of articles to be labelled. Pre-cut lines 43 are formed between the label pieces La-1, La-2, La-3, La-4 etc. Pairs of feed perforations 44 are so formed in the label pieces that they cross the middle portion of each pre-cut line 43 between the label pieces of each pair of adjacent label pieces. The feed perforations 44 are formed on the borders of the label pieces La-1, La-2, La-3, La-4 etc. of the label strip L. When the label strip L is brought into engagement with the feed pins 12 of the feed wheel 11, the lug portions between the two feed perforations of a pair of feed perforations 44 are bent up to form feed lips 45a and 45b when they are pushed up by the tips of the feed pins 12. A feed lip 45a is formed at the trailing end of the leading label La-2 and a feed lip 45b is formed at the leading end of the trailing label La-3.

The backing strip W has generally

U-shaped cuts 46 therein. Each cut 46 is aligned beneath a set of feed lips 45a and 45b and each cut 46 is of a length to extend across neighbouring feed lips 45a and 45b.

5 The curve of the U of cuts 46 is at the forward ends of these cuts and the feed pins engage the rounded forward ends. The cuts 46 define feed lips 47. However, the rounded portion can alternatively be
10 reversely formed. The feed lips 47 are bent upright when they are engaged by the feed pins 12 of the feed wheel 11. However, each feed lip 47 can be returned to its original flat position simultaneously with the flattening
15 of the respective feed lip 45a of a level piece La by means of the arranging member 40.

The upwardly bent feed lips 45a, 45b and 47 are flattened by the arranging member 40 in the label-feeding operation.

20 As shown in Fig. 4, as each label piece La-1, La-2, etc. is moved in its turn to a position just below the face of the type 8a in the printing position, and the arranging member 40 is so positioned that it comes
25 into contact with the respective feed lips 45a, 45b and 47 between the label pieces.

The labelling machine is provided with a label inserting device. The inserting device comprises a platen 20, over which the label
30 strip L is moved, a label guide member 22 above the label strip for depressing the label strip, an operating member 23 to guide the label strip L, a label guide piece 16 formed on a part of a label holder 15 carrying a roll
35 of label strip L, another label guide piece 17, which is positioned above the elongated portion of the label guide piece 16, and a bottom cover 24 having curved guide members 33 thereon to guide the backing strip W
40 of the label strip L with pressure after the backing strip has been separated from the label strip.

The platen 20 is provided on its rear side (the right hand side as seen in the drawings)
45 with a short arm and with a long arm. Both of these arms have shaft holes. The platen 20 is pivotally secured to the main shaft 10 of the feed wheel 11 through the shaft holes. At the rear tip end of the long arm there is
50 formed a pin 21, which is fitted into a slot 27 of the operating member 23.

The side walls of the operating member 23 define a rectangular frame and are extended forward, forming a pair of arms
55 28. The side walls of the operating member 23 are further provided on their outsides with outwardly projecting pins 25, with which the member 23 is pivotally attached to the machine frames 9. When the operating member 23 revolves in operation, the
60 planar label guide surface 27 of the rectangular frame serves as a guide surface for inserting the label strip L into the machine body. Pins 29 are formed on the inside walls
65 of the arms 28. Slits 30 are formed in a pair

of arms in the rear part of the label guide member 22. The pins 29 are fitted into the slits 30 of the label guide member 22 which is pivoted to the machine frames 9. Thus,
70 through the action of the pins 29, the operating member 23 is turned about the pins 25.

The label guide member 22 is pivotally secured to the machine frames 9 by a pair of pins 31 that are attached to the front end
75 portion of the member 22. The pins 31 are formed on the outsides of a pair of arms at the front part of the guide member 22. Further, the label guide member 22 has a curved undersurface portion 32 which
80 together with the upper surfaces of the feed wheel 11 and the platen 20 forms a narrow label passage for the label strip L.

The front end of the bottom cover 24 is pivotally secured to the machine frames 9
85 with a pivot shaft 13 so the cover can be opened in a clockwise direction about the shaft 13 as seen in the drawings. When the bottom cover 24 is closed, it is fastened to the machine frames 9 through fixing mem-
90 bers 36 on the cover engaging of the locking device 14. At the rear of, and on the top side of, the bottom cover 24, two curved guide member pieces 33 are formed. These lie
95 along the lower peripheral surface of the feed wheel 11. Attached to the front portion of the bottom cover 24 is a guide member 34 for the label strip L. The guide member has a notch 35 that opens toward the shaft
100 13.

The label strip L is loaded into the label-printing machine. The bottom cover 24 is turned clockwise to open it, and the platen 20 within the machine body is turned
105 counter-clockwise about the main shaft 10 to open the platen 20. Interlocking with the opening of the platen 20, the label guide surface 26 of the operating member 23 is turned until it becomes aligned with the
110 inclined label guide piece 16 to form a label guiding surface. At the same time, the label guide member 22 is separated from the peripheral surface of the feed wheel 11, forming a label insertion passage to facilitate
115 the loading of the label strip L.

Then the label strip L is inserted into the above described passage. The opened platen 20 and bottom cover 24 are closed, thereby
120 completing the loading of the label strip L, as shown in Figs. 1 and 6. The label strip L is depressed over the upper portion of the feed wheel 11 by the label guide member 22, and the feed perforations 44 and 46 of both of
125 the label pieces La-1, La-2, La-3, etc. and the backing strip W are brought into engagement with the feed pins 12 on the wheel 11. Further, the leading portion of the label strip L passes over the platen 20 and
130 into the narrow space at the front end of the platen 20. Only the backing strip W is

turned downwardly and rearwardly forming a loop in front of the platen. Each label piece La is peeled from the backing strip W at the loop in the backing strip. The rearwardly moving backing strip W is further depressed against the lower portion of the feed wheel 11 by the curved guide members 33 of the bottom cover 24, and the feed pins 12 of the wheel 11 are again brought into engagement with the feed perforations 46.

The operation of the label-arranging device of the invention will now be described. During operation of the labelling machine, it repeatedly moves from the stationary position of Fig. 1 (where the hand lever 2 is released) into the printing position of Fig. 2 (where the hand lever 2 is released) into the printing position of Fig. 2 (where the hand lever 2 is squeezed). When the hand grip 1 and the hand lever 2 are squeezed, the operating levers 2A are pivoted downwardly. The inking roller 19 attached to the pivoting, normally rearwardly spring biased, inking arm 18 is interlocked with the descent of the levers 2A so that the inking roller applies ink to the surfaces of types 8a of the printing head 7. Then the label strip L carried on the platen 20 is printed by the descending type 8a which is then in the printing position. When the hand lever 2 is released, the feed wheel 11 is turned counterclockwise through a certain angle equivalent to the length of one label piece by the drive section of the operating levers 2A under the force of the return spring 7. As a result, the label strip L is advanced for the length of one label.

As shown in Fig. 6, the feed pins 12 on the outer surface of the feed wheel 11 engage the feed perforations 44 and 46 of both the label pieces La and the backing strip W. Accordingly, as shown in Fig. 3, the feed lips 45a, 45b and 47 of the label strips and backing strip are pushed up by the feed pins 12. The feed lip 45a on the rear side of each label piece La is bent up perpendicularly. The rounded portions of the U-shaped cuts of the backing strip W come into contact with the front faces of the feed pins 12 so as to move the label strip L forward.

Although the feed lips 45b on the front sides of label pieces La and the feed lips 47 of the backing strip W are bent up with some inclination by the feed pins 12, they nearly restore themselves to their original flush position owing to the resilience of the label strip materials. However, as shown in Fig. 6, the feed lips 45a on the rear sides of the label pieces La-6, La-5, La-4, La-3 and La-2 are bent upright since they receive the driving force for moving the label strip L. The label pieces would therefore be transferred onto the platen 20 with upstanding feed lips 45a and 47.

Before the label piece La-2 is printed, by

the types 8a, the upstanding feed lip 45a of the label piece La-2 and the upstanding feed lips 47 of the backing strip are returned to their original flattened state by the arranging surface 41 of the label arranging member 40 that is interlocked with the printing head. While the label piece La-1 is being printed, the next label piece La-2 in sequence is simultaneously being brought under the arranging member for flattening its feed lips 45a and 47. Thus, the label piece La-1, whose feed lips 45a and 47 were previously flattened, can be passed smoothly over the platen 20. Therefore, excellent quality printing is obtained since there is no longer any obstacle to such printing above the surface of the label to be printed.

The printed label piece La-1 is next peeled from the looped backing strip W at the front end of the machine body and it is led out through the space under the label-applying member 13a. The label piece La-0 that is now positioned under the label piece applying member 13a is attached to the surface of an article to be labelled. The condition of the attached label piece La-0 is shown in Fig. 7. Its formerly upwardly bent feed lip 45a is made flat and even. The upper surface of the label piece La-0 has been printed with characters 48 showing, for example, the name of a store or the price of an article.

Because the label-arranging member is moved in synchronism with the type faces of the printing head, the bent label pieces can be successfully corrected to their original flat position by the label-arranging member simultaneously with the printing by the printing head against a label piece on the platen.

The following advantages are obtained with the labelling machine described with reference to the accompanying drawings:

(1) The label strip has a satisfactory imprintable surface when it is on the platen. Thus poor print quality can be eliminated.

(2) Since the feed lips on the edges of label pieces are flattened, the appearance of applied label pieces is good and smooth. In addition, the applied label pieces can be prevented from being peeled off (inadvertently or otherwise).

(3) Since the label-arranging member is directly attached to the frame of the printing head, the correction of the upwardly bent feed lips can be attained simultaneously with the printing of the label pieces. In addition, the bent feed lips can be flattened easily without special operation members having to be built into the machine body.

WHAT WE CLAIM IS:

1. A labelling machine for printing labels, comprising: label strip feed means including feed pins for engaging and moving



turned downwardly and rearwardly forming a loop in front of the platen. Each label piece La is peeled from the backing strip W at the loop in the backing strip. The rearwardly moving backing strip W is further depressed against the lower portion of the feed wheel 11 by the curved guide members 33 of the bottom cover 24, and the feed pins 12 of the wheel 11 are again brought into engagement with the feed perforations 46.

The operation of the label-arranging device of the invention will now be described. During operation of the labelling machine, it repeatedly moves from the stationary position of Fig. 1 (where the hand lever 2 is released) into the printing position of Fig. 2 (where the hand lever 2 is released) into the printing position of Fig. 2 (where the hand lever 2 is squeezed). When the hand grip 1 and the hand lever 2 are squeezed, the operating levers 2A are pivoted downwardly. The inking roller 19 attached to the pivoting, normally rearwardly spring biased, inking arm 18 is interlocked with the descent of the levers 2A so that the inking roller applies ink to the surfaces of types 8a of the printing head 7. Then the label strip L carried on the platen 20 is printed by the descending type 8a which is then in the printing position. When the hand lever 2 is released, the feed wheel 11 is turned counterclockwise through a certain angle equivalent to the length of one label piece by the drive section of the operating levers 2A under the force of the return spring 7. As a result, the label strip L is advanced for the length of one label.

As shown in Fig. 6, the feed pins 12 on the outer surface of the feed wheel 11 engage the feed perforations 44 and 46 of both the label pieces La and the backing strip W. Accordingly, as shown in Fig. 3, the feed lips 45a, 45b and 47 of the label strips and backing strip are pushed up by the feed pins 12. The feed lip 45a on the rear side of each label piece La is bent up perpendicularly. The rounded portions of the U-shaped cuts of the backing strip W come into contact with the front faces of the feed pins 12 so as to move the label strip L forward.

Although the feed lips 45b on the front sides of label pieces La and the feed lips 47 of the backing strip W are bent up with some inclination by the feed pins 12, they nearly restore themselves to their original flush position owing to the resilience of the label strip materials. However, as shown in Fig. 6, the feed lips 45a on the rear sides of the label pieces La-6, La-5, La-4, La-3 and La-2 are bent upright since they receive the driving force for moving the label strip L. The label pieces would therefore be transferred onto the platen 20 with upstanding feed lips 45a and 47.

Before the label piece La-2 is printed, by

the types 8a, the upstanding feed lip 45a of the label piece La-2 and the upstanding feed lips 47 of the backing strip are returned to their original flattened state by the arranging surface 41 of the label arranging member 40 that is interlocked with the printing head. While the label piece La-1 is being printed, the next label piece La-2 in sequence is simultaneously being brought under the arranging member for flattening its feed lips 45a and 47. Thus, the label piece La-1, whose feed lips 45a and 47 were previously flattened, can be passed smoothly over the platen 20. Therefore, excellent quality printing is obtained since there is no longer any obstacle to such printing above the surface of the label to be printed.

The printed label piece La-1 is next peeled from the looped backing strip W at the front end of the machine body and it is led out through the space under the label-applying member 13a. The label piece La-0 that is now positioned under the label piece applying member 13a is attached to the surface of an article to be labelled. The condition of the attached label piece La-0 is shown in Fig. 7. Its formerly upwardly bent feed lip 45a is made flat and even. The upper surface of the label piece La-0 has been printed with characters 48 showing, for example, the name of a store or the price of an article.

Because the label-arranging member is moved in synchronism with the type faces of the printing head, the bent label pieces can be successfully corrected to their original flat position by the label-arranging member simultaneously with the printing by the printing head against a label piece on the platen.

The following advantages are obtained with the labelling machine described with reference to the accompanying drawings:

(1) The label strip has a satisfactory imprintable surface when it is on the platen. Thus poor print quality can be eliminated.

(2) Since the feed lips on the edges of label pieces are flattened, the appearance of applied label pieces is good and smooth. In addition, the applied label pieces can be prevented from being peeled off (inadvertently or otherwise).

(3) Since the label-arranging member is directly attached to the frame of the printing head, the correction of the upwardly bent feed lips can be attained simultaneously with the printing of the label pieces. In addition, the bent feed lips can be flattened easily without special operation members having to be built into the machine body.

WHAT WE CLAIM IS:

1. A labelling machine for printing labels, comprising: label strip feed means including feed pins for engaging and moving

- a label strip to feed the label strip over a platen; which pins tend in use to raise feed lips on the label strip as the feed pins engage and move the label strip; a printing head including types opposable to the platen for imprinting label pieces of the label strip; means for moving the printing head and the platen together and apart from one another, to imprint a label piece then on the platen; and a label-arranging device comprising an arranging member having an arranging surface for engaging and flattening the upraised feed lips of the label strip as the label strip is moved past the arranging surface by the feed means.
2. A labelling machine as claimed in claim 1, wherein, in operation, the arranging surface is opposed to the surface of the label strip passing by the arranging surface.
3. A labelling machine as claimed in claim 1 or claim 2, wherein the printing head includes a rotatable type wheel having the said types arrayed about its periphery; the arranging surface being so positioned as to be on the pathway of rotation of the type surfaces and facing in the same direction as those type surfaces that are then opposable to the platen.
4. A labelling machine as claimed in any one of claims 1 to 3, wherein the arranging surface is flat.
5. A labelling machine as claimed in any one of claims 1 to 4, wherein the arranging member is attached to the printing head.
6. A labelling machine as claimed in any one of claims 1 to 5, wherein the arranging surface is located at the upstream side of the said types with respect to the direction of the motion of the label strip imparted to it by the feed means, past the platen.
7. A labelling machine as claimed in any one of claims 1 to 6, wherein the platen is held stationary relative to the machine as a whole and the printing head is movable towards and away from the platen.
8. A labelling machine as claimed in claim 7, wherein the arranging member is attached to the printing head and moves with the printing head in operation.
9. A labelling machine as claimed in claim 7 or claim 8, which also includes an operating lever connected to the printing head and the feed means and capable of being moved so that it in turn operates the feed means to move the label strip and moves the printing head towards and away from the platen.
10. A labelling machine as claimed in claim 9, wherein the feed means comprises a rotatable feed wheel having the feed pins thereon; the operating lever being so connected with the feed wheel so as to rotate the feed wheel.
11. In combination, a labelling machine as claimed in any one of claims 1 to 10 and a label strip; the label strip being capable of being pierced by the feed pins to define upraised feed lips for engagement by the arranging surface.
12. A combination as claimed in claim 11, wherein the label strip comprises a backing strip and a plurality of label pieces removably attached to the backing strip; the label strip being so oriented that the label pieces face towards the said types and towards the arranging surface; and the feed pins being placed to pierce the label strip from the side thereof of the backing strip.
13. A combination of a labelling machine and a label substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 7 of the accompanying drawings.

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