

SPECIFICATION

Improvements in and relating to hand labellers

- 5 The invention relates to portable labelling machines.

Generally speaking, the printing platen of a portable labelling machine (which will be referred to hereinafter as a "hand labeller") or a tagging machine is made of a hard material such as a metal plate or hard plastics so that labels or tags placed thereon may be printed by the impression of a plurality of type characters which are carried on type wheels or bands. The type characters of such labellers are generally made of an elastic material such as rubber. As a result, even if the printing surfaces of the different characters forming the printing face of a printing head (or its type wheels or bands) are uneven or rough due to errors during production or to wear in use, the prouder characters, or parts of characters, are depressed more when they are brought into contact with the surface of the label upon the printing platen during the printing operation. As a result, the printing face as a whole is flattened, when it contacts the label surface, so that a clear print having uniform density can be effected.

However, type characters made of relatively hard plastics have recently been used frequently because they are easier and cheaper to produce and have excellent durability in comparison with conventional type characters made of rubber. When the type characters are made of hard plastics or metal, however, if there is discrepancy in height between the characters in the printing face, the proud characters will not be depressed during the printing operation because the material of the characters has lower elasticity. As a result, the sunken characters will contact the label surface very lightly or will entirely fail to make contact so that they will produce a weak print or none at all, making it difficult to obtain a clear print of the printing face as a whole.

Some degree of imperfection in the print is tolerable when the print is to be read by eye, but this is not the case with a POS(Point-Of-Sale) system in which the print has to be read by an optical reader, which requires a very clear and accurate print.

It is an object of the invention to provide a portable labelling machine which is free from the drawbacks inherent in the prior art.

50 Another object of the present invention is to provide a labelling machine which is so improved that a clear print having uniform overall density can be obtained even if there is a discrepancy in height among the type characters of the printing face of a printing head.

The invention provides a portable label printing machine comprising a printing head bearing type characters opposed to a platen and arranged in operation to print a label on the platen, wherein the platen comprises an impression plate having resilient projections on its surface, a plurality of the projections being opposed to each said type character.

Five forms of hand labeller constructed in accordance with the present invention will now be described by way of example with reference to the

accompanying drawings, in which:

Fig. 1 is a sectional side elevation of the first form of hand labeller;

Fig. 2 is a perspective view of the printing platen of the labeller shown in Fig. 1;

Fig. 3 is a sectional front view of the labeller shown in Fig. 1, with the printing platen and the printing head in contact during the printing operation;

Fig. 4(A) is similar to Fig. 2 but shows the printing platen of the second form of hand labeller;

Fig. 4(B) is a perspective view showing part of the printing platen of the third form of labeller, to a larger scale than Fig. 2;

Fig. 4(C) is a perspective view showing part of the printing platen of the fourth form of labeller, to a larger scale than Fig. 2; and

Fig. 4(D) is a perspective view showing part of the printing platen of the fifth form of labeller, to a larger scale than Fig. 2.

Referring to Fig. 1 of the accompanying drawings, the hand labeller comprises a grip 1 which is made integral with the body of the hand labeller and extends backwards (to the right as seen in Fig. 1) from the labeller body. There is also provided a hand lever 2 which is located below the grip 1 and which is supported between the side frames 10 of the labeller body so as to be rotatable about a pivot pin 3.

The front portion of the hand lever 2 extends forwards beyond the pivot pin 3 and forms an operating lever 2A which is composed of a printing portion 2a and an actuating portion 2b. There is mounted on the printing portion 2a of the operating lever 2A a printing head 7, in which a plurality of type carrying wheels 8a to 8e are rotatably mounted side by side on a common axis. The type wheels 8a to 8e are made of hard plastics and have their outer peripheries carrying or formed with printing type characters 9a to 9e, respectively.

A lug 4 is provided on the hand lever 2 above the pivot pin 3 and a pin 5 is mounted inside the rear end of the grip 1. A helical spring 6 serving as a return spring is stretched between the lug 4 and the pin 5 and acts in tension to bias the hand lever 2 counter-clockwise as seen in Fig. 1 away from the grip 1.

In the labeller body below (as seen in Fig. 1) the actuating portion 2b of the operating lever 2A there is a feed roller 11 which is formed on its outer circumference with a plurality of evenly spaced feed pins 12. The feed roller 11 is rotatably mounted on a spindle 13 which is supported between the side frames 10 of the hand labeller. The feed roller 11 is turned counter-clockwise, as seen in Fig. 1, by a drive mechanism (not shown) when the hand lever 2 is released, that is to say, when the operating lever 2A is returned upward or clockwise, as seen in Fig. 1, about the spindle 3, thereby advancing a continuous strip 30 of labels one pitch.

In front of the feed roller 11 there is a printing platen 14. The printing platen 14, which is shown in more detail in Fig. 2 of the accompanying drawings, is made of hard plastics or metal and comprises a pair of upright side plates 15 which are formed at their rear portions with a pair of coaxial bores 19. When the platen is installed in the labeller, the spindle 13 is fitted in the bores 19 so as to rotatably

support the feed roller 11 between the side plates 15.

The printing platen 14 further comprises a label guide bottom plate 16, which is cylindrically curved although, as may be seen from the drawings, not right circular cylindrically, and which is mounted between the side plates 15 at the front portions thereof. The bottom plate 16 has its upper surface formed with a plurality of ribs 17 which extend parallel to the direction of advance of the continuous label strip 30.

The bottom plate 16 has its leading end portion formed with a shallow recess, in which an impression plate 18 made of a resilient material such as rubber or soft plastics is received to form a printing portion 20. The impression plate 18 of the first form of labeller has its upper surface formed with a multiplicity of projections in the form of ribs 21 parallel to the direction of advance of the continuous label strip 30.

As may be seen from Figs. 4(A) to 4(D) of the accompanying drawings, the other forms of labeller to be described, which are otherwise identical to the first form, have an impression plate 18 formed with a multiplicity of projections 22 which are arranged in a chequerboard pattern, and are of cuboid, pyramidal, hexagonal frusto-pyramidal and hemispherical shape, respectively.

There is no special limitation on the sizes of the projections 21 or 22. As is shown in Fig. 3 of the accompanying drawings, however, the projections 21 or 22 are advantageously so sized that two to four of them are spanned by the width of one of the printing type characters 9a to 9e.

Referring again to Fig. 1 to 3 of the accompanying drawings, the label strip 30 is unrolled from a rolled label strip 29 held on a label holder 23 at the top of the labeller. The label strip 30 is guided by the lower side of a label guide member 24 and forced into contact with the upper side of the outer circumference of the feed roller 11 so that perforations in the label strip are brought into engagement with the feed pins 12 of the feed roller 11. The label strip 30 is then fed forwards from the feed roller 11 along the upper surface of the platen 14. At the front end of the platen 14 the backing paper 31 of the label strip 30 is turned back and returned under the platen to the underside of the feed roller 11, where the perforations in the backing paper are again engaged by the feed pins 12 of the feed roller, and the backing paper is then fed out of the body of the hand labeller. Meanwhile, the labels 32, which are separated or peeled from the backing paper 31 by the sharpness of the curve that the backing paper follows round the front of the printing portion 20 of the platen 14, are fed to a position below a label applying roller 28 mounted at the lower front of the labeller body.

When the hand lever 2 is squeezed from its released condition shown in Fig. 1, the operating lever 2A is turned counter-clockwise, as seen in Fig. 1, about the pivot pin 3. As a result, the printing head 3 is moved down while the type characters 9a to 9e of its printing face are supplied with ink from an inking roller 26 carried on an inking assembly 25 that is pivotally mounted on the front end portion of one of the side frames 10 by means of a pivot pin 27. In the

fully squeezed condition of the hand lever 2, the type characters 9a to 9e impress that label of the label strip 30 which is in position on the impression plate 18 at the leading end of the printing platen 14, thus accomplishing the printing operation.

In this printing condition, the type characters 9a to 9e at the printing of lowermost positions of the respective type wheels 8a to 8e constituting the printing head 7 may be so irregular that the type surfaces are not coplanar, as is shown, for example, in Fig. 3 of the accompanying drawings. In this case, if the impression plate 18 is made of a hard material such as a metal plate, as has hitherto been customary, the relatively sunken characters of the printing face contact the label surface lightly or not at all so that their impression is not clear or, still worse, entirely absent. According to the present invention, on the contrary, since the impression plate 18 is made of an elastic material and formed with corrugations or projections, the ribs 21a contacting the proud characters 9a, 9c and 9e are depressed whereas the other ribs 21b contacting the sunken characters 9b and 9d are substantially undistorted and maintain their initial forms. As a result, the label strip 30 sandwiched between the characters 9a to 9e and the impression plate 18 is curved to follow the curved surface joining the apices of the ribs 21a and 21b. Thus, all of the characters 9a to 9e of the printing face can contact the upper side of the label strip 30 substantially uniformly so that a clear print having a more uniform density can be effected without any missing or faint character.

That result can naturally be obtained not only with type characters made of a hard material as has been described above but also with conventional type characters made of an elastic material such as rubber.

When the hand lever 2 is released from its squeezed condition, it is returned clockwise, as seen in Fig. 1 of the accompanying drawings, together with the operating lever 2A by the biasing action of the return spring 6. As a result, the printing head 7 is moved upward, and the drive mechanism is actuated to turn the feed roller 11 through a present angle so that the label strip 30 is moved forward one pitch by the feed pins 12 on the top of the roller 11. Since the backing paper 31 is simultaneously pulled backwards by the feed pins 12, on the bottom of the roller 11, the printed label 32 is peeled from the backing paper 31 and is delivered below the label applying roller 28 so that it can be applied to an article that is to be marked.

In the course of advancement of the label strip 30, incidentally, since the label guide bottom plate 16 is formed on its upper side with the ribs 17, the lower side of the label strip 30, that is to say, the backing paper 31, is allowed to contact only the upper sides of the ribs 17, resulting in a sufficiently low frictional resistance, while the label strip 30 is advancing, that the label strip 30 can be conveyed smoothly.

As has been described hereinbefore, the impression plate of the printing platen is made of an elastic member having corrugations or projections. As a result, even if the type surfaces of the printing head are irregular or rough, the corrugations or projec-

tions of the elastic member are depressed by the corresponding proud printing type characters so that the surfaces of the sunken characters are brought into proper contact with the label surface. Thus, a clear print having uniform density can be effected without any missing or faint character. It should be appreciated that the shock of the printing operation is so damped as to prevent damage to the printing head and platen.

10 CLAIMS

1. A portable label printing machine comprising a printing head bearing type characters opposed to a platen and arranged in operation to print a label on the platen, wherein the platen comprises an impression plate having resilient projections on its surface, a plurality of the projections being opposed to each said type character.

2. A machine as claimed in claim 1, wherein different projections are opposed to different type characters.

3. A machine as claimed in claim 1 or claim 2, wherein a plurality of type characters are arranged to print a label simultaneously.

4. A machine as claimed in any one of claims 1 to 3, wherein the impression plate is made of resilient material.

5. A machine as claimed in any one of claims 1 to 4, wherein the platen includes two planar, parallel, symmetrically arranged side plates and a cylindrically curved guide plate that is everywhere perpendicular to the side plates and extends the whole width of the gap between them, and wherein one edge of the impression plate is adjacent to and aligned with one free edge of the guide plate, and the impression plate is aligned with the adjacent edge portion of the guide plate, the arrangement being such that labels can be fed over the concave surface of the guide plate into position on the impression plate to be printed.

6. A machine as claimed in claim 5, comprising means for feeding labels onto the impression plate along the guide plate.

7. A machine as claimed in claim 6, wherein the labels are arranged to be fed onto the impression plate in a continuous strip.

8. A machine as claimed in any one of claims 5 to 7, wherein the guide plate has its surface formed with a plurality of ribs which extend parallel to the normal direction of movement of labels along the guide plate.

9. A machine as claimed in any one of claims 1 to 8, wherein the projections on the surface of the impression plate are parallel ribs.

10. A machine as claimed in claim 9, wherein the ribs on the impression plate extend parallel to the normal direction of motion of labels over the impression plate.

11. A machine as claimed in claim 9 or claim 10, wherein the printing head bears a row of type characters extending perpendicular to the ribs on the impression plate, and the spacing of those ribs is not more than one half of the spacing of the characters in the said row.

12. A machine as claimed in claim 11, in which the spacing of those ribs is not less than one quarter

of the spacing of those characters.

13. A machine as claimed in any one of claims 1 to 8, wherein the projections on the surface of the impression plate are arranged in a regular array.

14. A machine as claimed in claim 13, wherein the regular array is a chequerboard array.

15. A machine as claimed in claim 14, wherein the projections on the impression plate have a square shape.

16. A machine as claimed in claim 14, wherein the projections on the impression plate have a pyramidal shape.

17. A machine as claimed in claim 13, wherein the regular array is an equilateral triangular array.

18. A machine as claimed in claim 17, wherein the projections on the impression plate have a hexagonal shape.

19. A machine as claimed in claim 18, wherein the projections on the impression plate are hexagonal pyramid frusta.

20. A machine as claimed in claim 14 or claim 17, wherein the projections on the impression plate have a hemispherical shape.

21. A machine as claimed in any one of claims 13 to 20, wherein the printing head bears a plurality of characters and the spatial frequency of the projections on the impression plate in any direction is at least twice that of the characters on the printing head in the same direction.

22. A portable labelling machine substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 3 of the accompanying drawings.

23. A machine as claimed in claim 22, modified substantially as hereinbefore described with reference to, and as shown in, any one of Figs. 4A to 4D of the accompanying drawings.

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tions of the elastic member are depressed by the corresponding proud printing type characters so that the surfaces of the sunken characters are brought into proper contact with the label surface. Thus, a

5 clear print having uniform density can be effected without any missing or faint character. It should be appreciated that the shock of the printing operation is so damped as to prevent damage to the printing head and platen.

10 CLAIMS

1. A portable label printing machine comprising a printing head bearing type characters opposed to a platen and arranged in operation to print a label on the platen, wherein the platen comprises an impression plate having resilient projections on its surface, a plurality of the projections being opposed to each said type character.

2. A machine as claimed in claim 1, wherein different projections are opposed to different type

20 characters.

3. A machine as claimed in claim 1 or claim 2, wherein a plurality of type characters are arranged to print a label simultaneously.

4. A machine as claimed in any one of claims 1 to 25 3, wherein the impression plate is made of resilient material.

5. A machine as claimed in any one of claims 1 to 4, wherein the platen includes two planar, parallel, symmetrically arranged side plates and a cylindrically curved guide plate that is everywhere perpendicular to the side plates and extends the whole width of the gap between them, and wherein one edge of the impression plate is adjacent to and aligned with one free edge of the guide plate, and the impression plate is aligned with the adjacent edge portion of the guide plate, the arrangement being such that labels can be fed over the concave surface of the guide plate into position on the impression plate to be printed.

6. A machine as claimed in claim 5, comprising means for feeding labels onto the impression plate along the guide plate.

7. A machine as claimed in claim 6, wherein the labels are arranged to be fed onto the impression plate in a continuous strip.

8. A machine as claimed in any one of claims 5 to 7, wherein the guide plate has its surface formed with a plurality of ribs which extend parallel to the normal direction of movement of labels along the guide plate.

9. A machine as claimed in any one of claims 1 to 8, wherein the projections on the surface of the impression plate are parallel ribs.

10. A machine as claimed in claim 9, wherein the ribs on the impression plate extend parallel to the normal direction of motion of labels over the impression plate.

11. A machine as claimed in claim 9 or claim 10, wherein the printing head bears a row of type characters extending perpendicular to the ribs on the impression plate, and the spacing of those ribs is not more than one half of the spacing of the characters in the said row.

12. A machine as claimed in claim 11, in which the spacing of those ribs is not less than one quarter

of the spacing of those characters.

13. A machine as claimed in any one of claims 1 to 8, wherein the projections on the surface of the impression plate are arranged in a regular array.

14. A machine as claimed in claim 13, wherein the regular array is a chequerboard array.

15. A machine as claimed in claim 14, wherein the projections on the impression plate have a square shape.

16. A machine as claimed in claim 14, wherein the projections on the impression plate have a pyramidal shape.

17. A machine as claimed in claim 13, wherein the regular array is an equilateral triangular array.

18. A machine as claimed in claim 17, wherein the projections on the impression plate have a hexagonal shape.

19. A machine as claimed in claim 18, wherein the projections on the impression plate are hexagonal pyramid frusta.

20. A machine as claimed in claim 14 or claim 17, wherein the projections on the impression plate have a hemispherical shape.

21. A machine as claimed in any one of claims 13 to 20, wherein the printing head bears a plurality of characters and the spatial frequency of the projections on the impression plate in any direction is at least twice that of the characters on the printing head in the same direction.

22. A portable labelling machine substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 3 of the accompanying drawings.

23. A machine as claimed in claim 22, modified substantially as hereinbefore described with reference to, and as shown in, any one of Figs. 4A to 4D of the accompanying drawings.

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