Nov. 13, 1962 B. HOWARD 3,063,539

SELF-INKING TAPE MECHANISM

Filed May 12, 1960 3 Sheets-Sheet 1

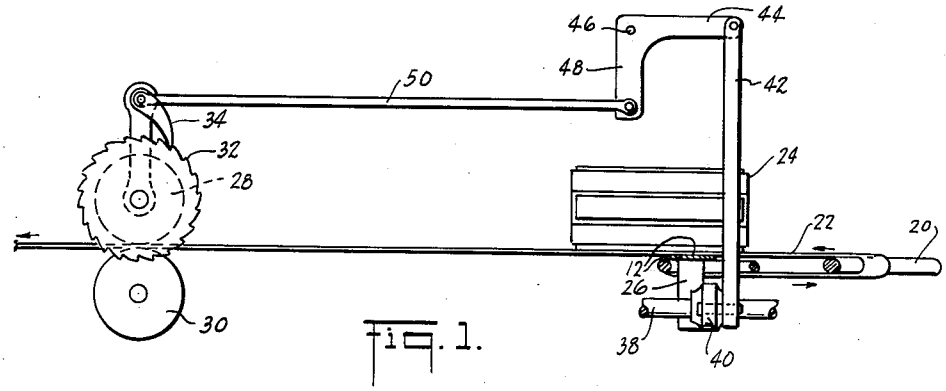


Fig. 1.

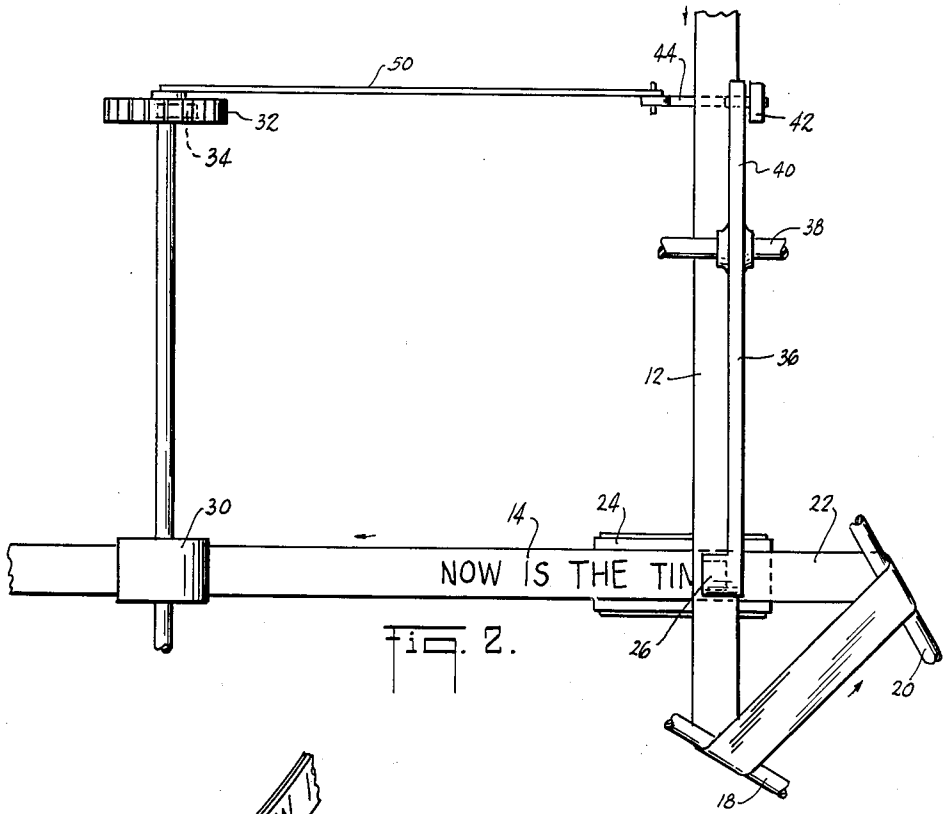


Fig. 2.

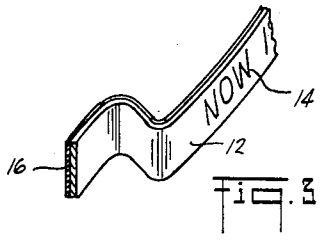


Fig. 3.

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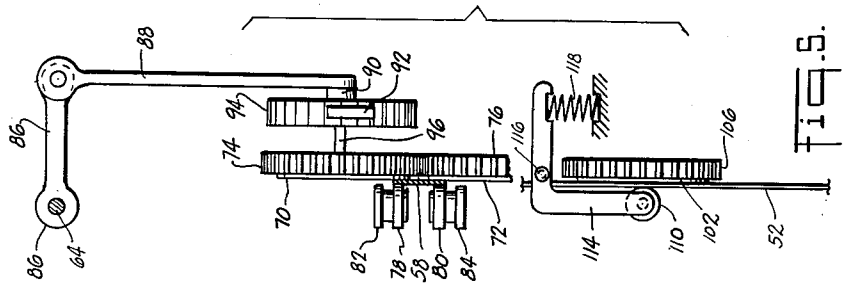


Fig. 5.

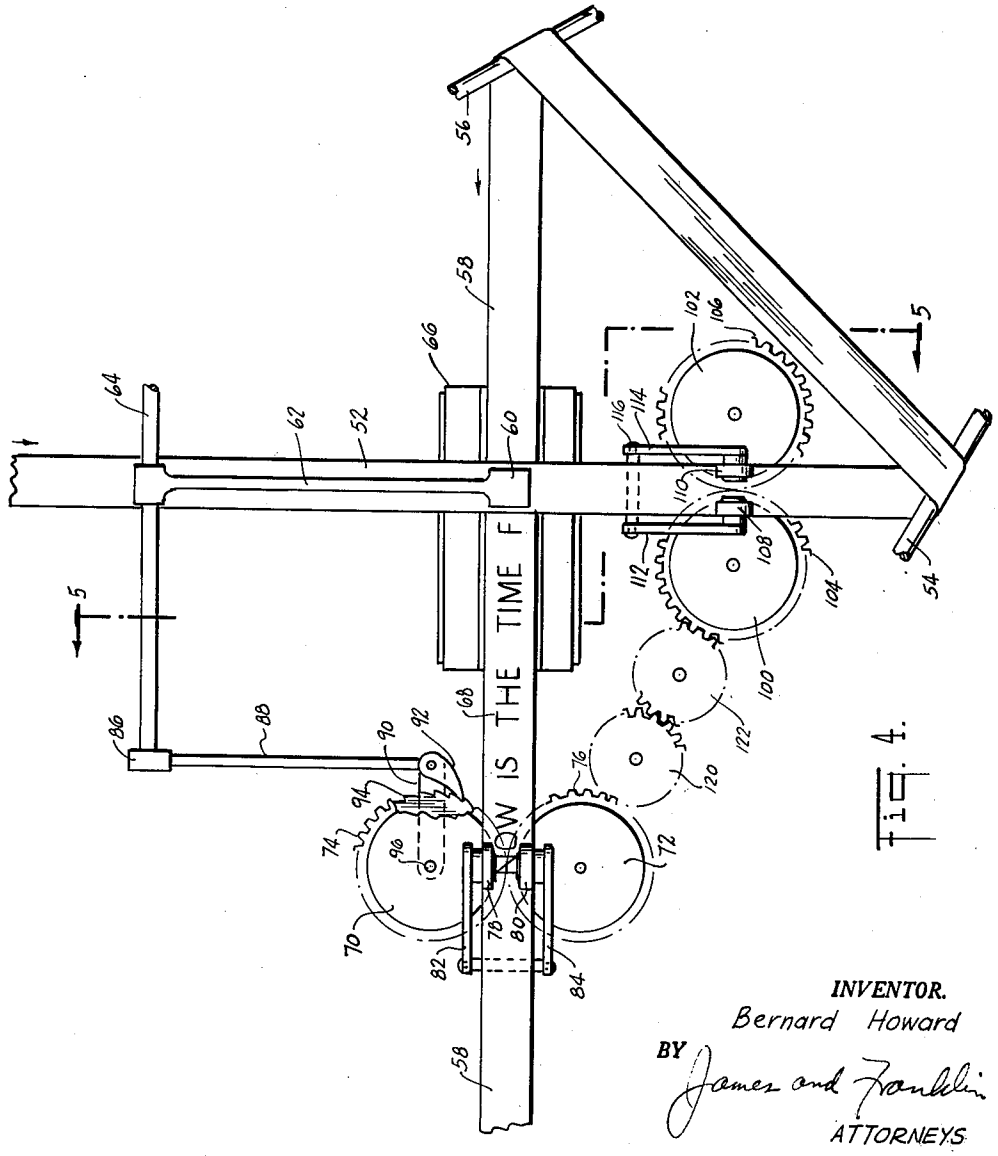


Fig. 4.

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SELF-INKING TAPE MECHANISM

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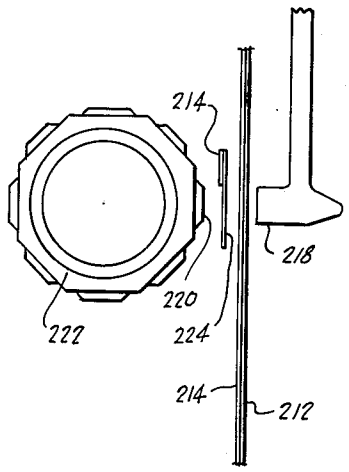


Fig. 6.

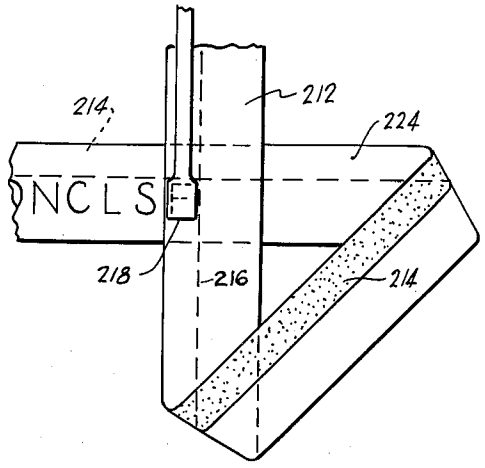


Fig. 7.

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SELF-INKING TAPE MECHANISM

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Filed May 12, 1960, Ser. No. 28,612
13 Claims. (Cl. 197—49)

This invention relates to tape printers, and more particularly to the inking mechanism and supply for such printers.

In printers, the usual practice is to employ an ink ribbon, somewhat as in a typewriter. In has already been proposed to eliminate the need for an ink ribbon by coating the back of the paper with material (for example, carbon as used on carbon paper) suited to act as an ink supply. Such dual-purpose paper has not come into actual use, and one difficulty is that the message being typed is concealed by the ink supply paper necessarily disposed in front of the paper receiving the message.

The primary object of the present invention is to overcome the foregoing difficulty, and to provide a self-inking tape mechanism in which the printed characters may be seen immediately after printing, so that the message may be read as it is being printed.

To accomplish the foregoing general object, and other more specific objects which will hereinafter appear, my invention resides in the self-inking tape mechanism and the interrelated elements thereof, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 is a simplified plan view of mechanism utilizing a self-inking tape;

FIG. 2 is a front elevation thereof;

FIG. 3 shows a fragment of the self-inking tape;

FIG. 4 is a front elevation of another mechanism for utilizing the tape;

FIG. 5 is a fragmentary side elevation thereof; and

FIGS. 6 and 7 are explanatory of a modification.

Referring to the drawing, and more particularly to FIG. 3, the tape **12** is a narrow paper tape adapted to receive only a single line of printed matter, as indicated at **14**. The front of the tape is light in color, usually white, and has a texture suitable to receive the print. The back of the tape is coated as shown at **16** with material suited to act as an ink ribbon or ink supply for use with a type body, for printing on the front surface of another portion of the same tape. The material **16** may be a carbonaceous inking material of the type commonly used on carbon paper, and it will be understood that we deal here with a printer which displays its printed message, so that the printed tape is not ordinarily manually handled. The tape may be like certain ink ribbons already in use, which have a paper base instead of a fabric base, but here the paper base is light or white in color.

Referring now to FIG. 2, the tape **12** coming from a suitable supply roll (not shown) is first fed downward past the printing station. It then goes to tape folding means **18** and **20**, which so fold and guide the tape that another portion **22** is fed across the portion **12**. The portion **22** is located behind the portion **12**, and receives the print, and the two portions preferably cross in perpendicular relation as shown.

In the present machine the type body is behind the paper, and the hammer is in front. This arrangement is preferred when using a large type body, in order not to conceal the printing, but in other cases the type body could be in front, particularly when using a small or retractable type body. In the drawing the type body is shown at **24**, and the hammer at **26**. It will be evident that with the crossed tape arrangement shown the printed matter **14** is exposed as fast as it is printed.

The tape is fed by a feed wheel **28** (FIG. 1) and a cooperating pressure wheel or roller **30**. The feed wheel **28** is turned by a ratchet wheel **32**, intermittently moved by a pawl **34**. This pawl and ratchet mechanism is preferably so related to the hammer **26** that the tape **22** is fed during return movement of the hammer, and is stationary during printing movement of the hammer. Each movement of the tape corresponds to the spacing between one letter and the next.

In the present mechanism the hammer **26** is carried on an upright arm **36** mounted on a hammer shaft **38** which may be the source of movement of the hammer, that is, the shaft **38** may be rocked to actuate the hammer. The hammer arm is extended at **40**, and connected by a link **42** to the arm **44** of an angle lever which is pivoted at **46**. The other arm **48** of the angle lever is connected by a link **50** to the pawl **34**. On reflection, it will be seen that the tape is fed during outward or return movement of the hammer, and is stationary with the pawl slipping over the teeth of the ratchet wheel during the printing movement of the hammer.

In the particular case here shown the type body is generally cylindrical, there being eight lines of type around the cylinder, and each line having eight characters, thus providing sixty-four characters in all. The mechanism of the printer moves the type body both rotatively and axially to select the desired character, and that character is positioned directly behind the hammer **26**. The mechanism for moving the type body may be like that shown in U.S. patent to Howard, 2,727,944, issued December 27, 1955, or in U.S. Patent 2,769,029, issued October 30, 1956, or in the copending application of Bernard Howard, Serial No. 63,739, filed October 20, 1960

A modified tape feed arrangement may be described with reference to FIGS. 4 and 5 of the drawing. Referring to those figures, the self-inking tape is first fed downward as shown at **52**, and is then guided angularly by successive folding means **54** and **56**, and then led horizontally at **58** past the printing station which is also the location of hammer **60**. The hammer is carried by an arm **62** and a hammer shaft **64** which is rocked to actuate the hammer.

The hammer strikes the crossed tapes against the selected character on a type body **66**. This may be like that previously described, and may similarly be moved rotatively and axially relative to the printing station or hammer **60**, for character selection. Each printed character on tape portion **58** is exposed immediately after printing, as will be seen by the printed characters **68**.

In the present case there are feed and pressure wheels engaging the vertical portion **52** of the tape, as well as feed and pressure wheels engaging the horizontal portion **58** of the tape. The specific feed mechanism shown generally resembles that disclosed in the aforesaid co-pending patent application Serial No. 63,739.

Specifically, the upper and lower edges of the tape **58** engage frictional material **70** and **72** (e.g. soft rubber) acting as face feed wheels. The frictional material is mounted directly on the front faces of gears **74** and **76**, which mesh and therefore turn in proper direction to simultaneously feed the tape. The upper and lower edges of the tape are pressed against the frictional faces **70** and **72** by small pressure wheels **78** and **80**. These are carried on arms **82** and **84** which are resiliently urged toward the paper by springs, not shown in the drawing, but described later.

Referring now to FIG. 5, the rock shaft **64** of hammer arm **62** carries an arm **86** connected at its rear end to a link **88**, the lower end of which is connected to a pawl lever **90** (FIG. 4) carrying a pawl **92** which engages a

ratchet wheel 94 connected at 96 (FIG. 5) to the gear 74. During the print movement of the hammer the pawl rides backward over the ratchet teeth, but on outward or return movement of the hammer the pawl turns the gear 74, and consequently its meshing gear 76, thereby feeding the tape 58.

In the present mechanism the vertical tape portion 52 is also fed, instead of being merely pulled by tape portion 58, and for this purpose I provide additional feed wheels 100 and 102, which again are preferably secured directly on the front faces of gears 104 and 106. These gears mesh with one another for simultaneous rotation, and they may be driven by the feed wheels previously described. Specifically, in the present case, gear 104 is operatively connected to gear 76 by intermediate idlers 120 and 122. Thus, all four feed wheels turn in unison, and all turn in proper direction to feed the tape in desired direction.

The upright tape portion 52 is held against the frictional feed wheels 100 and 102 by pressure rollers or wheels 108 and 110 which are carried by arms 112 and 114. These are angle levers, better shown in FIG. 5, referring to which the arms are pivoted at 116 and are urged against the tape 52 by a compression spring 118.

It will be understood that the arms 82 and 84 for the horizontal tape portion 58 similarly may be angle levers urged by springs in proper direction for the rollers 78 and 80 to press the tape against the feed wheels 70 and 72.

Although I have referred to the use of carbon, it will be understood that other chemically treated papers may be employed. For example The National Cash Register Company sells chemically treated papers in which the front surface of the back sheet is treated with one chemical, while the rear surface of the front sheet is treated with another, and these chemicals produce visible print when combined by impact. Two different sheets are used, but in the present system one of the chemicals may be applied to the front of the tape and the other to the back of the tape, thereby producing the desired print on impact. When the type body is in the rear, such chemical printing has an advantage over the use of carbon in not dirtying the characters on the type body.

However, dirtying of the type body may be avoided even when using carbon, and the amount of carbon surface needed may be minimized, by a modification of my invention shown in FIGS. 6 and 7 of the drawing. Referring to those figures, the tape 212, as before, has a light color and texture suitable to receive print on the front. A narrow strip on the back of the tape is coated with carbon or other material suited to act as ink, and the said strip is located along one edge of the tape, as indicated at 214. This strip is at least as wide as the characters being printed, as is indicated by the broken line 216, which at the moment encloses the character "F." The hammer 218 and the selected character 220 (FIG. 6) on the type body 222 are disposed respectively in front of and in back of the left marginal portion of the vertical tape 212, that is, at the vertical carbon strip. However, the hammer 218 and character 220 are disposed below the horizontal carbon strip 214 of the horizontal tape portion 224.

With this arrangement, although the type body strikes the back of the horizontal tape, it is not dirtied by carbon on back of the tape, for it engages a clear or non-carbonized part of the horizontal tape. However, the inking material is available in proper position on the back of the vertical or front tape portion 212 to produce the desired printing on the front of the horizontal or rear tape portion 224.

For this purpose alone the carbon strip might be behind the right edge instead of the left edge of the vertical tape portion 212, but the left edge location shown in the drawing is preferred in order to immediately expose each printed character, so that the message may be read as it is being printed. Indeed, it is mainly for this reason that the type body is disposed in back of the paper, for the type body is large and would conceal some of the message if it were in front of the paper, whereas the hammer is tiny and does not conceal the printed message. With the type body in front, the problem of dirtying the type would not even arise.

It is believed that the construction and operation of my improved tape printer for use with a narrow self-inking paper tape, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while I have shown and described the invention in several preferred forms, changes may be made in the structures shown without departing from the scope of the invention as sought to be defined in the following claims. In the claims the term "carbon" is used for convenience, and is not intended to exclude other inking materials which would serve for the present purpose. The terms vertical and horizontal as applied to the crossed tape portions are used merely for convenience, and are intended only in a relative sense, for both could be horizontal or inclined, the important thing being that they cross one another.

I claim:

1. A tape printer for use with a narrow paper tape having a carbon coating on back, said printer comprising tape folding means to so fold and guide the tape that one portion of the tape is fed in front of and across another portion which is being printed, whereby one portion acts as an ink ribbon for printing of the other portion, said crossed relation of the tape portions permitting reading of the printed matter on the rear portion without concealment by the front portion.

2. A tape printer for use with a narrow paper tape having a carbon coating on back, said printer comprising a type body, means to feed the tape past the type body and to expose the printed tape immediately beyond the type body, tape folding means to so fold and guide the tape that a preceding or second portion is fed in front of and across the tape portion which is being printed, the carbon of said second tape portion being at the rear for contact with the front of the first tape portion at the type body, whereby the said second tape portion acts as an ink-ribbon for cooperation with the type body, said crossed relation of the tape portions permitting reading of the printed matter without concealment by the second tape portion.

3. A tape printer for use with a narrow paper tape having a carbon coating on back, said printer comprising a type body, a print hammer, means to feed the tape past the type body and hammer and to expose the printed tape immediately beyond the type body and hammer, tape folding means to so fold and guide the tape that a preceding or second portion is fed in front of and across the tape portion which is being printed, the carbon of said second tape portion being at the rear for contact with the front of the first tape portion at the type body, whereby the said second tape portion acts as an ink ribbon for cooperation with the type body and hammer, said crossed relation of the tape portions permitting reading of the printed matter without concealment by the second tape portion.

4. A tape printer for use with a narrow paper tape having a carbon coating on back, said printer comprising a type body, a print hammer, means to feed the tape past the type body and hammer and to expose the printed tape immediately beyond the type body and hammer, tape folding means to so fold and guide the tape that a preceding or second portion is fed in front of and across the tape portion which is being printed, the carbon of said second tape portion being at the rear for contact with the front of the first tape portion at the type body, whereby the said second tape portion acts as an ink ribbon for cooperation with the type body and hammer, said crossed relation of the tape portions permitting reading of the printed matter without concealment by the second tape portion, the aforesaid tape feed means including one or more feed and pressure wheels engaging the first tape portion to pull the same past the type body, one or more feed and pressure wheels engaging the second tape portion to pull the

same across the first tape portion, and pawl and ratchet means to intermittently turn said wheels.

5. A tape printer for use with a narrow paper tape having a carbon coating on back, said printer comprising a type body, a print hammer, means to feed the tape past the type body and hammer and to expose the printed tape immediately beyond the type body and hammer, tape folding means to so fold and guide the tape that a preceding or second portion is fed in front of and across the tape portion which is being printed, the carbon of said second tape portion being at the rear for contact with the front of the first tape portion at the type body, whereby the said second tape portion acts as an ink ribbon for cooperation with the type body and hammer, said crossed relation of the tape portions permitting reading of the printed matter without concealment by the second tape portion, the aforesaid tape feed means including one or more feed and pressure wheels engaging the first tape portion to pull the same past the type body, one or more feed and pressure wheels engaging the second tape portion to pull the same across the first tape portion, and pawl and ratchet means to intermittently turn said wheels, said pawl being so related to the hammer that the tape is fed during return movement of the hammer and is stationary during printing movement of the hammer.

6. A tape printer as defined in claim 3 in which said tape feed means engages the first tape portion to pull the same past the type body, and in which the pull of the first tape portion serves also to pull the second tape portion across the first tape portion.

7. A tape printer as defined in claim 3 in which said tape feed means includes one or more feed and pressure wheels engaging the first tape portion to pull the same past the type body, and in which the same wheels serve also to pull the second tape portion across the first tape portion.

8. A tape printer as defined in claim 4 in which said tape feed means includes upper and lower face feed wheels engaging the upper and lower rear edges of the first tape portion.

9. A tape printer as defined in claim 4 in which said tape feed means includes upper and lower face feed wheels engaging the upper and lower rear edges of the first tape portion, and one or more additional feed wheels engaging the second tape portion, and in which said feed wheels are geared together for simultaneous rotation.

10. A tape printer as defined in claim 4 in which said tape feed means includes upper and lower face feed wheels engaging the upper and lower rear edges of the first tape portion, and left and right face feed wheels engaging the left and right rear edges of the second tape portion, and in which all four of said face feed wheels are geared together for simultaneous rotation, and in which the pawl and ratchet means drives one of said face feed wheels.

11. A tape printer as defined in claim 5 in which said tape feed means includes upper and lower face feed wheels engaging the upper and lower rear edges of the first tape portion, and left and right face feed wheels engaging the left and right rear edges of the second tape portion, and in which all four of said face feed wheels are geared together for simultaneous rotation, and in which the pawl and ratchet means drives one of said face feed wheels.

12. A tape printer for use with a narrow paper tape having a narrow strip of carbon coating on the back adjacent one edge of the tape, the width of said coating being as large as the width of the characters to be printed, said printer comprising a type body disposed in back of the tape, a hammer in front of the tape, means to feed the tape horizontally past the type body and hammer, tape folding means to so fold and guide the tape that a preceding or second portion is fed vertically in front of and across the horizontal tape portion which is being printed, the carbon of said second tape portion being at the rear for contact with the front of the first tape portion at the type body, whereby the second tape portion acts as an ink ribbon for cooperation with the type body and hammer, the carbon strip in back of the second tape portion being at one edge, and the working portions of the hammer and type body being correspondingly located in front and in back of the said edge respectively, and the said working portions thereof being vertically displaced from the carbon strip in back of the horizontal first tape portion, whereby the type body does not collect carbon from the back of the first tape portion.

13. A tape printer for use with a narrow paper tape having a narrow strip of carbon coating on the back adjacent one edge of the tape, the width of said coating being as large as the width of the characters to be printed, said printer comprising a type body disposed in back of the tape, a hammer in front of the tape, means to feed the tape horizontally past the type body and hammer and to expose the printed tape immediately beyond the hammer, tape folding means to so fold and guide the tape that a preceding or second portion is fed vertically in front of and across the horizontal tape portion which is being printed, the carbon of said second tape portion being at the rear for contact with the front of the first tape portion at the type body, whereby the second tape portion acts as an ink ribbon for cooperation with the type body and hammer, said crossed relation of the tape portions permitting reading of the printed matter without concealment by the second tape portion, the carbon strip in back of the second tape portion being at the left edge and the working portions of the hammer and type body being correspondingly located in front and in back of the left edge respectively, and the said working portions thereof being vertically displaced from the carbon strip in back of the horizontal first tape portion, whereby the type body does not collect carbon from the back of the first tape portion.

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