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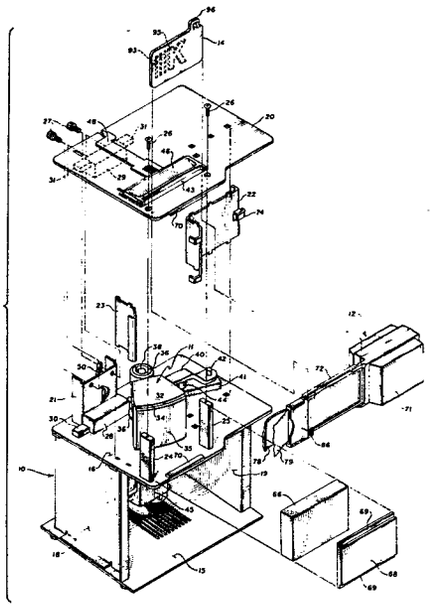
(71) Applicant: **KROY INDUSTRIES INC., 1728 Gervais Avenue, St. Paul Minnesota 55109 (US)**

(72) Inventor: **Paque, Michael W., 954 Northland Court, Stillwater Minnesota 55082 (US)**

(74) Representative: **Strehl, Peter K.L. Schiff, Dr. A.v. Füner et al, Dipl. Ing. P. Strehl Dr. U. Schübel-Hopf Dipl. Ing. D.Ebbinghaus Dr. Ing. D. Finck Patentanwälte Mariahilfplatz 2&3, D-8000 München 90 (DE)**

(54) **Printing apparatus and tape-ribbon cartridge therefor.**

(57) A printing apparatus of the type having a printing station, a printing force exerting (11) and resisting means (66), an image carrier (78) and a font element (14) with a raised character (95) and a tape-ribbon cartridge (12) therefor. The improvement of the present invention relates to an improved device for exerting a printing force and an improved tape-ribbon cartridge (12) for supplying tape (78) and ribbon (79) to the printing station and for guiding and supporting the font element (14) into printing alignment.



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PRINTING APPARATUS AND TAPE-RIBBON CARTRIDGE THEREFOR

Background of the Invention

The present invention relates generally to an improved printing apparatus or composing system and tape-ribbon cartridge therefor, and more particularly, to a printing apparatus of the type having a printing station, a printing force exerting and resisting means, an image carrier and a font element with a raised character positionable in printing alignment with the printing station. The improvement of the present invention relates specifically to an improved means for exerting a printing force against the raised character on the font element and an improved means in the form of a tape-ribbon cartridge for supplying tape and ribbon to the printing station.

The printing apparatus of the present invention has particular application in theprinting of relatively large characters for use in engineering drawing title blocks, flip charts, overhead transparencies, posters, silk screen stencils, signs, newspaper headlines and the like. These characters are generally much larger than most typewriters or other conventional means can generate. In the prior art four major methods have been used to create such letters; stencils, press-on letters, phototype setters and dry lettering printing processes. The application of stencils and press-on letters to form words, sentences is relatively time consuming. In addition, it is easy to misalign letters and get uneven spacing. Photo typesetting systems are rather large, expensive, permanent installations having several chemical baths that must be maintained.

Further, a trained operator is necessary to get good results. Although the dry lettering processes presently used overcome many of the disadvantages and limitations of stencils, press-on letters and photo typesetters, a relatively large printing force is necessary to transfer an image of the desired character from the high-carbon content toners to the image carrier. Generally, the quality of the printing or the image transfer is dependent upon the magnitude of the printing force developed.

In the prior art dry lettering systems, a variety of printing force exerting means have been utilized. One such means involves the use of a printing piston having a flat upper surface disposed in printing relationship with the printing surface. Such printing piston is lifted by a cam element, thereby creating a printing force to transfer an image to the image carrier. Another means for creating printing pressure is shown in U.S. Patent No. 4,108,556 which utilizes a wedge-shaped element for creating the necessary printing force as it rolls across the printing station.

Summary of the Invention

In general, the present invention relates to an improved means for supporting and guiding a rolling force exerting piston of the type generally illustrated in U.S. Patent No. 4,108,556 and an improved tape-ribbon cartridge for providing tape and ribbon to the printing station in such a printing apparatus and for supporting the printing font element.

The improved support and guide means includes a rack and gear assembly, one element of which is connected with the apparatus frame and the other element of which is connected with the rolling piston to align it properly as it rolls across the printing station. The position of and relationship between the rack and gear sections causes the printing piston to move across the printing station in true rolling contact motion.

The improved tape-ribbon cartridge includes a cartridge housing containing a supply of printing tape and ribbon and a generally elongated tape-ribbon guide portion to assist in properly positioning and guiding the tape and ribbon relative to the printing station. The cartridge also provides a support and alignment means for the insertable font element and a printing window through which the printing force is applied against the force resisting means.

Accordingly, it is an object of the present invention to provide an improved printing apparatus of the type generally shown in U.S. Patent No. 4,108,556 having improved means for supporting and guiding the printing piston during its rolling movement across the printing surface.

Another object of the present invention is to provide an improved tape-ribbon cartridge for a printing apparatus.

A further object of the present invention is to provide a printing cartridge having means for properly aligning and supporting a printing chip or font element.

Another object of the present invention is to provide an improved combination printing apparatus and tape-ribbon cartridge for use in connection therewith.

These and other objects of the present invention will become apparent with reference to the drawings, the description of the preferred embodiment and the appended claims.

Description of the Drawings

Fig. 1 is an exploded, pictorial view of the printing apparatus and improved tape-ribbon cartridge of the present invention.

Fig. 2 is a plan view, partially in section, showing the side of the rolling piston element and the means for actuating the printing cycle.

Fig. 3 is a plan view showing the printing force exerting piston at one of its end positions and showing the improved means for guiding and supporting the piston during the printing cycle.

Fig. 4 is a plan view of the printing force exerting piston, similar to Fig. 3, showing the piston in various positions during the printing cycle.

Fig. 5 is an exploded, pictorial view of the improved tape-ribbon cartridge of the present invention.

Fig. 6 is a plan view of the tape-ribbon cartridge of the present invention.

Fig. 7 is a sectional view of the tape-ribbon cartridge as viewed along the section lines 7-7 of Fig. 6.

Fig. 8 is a top view, partially in section, showing successive positions of the printing piston during the printing cycle.

Fig. 9 is a side view, partially in section, showing the printing piston and its relationship to the tape-ribbon cartridge during the printing cycle.

Fig. 10 is a cross sectional view showing the means for maintaining activation of the printing cycle.

Description of the Preferred Embodiment

Reference is first made to Fig. 1 which is an exploded, pictorial view of the printing apparatus and tape-ribbon cartridge of the present invention. As shown, the apparatus of the present invention includes a lower housing 10, a printing piston 11 for exerting a printing force toward a printing station, and a tape-ribbon cartridge 12 for supplying tape and ribbon to the printing station and for properly aligning and supporting a font element 14.

The lower housing 10 includes bottom and top members 15 and 16 and a pair of side members 18 and 19. The side members 18 and 19 are secured at their upper edges to the lower surface of the top member 15 and at their lower edges to the upper surface of the bottom member 15. The members 15, 16, 18 and 19 may be secured together either by screws, bolts, welds or any other appropriate means.

Positioned above the lower housing 10 is an upper housing defined by the frame member 16 and a vertically

spaced frame member 20. These members 16 and 20 are joined together in spaced relationship to form an upper housing for the printing piston assembly 11 and the tape-ribbon cartridge 12. The frame members 16 and 20 are generally flat plates which are secured to each other in spaced relationship by the support brackets 21, 22 and 23 and by the pair of support posts 24 and 25. In the preferred embodiment, the bracket 21 is fastened to a rearward surface of the support rails 28 and 29 by the screws 27 and the brackets 22 and 23 are held in place between the plates 16 and 20 by tabs protruding into slots in the plates 16 and 20. The support posts 24 and 25 are secured by the screws 26. Each of the inner surfaces of the frame mebers 16 and 20 includes a printing piston rail 28 and 29, respectively, for guiding and supporting the printing piston 11 during a printing cycle. The rails 28 and 29 are securely fastened to their respective members 16 and 20 by welding or other appropriate means. Disposed at each longitudinal end of the rail members 28 and 29 is an end rail section 30 and 31, respectively. As will be discussed in greater detail below, these end rail sections 30 and 31 support the printing piston 11 at each end of the printing cycle. These end rail sections 28 and 29 are also ridigly secured to the frame members 16 and 20 by welding or other appropriate means.

As shown best in Figs. 1 to 4, the printing piston assembly 11 includes a generally wedge-shaped roller segment 32 having a curved surface, a urethane pad 35 secured to the curved surface, a shoulder portion 34 conforming to the curvature of the curved surface and a pair of roller or bearing members 36 rotatably supported on an axle 38. The roller shaft 38 is journalled within portions 39 (Fig. 2) of the roller segment 32 to rotatably support the rollers 36 for rolling movement along the rails 28 and 29. As best illustrated in Figs. 3 and 4, rolling motion is imparted to the printing piston, and in particular the

curved surface of the urethane pad 35, by an elongated connecting link 40 and a crank member 41. One end of the connecting link 40 is rotatably connected with the bearing shaft 38 while the other end of the link 40 is rotatably connected at the pivot 42 to the crank member 41. The other end of the crank 41 is secured to a shaft 44 associated with an electric motor 45 (Fig. 1) for movement therewith. As shown in Fig. 2, the connecting link 40 is positioned between the portions 39. To impart true rolling movement to the piston 11, the radius of curvature of the curved urethane pad surface 35 has its center at the axial center of the shaft or axle 38.

With reference to Figs. 1 and 2, the means for actuating the electric motor 45 includes the elongated switch bar 46 and the force transfer links 48 and 50. The members 46 and 48 are associated with each other such that movement of the switch bar 46 toward the front of the printing apparatus moves the link 48 in a forward direction. As illustrated best in Fig. 2, the elongated link member 48 includes a downwardly extending portion 49 which engages a motion transfer link 50. The link 50 is pivotally secured at its midpoint to a flange portion 51. Forward movement of the print bar 46, and thus link 48, causes clockwise movement of the link member 50, thus releasing the switch member 53 of the microswitch 52. This results in activation of the motor 45 and commencement of the printing cycle. The printing cycle is maintained as the piston element 32, and particularly the shoulder portion 34, moves forward into contact with a downwardly extending tab portion 98 (Fig. 10) located at the forward end of the link 48. Once the piston has started to move forward, engagement between the shoulder 34 and tab 98 prevents the link 48 and other switching linkages from moving back into their off position during the printing cycle. When the piston 32 has traversed to the opposite end of the rails 28 and 28, the piston drops down onto the rails 30 and 31, thus allowing the tab 98 to move rearwardly. This latter move-

ment results in corresponding rearward movement of the link 48 and print bar 46 and thus counterclockwise movement of the link 50 as a result of the spring 55. The counterclockwise movement of the link 50 depresses the switch member 53, thus deactivating the printing cycle. The spring 55 extends between the lower end of the link 50 and the bracket 54.

Upon forward movement of the print bar 46 and activation of the printing cycle, the electric motor 45 (Fig. 1) provides rotational movement ot the shaft 44. This rotational movement, through the link members 40 and 41, causes generally transverse rolling movement of the rollers 36 along the rails 28 and 29. As illustrated in Figs. 3 and 4, the translational movement of the rollers 36 is guided by first and second gear sections comprising the gear section 56 and the associated gear rack 58. The gear section 56 is securely fastened to the generally wedge-shaped piston 32 by a pair of bolts 61 and includes a plurality of gear teeth 59. The gear rack 58 is securely fastened to the lower frame member 16 by the screws 62 and includes a plurality of gear teeth 60 adapted to mesh with the gear teeth 59 of the gear section 56. During a printing cycle the teeth 59 of the gear segment 56 maintain a constant engagement with the teeth 60 of the gear rack 58 to properly align the printing piston 11 (Fig. 1) in printing registration with the printing station. It should be noted that the pitch line of the gear segment coincides with the curved surface of the polyurethane pad 35. Therefore, as the printing piston 11 moves back and forth, the surface of the polyurethane pad 35 is moved along in true rolling contact motion with respect to the printing station. In the preferred embodiment, the gear teeth 59 are positioned arcuately along an outer edge of the gear segment 56 and the gear teeth 60 are disposed along a straight line. It is contemplated however, that the gear and rack sections could be reversed (i.e.) the rack 58 could be mounted to the section 32 and the gear segment 56 mounted

to the lower frame member 16. In fact, the corresponding gear teeth of the gear segment and rack could be disposed along various paths as long as the meshing of such teeth results in true rolling movement of the wedge-shaped section 32 and in particular the curved surface of the pad 35 with respect to the printing station.

Figs. 3 and 4 show the printing piston assembly in various positions during a printing cycle. Fig. 3 shows the printing piston assembly 11 in one of its end positions. In its end postion, the rollers 36 are supported by the pair of end rail sections 30 and 31 disposed at each end of the supporting rails 28 and 29. A spring member 64 extending between one of the bolts 61 and a bracket 54 causes the rollers 36 to be moved onto the end rails 30 and 31 at the end of each printing cycle, thereby causing generally rearward movement of the wedge-shaped element 32 and the gear segment 56. Upon commencement of a printing cycle, the rollers 36 move back upon the support rails 28 and 29 nd the gear teeth 59 and 60 become engaged to cause the piston member to move in rolling movement with respect to the printing station such that a normal or perpendicular printing force is exerted against successive portions of the printing surface.

In the preferred embodiment, the wedge-shaped section 32 of the printing piston assembly is disposed between and guided by the upper and lower frame members 20 and 16, respectively, while the gear segment 56 and the gear rack 58 are mounted below the lower frame member 16. To permit connection bewtween the gear segment 56 and the section 32, an opening 65 is provided in the frame member 16. The gear segment 56 is mounted in spaced relationship with respect to the section 32 to permit a portion of the frame 16 to extend between the two elements 56 and 2. The spacing is accomplished by the bushings or spacing members 63 associated with the screws 61. It should be noted that the spacing members 63 may be separate bushings as shown

in the drawings or bosses integrally joined with the piston element 32.

As shown in Figs. 1 and 2, a transparent glass window 66 is disposed between the frame members 16 and 20 and between the support posts 24 and 25. Positioned immediately forward of the glass block 66 is a transparent plastic safety window 68 having a pair of shoulder portions 69 on each edge. When assembled, these shoulder portions 69 are engaged by the retaining rail members 70 which are rigidly secured to the opposing inner surfaces of the frame members 16 and 20. As illustrated best in Fig. 2, the rearward surface of the glass block 66 defines the surface against which the printing force generated by the printing piston 11 is exerted. This exertion of printing pressure is then resisted by the plastic window 68 and ultimately by the pair of retaining brackets 70. In the preferred embodiment, the glass block 66 is approximately 3/4 of an inch thick while the plastic member 68 is approximately 1/8 of an inch thick. It has been found that these thicknesses are sufficient to withstand the printing pressures created in the present apparatus which can be in excess of 2000 p.s.i. The combination of the glass window 66, the plastic window 68 and the retaining members 70 function together as the means for resisting the printing force.

With reference to Fig. 1, the tape-ribbon cartridge 12 is adapted for positioning between the frame members 16 and 20 to provide image carrying tape and printing ribbon to the printing station defined in part by the rearward face of the glass block 66. The tape-ribbon cartridge 12 includes a cartridge body or housing 71 and an elongated tape guide portion or snout member 72 extending outwardly from the housing 71. The cartridge 12 is retained within the printing apparatus by the cartridge retaining bracket 22. When properly inserted, the tape guide portion 72 is positioned immediately behind the glass block 66 and the housing portion 71 is retained by the bracket 22 and the spring clip member 74.

As illustrated best in Figs. 5 and 7, the cartridge housing 71 is formed from a pair of housing sections 71a and 71b which are joined together by a plurality of connecting posts 75 and corresponding holes 76. Disposed within the housing 71 is a supply of image carrying adhesive backed tape 78 and a supply of colored toner ribbon 79. The ribbon 79 can consist of a high-carbon content ribbon, although non-carbon toners can also be utilized. The supply of tape 78 and ribbon 79 is in roll form, with each of the rolls being rotatably supported within the housing 71 by appropriate support members 80 and 81, respectively. Also disposed within the housing 71 is a tape-ribbon divider 82 which assists in guiding the tape 78 and ribbon 79 out of the housing 71 and also in maintaining separation between the tape 78 and ribbon 79 to prevent relative movement between the tape and ribbon during the feeding process. This, accordingly avoids the undesirable depositing of carbon from the ribbon 79 onto the tape 78 which is often caused by relative movement between the two surfaces. The divider 82 is disposed within the housing 71 and includes a section 84 which extends outwardly from the housing 71 to continue guiding and separating the tape 78 and ribbon 79 for a portion of its travel along the snout 72. In the preferred embodiment the divider 82 is a paper divider which has a smooth surface in contact with the ribbon 79 to prevent scratching the ribbon during the feeding process.

The snout or tape guide portion 72 is integrally joined with the housing portion 71b and extends outwardly therefrom to support and guide the tape 78 and ribbon 79 during their movement into alingment with the printing station. As illustrated best in Fig. 5, the elongated snout 72 includes an opening 85 and an outer end section 86. A pair of sections 77 define the side edges of the opening 85 and assist in guiding the tape 78 and ribbon 79 through the snout 72. Associates with the end 86 is a corresponding tape-ribbon retaining clip member 88. The

clip member 88 includes a pair of end latch members 87 for appropriate connection with corresponding latch seats 91 in the end 86 and a pair of tape engaging ribs 89. A foam pad 90 is positioned between the members 86 and 88 to hold the tape and ribbon materials in contact with each other as they are dispensed from the tape-ribbon cartridge. As illustrated in Fig. 7, the tape and ribbon are fed between the members 86 and 88 with the foam pad 90 being disposed between the ribbon 79 and inner surface of the end section 86. The pair of ribs 89 formed on the inside surface of the member 88 are used to facilitate the use of narrower printing materials by providing an additional guiding means so as to maintain an accurate center line position of the materials as they pass through the cartridge. It should be noted that the foam pad 90 has sufficient composition to retain the tape and ribbon in contact with each other so as to avoid inadvertent or undesirable relative movement with respect to each other, but also sufficient resiliency and flexibility to avoid pressure which would result in the depositing of carbon material 79 from the ribbon onto the tape material 78. The end portion 86 also includes a recessed portion 83 to permit manual grasping of the tape and ribbon for advancing the same.

The tape guide portion or elongated snout member 72 also includes means for guiding the font element 14 into printing alignment and for supporting the element 14 during a printing cycle. This means includes a pair of tab or support members 92 and a pair of side guide portions 94 to properly support and guide the printing font or chip 14 into printing alignment. As illustrated in Figs. 6 and 7, when the font element 14 is properly positioned, the bottom surface rests on the supprt tabs 92 while the side edges are guided and aligned horizontally by the side edge portions 94.

The font chip 14 is a generally rectangular shaped element having a raised character 95, a tab portion 96, and a plurality of alignment indicia 93. When properly inserted into the snout 72, the raised portion of the character 95

faces the opening 85 and the tab portion 96 extends above the tape-ribbon cartridge. The snout or tape guide portion 72 includes a recessed portion 97 immediately above the window 85 to permit the element 14 with raised characters 95 thereon to be inserted into the cartridge when the cartridge is properly postioned within the apparatus.

Figs. 8 and 9 show views of the printing piston member exerting a printing force against the font element 14 during a printing cycle. When properly inserted, the snout member 72 is disposed immediately behind the glass block 66 and a portion of the snout 72 forms a cavity to receive the font element 14. Such cavity is defined in part by the rearward surface of the glass font 66, forward portions of the snout 72, the side guide edges 94 and the tab portions 92. Disposed immediately to the rear of the font element 14 are the tape and ribbon members which extend across the opening 85 in the snout 72. As shown the tape 78 includes an adhesive bakced, image carrying film layer 78a and a supporting paper layer 78b. During the printing cycle, the urethane pad 35 secured to the curved surface of the piston member 32 presses against the raised portions 95 of the font element 14 with the tape 78 and ribbon members 79 disposed therebetween. This causes the transfer of an image of the raised character from the carbon ribbon 79 to the image carrying tape 78. As shown best in Fig. 9, the piston member 32 is guided in its rolling movement in part by the inner surfaces of the frame member 16 and 20. Accordingly, the general thickness of the member 32 is slightly smaller than the distance between the frame members 16 and 20 to allow freedom of movement therebetween. Additionally, the outer curved portion of the member 32 has a reduced width to permit the outer curved portion and the urethane pad 35 to extend through the opening 85 to exert the necessary printing pressure against the font element 14.

The operation of the present printing apparatus can be described as follows. First, the machine operator inserts the tape-ribbon supply cartridge 12 into the machine until

the retaining latch 74 snaps into position to hold the cartridge in place. In this position, the tape guide portion or snout 72 is disposed immediately to the rear of the glass block 66. A type chip or font element 14 bearing the desired character is then selected from a container (not shown) and inserted down through the opening 43 (Fig. 1) in the top of the machine. As shown best in Figs. 2, 8 and 9, the chip 14 is inserted into a cavity defined by the rearward face of the glass block 66 and portions of the snout 72. The chip is properly aligned and supported by the side edges 94 and the support tabs 92.

The printing cycle is then initiated by pulling the print bar 46 on top of the machine forward. This movement releases the switch member 53 (Fig. 2) and activates the electric motor 45. The connecting link 40 and crank 41 transmit the force of the motor to the printing piston assembly 11 and causes the rollers 36 to move off the end support rails 30 and 31 and onto the rails 28 and 29. As the printing cycle continues, the rollers 36 roll along the supporting rails 28 and 29 traversing from one side to the other. During this movement, a narrowed portion of the wedge-shaped element 32 including the polyurethane pad 35 secured to the surface of such portion passes through the opening 85 in the snout portion 72 of the cartridge and contacts the rear surface of the tape material 78. This results in printing pressure being applied, thus causing an image of the raised character on the font element 14 to be transferred from the colored ribbon 79 to the tape 78. During transverse movement of the piston element 32 from one side to the other, constant engagement is maintained between the teeth 59 on the gear segment 56 and the teeth 60 on the rack 58. In the preferred embodiment, the pitch line of the gear segment 56 coincides with the surface radius of the polyurethane pad, insuring true rolling contact motion between the surface of the urethane pad 35 and the printing materials.

The front rails 70 secured to the top and bottom frame plates 20 and 16 resist motion of the glass block 66 and plastic window 68 and thus the font element 14. This resistance results in significant printing force as the rolling piston rolls across the support rails 28 and 29 from one side to the other. In the preferred embodiment, the distances which are involved between the roller segment 32 and the raised surface 95 of the font-type chip 14 when inserted in printing alignment are such that during the printing cycle the polyurethane pad 35 is compressed approximately .010 of an inch. This amount of compression generates the correct amount of pressure to transfer toner from the carbon ribbon 79 onto the surface of the tape material 78. In the apparatus of the present invention, this can be about 2,000 pounds per square inch.

As the roller segment nears theend of its travel, the bearings 36 of the roller segment 32 move off the end of the support rails 28 and 29 and onto the end rails 30 and 31. This movement is a result of the force exerted by the extension spring 64. When the rollers 36 have moved their proper end positon, the switching system is de-activated.

The type chip 14 hwich has been printed is then removed from the machine by the operator and the next character to be printed is inserted into the machine. The operator can view the new chip through the glass and plastic windows 66 and 68. The operator then grasps the tape and ribbon by hand, near the outer edge of the snout 72 and pulls the materials 78 and 79 from the cartridge until proper spacing is desired. When the spacing is completed, the print bar 46 is again pulled forward, thereby activating a further printing cycle. When a word or sentence is completed, the tape and ribbon is pulled out of the cartridge snout 72 far enough so that the materials may be cut off with a scissors.

Although the description of the preferred embodiment has been quite specific, it is contemplated that various

changes could be made to the structure without deviating from the spirit of the present invention. Accordingly, it is contemplated that the scope of the present invention be dictated by the appended claims rather than by the description of the preferred embodiment.

Claims:

1. A printing apparatus, characterized in that it comprises:

a printing station;

a force resisting means (66, 70) for resisting a printing force;

a force exerting means (11) positioned in printing alignment with said printing station for exerting a printing force toward said force resisting means (66, 70);

a font element (14) having a raised character (95) positionable in printing alignment with said printing station; and

a cartridge (12) having a supply of image carrying tape (78) and a tape guide portion (72) for guiding said image carrying tape (78) into printing alignment with said printing station, said guide portion (72) having an opening (85) therein to define said printing station.

2. The printing apparatus of claim 1, characterized in that said guide portion (72) includes means (94) for guiding said font element (14) into printing alignment and means (92) for supporting said font element (14) during a printing cycle.

3. The printing apparatus of claim 2, characterized in that said means for guiding said font element (14) into printing alignment includes a pair of guide edges (94)

and said means for supporting said font element (14) includes a support edge (92).

4. The printing apparatus of any of claims 1 to 3, characterized in that said cartridge (12) includes a housing (71) containing a supply of image carrying tape (78) and printing ribbon.

5. The printing apparatus of any of claims 1 to 4, characterized in that said tape guide portion (72) is disposed between said force resisting means (6, 70) and force exerting means (11).

6. The printing apparatus of claim 5, characterized in that the printing force is exerted by said force exerting means (11) through said opening in said opening (85) in said tape guide portion (72).

7. The printing apparatus of any of claims 1 to 6, characterized in that said force exerting means (11) includes a curved force exerting surface (35) and a support and guide means (28, 29, 56, 58) for supporting and guiding said force exerting surface (35) in rolling movement with respect to said printing station such that a normal printing force is exerted against successive portions of said raised character (95) during said rolling movement.

8. The printing apparatus of claim 7, characterized in that said support and guide means includes gear means (56, 58) for guiding the rolling movement of said curved force exerting surface (35).

9. A printing apparatus, characterized in that it comprises:

a printing station;

a force resisting means (66, 70) for resisting a printing force; a font element (14) having a raised character (95) positionable in printing alignment with said printing staation; and

a force exerting means (11) positioned in printing alignment with said printing station for exerting a printing force toward said force resisting means (66, 70) including a druved force exerting surface (35) and support and guide means (28, 29, 56, 58) for supporting and guiding said force exerting surface in rolling movement with respect to said printing station such that a normal printing force is exerted against successive portions of said raised character (95) during said rolling movement, said support and guide means including gear means (56, 58) for guiding the rolling movement of said curved force exerting surface (35).

10. The printing apparatus of claim 8 or 9, characterized in that said gear means includes a first gear section (56) connected with said force exerting surface (35) and a

second gear section (58) connected with a frame (16, 20) of the printing apparatus, each of said first and second gear sections (56, 58) having gear teeth (59, 60) for corresponding engagement with each other.

11. The printing apparatus of claim 10, characterized in that the pitch line of the gear teetch (59) of said first gear section (56) coincides with said curved force exerting surface (35).

12. The printing apparatus of any of claims 1 to 11, characterized in that said font element comprises a generally rectangular font chip (14) having a single raised character (95) thereon.

13. The printing apparatus of any of claims 1 to 12, characterized in that said force resisting means (66, 70) includes a transparent glass block (66).

14. The printing apparatus of any ov claims 1 to 13, characterized in that said force resisting means (66, 70) further includes a pair of force resisting rails (70) secured to the frame (16, 20) of the printing apparatus.

15. A tape-ribbon cartridge (12) for use in a printing apparatus having a printing station, a force resisting means (66, 70) for resisting a printing force, a font element (14) having a raised character (95) positionable

in printing alignment with said printing station and a force exerting means (11) for exerting a printing force toward said force resisting means (66, 70), characterized in that said cartridge comprises:

a housing (71) containing a supply of printing tape (78) and printing ribbon (79);

a tape-ribbon guide portion (72) connected with said housing (71) for guiding said printing tape (78) and printing ribbon (79) into printing aligment with said printing station;

an opening (85) in said tape-ribbon guide (72) to define the printing station; and

means (94) for guiding said font element (14) into printing alignment and means (92) for supporting said font element (14) during a printing cycle.

16. The tape-ribbon cartridge of claim 15, characterized in that said means for guiding said font element (14) into printing alignment includes a pair of guide edges (94) and said means for supporting siad font element (14) includes a support edge (92).

17. The tape-ribbon cartridge of claim 15 or 16, characterized in that it includes means (82) for maintaining separation between said printing tape (78) and printing ribbon (79) during their movement from said housing (71) to said guide portion (72).

18. The tape-ribbon cartridge of any of claims 15 to 17, characterized in that it includes means (90) for preventing relative movement between said printing tape (78) and printing ribbon (79) during their movement through said guide portion (72).

19. the tape-ribbon cartridge of claim 18, characterized in that said means for preventing relative movement between said printing tape (78) and printing ribbon (79) includes a foam pad (90) disposed near the outer end of said guide portion (72).

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Fig.1a

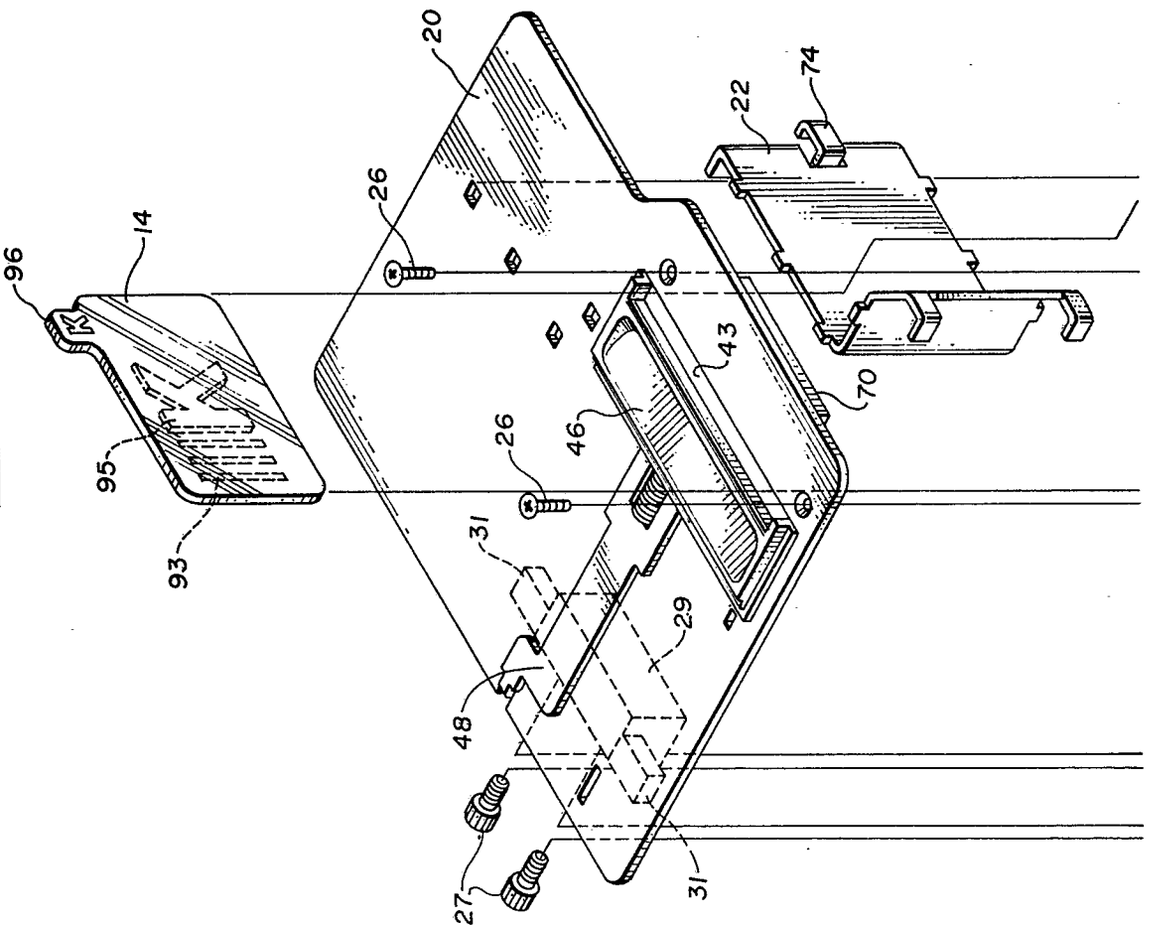
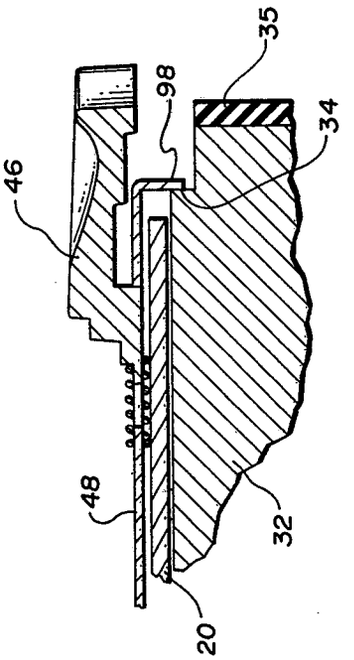


Fig.1b



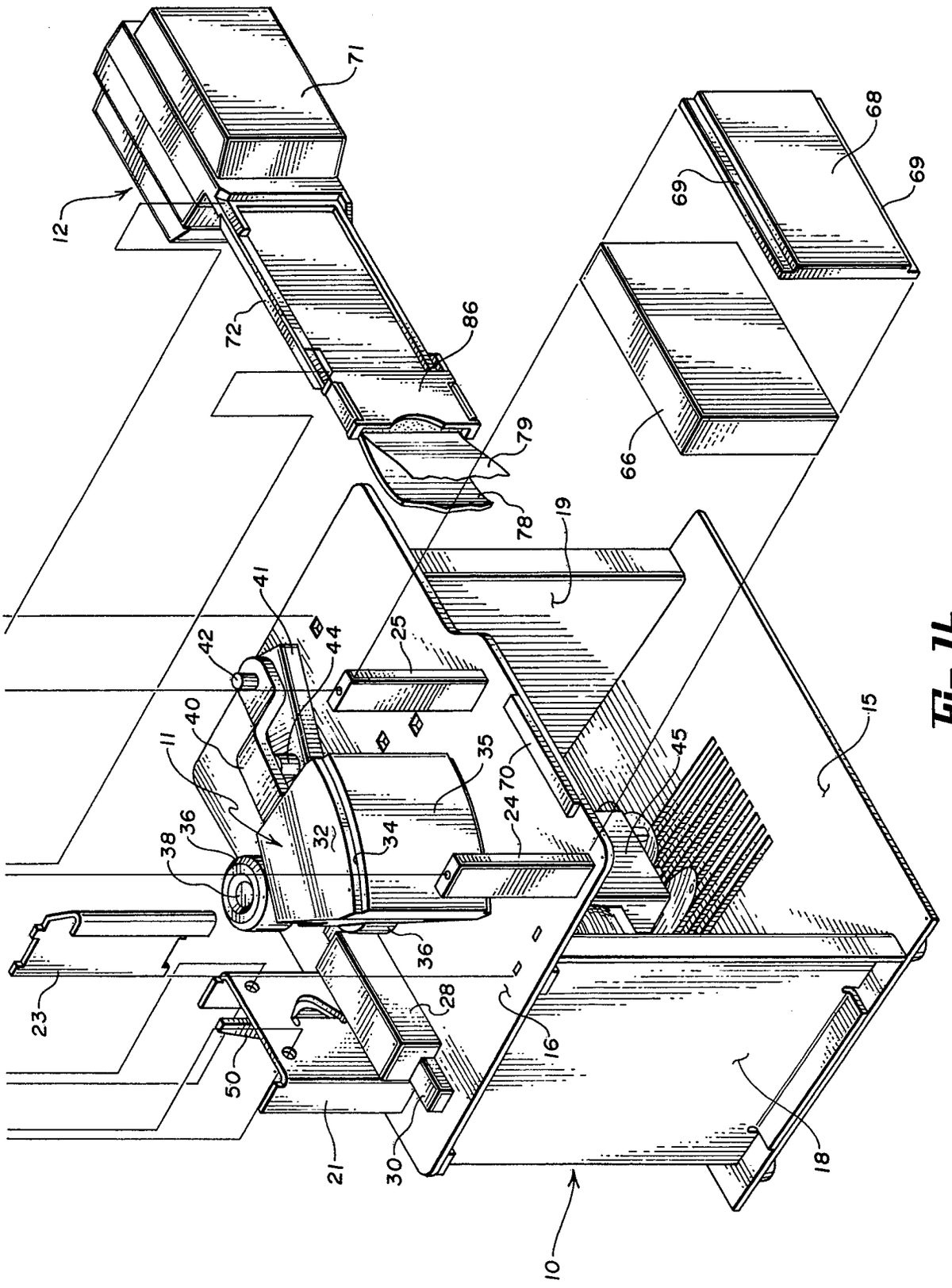

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Fig.1b

Fig.8

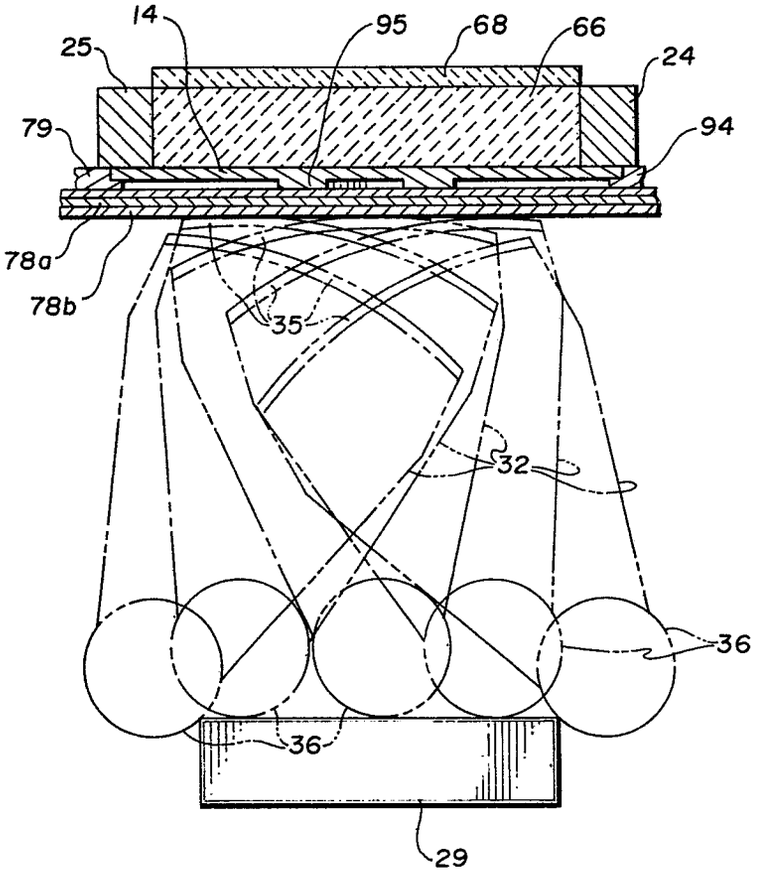
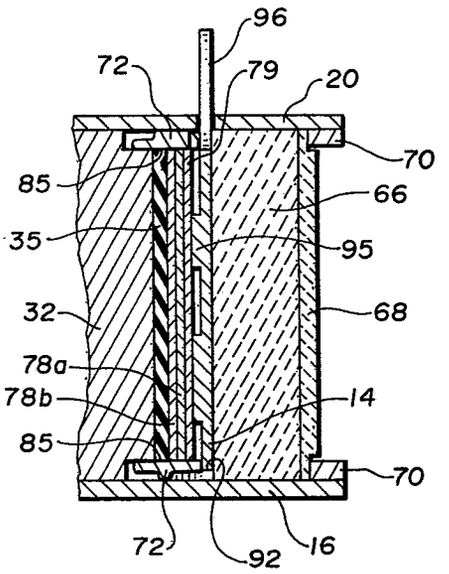


Fig.9



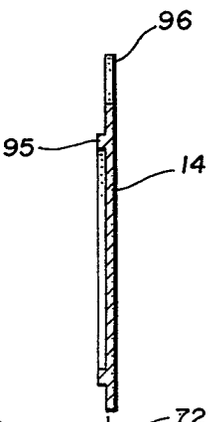


Fig.2

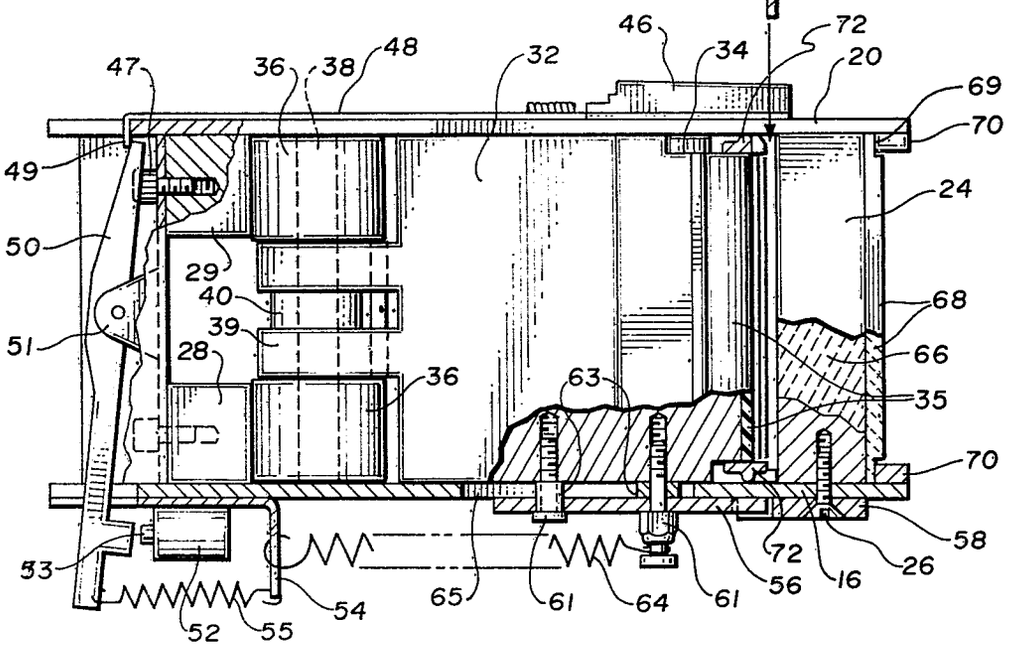


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Fig. 3

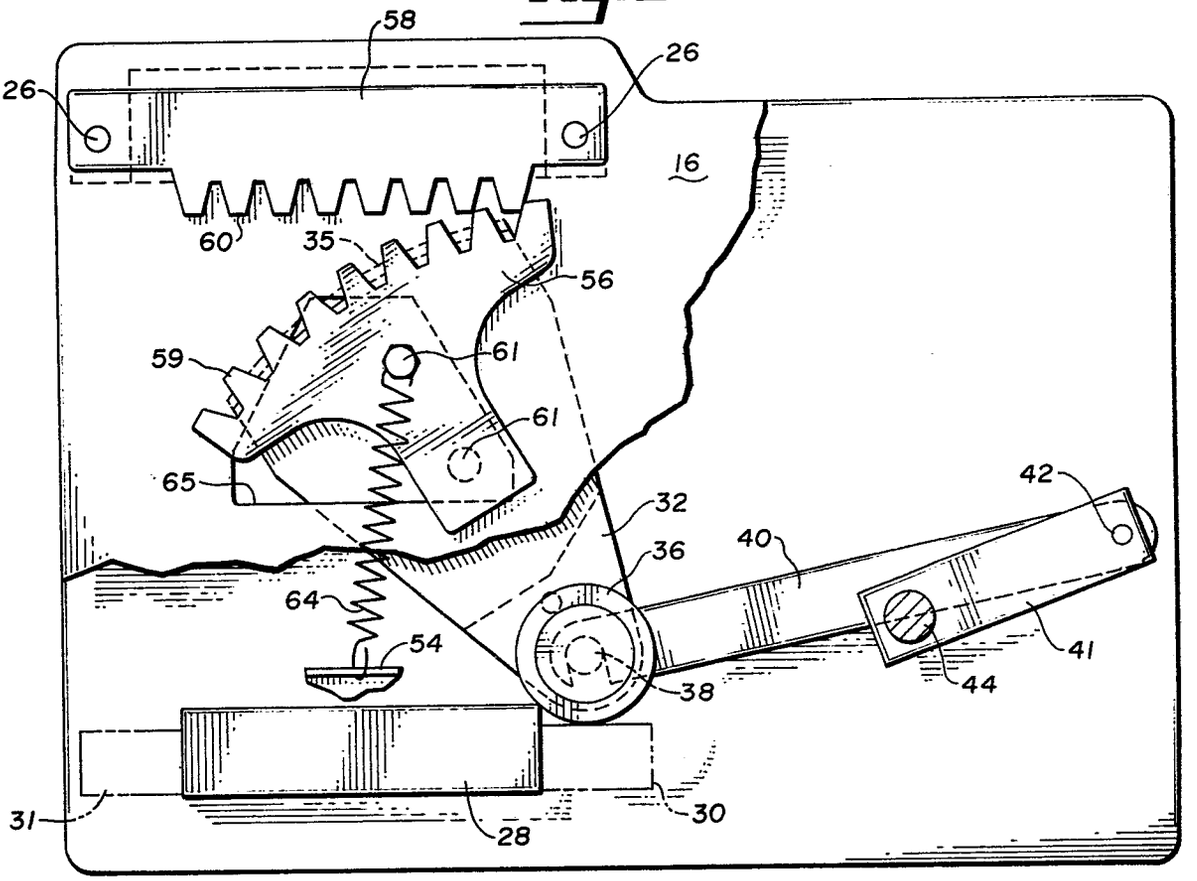
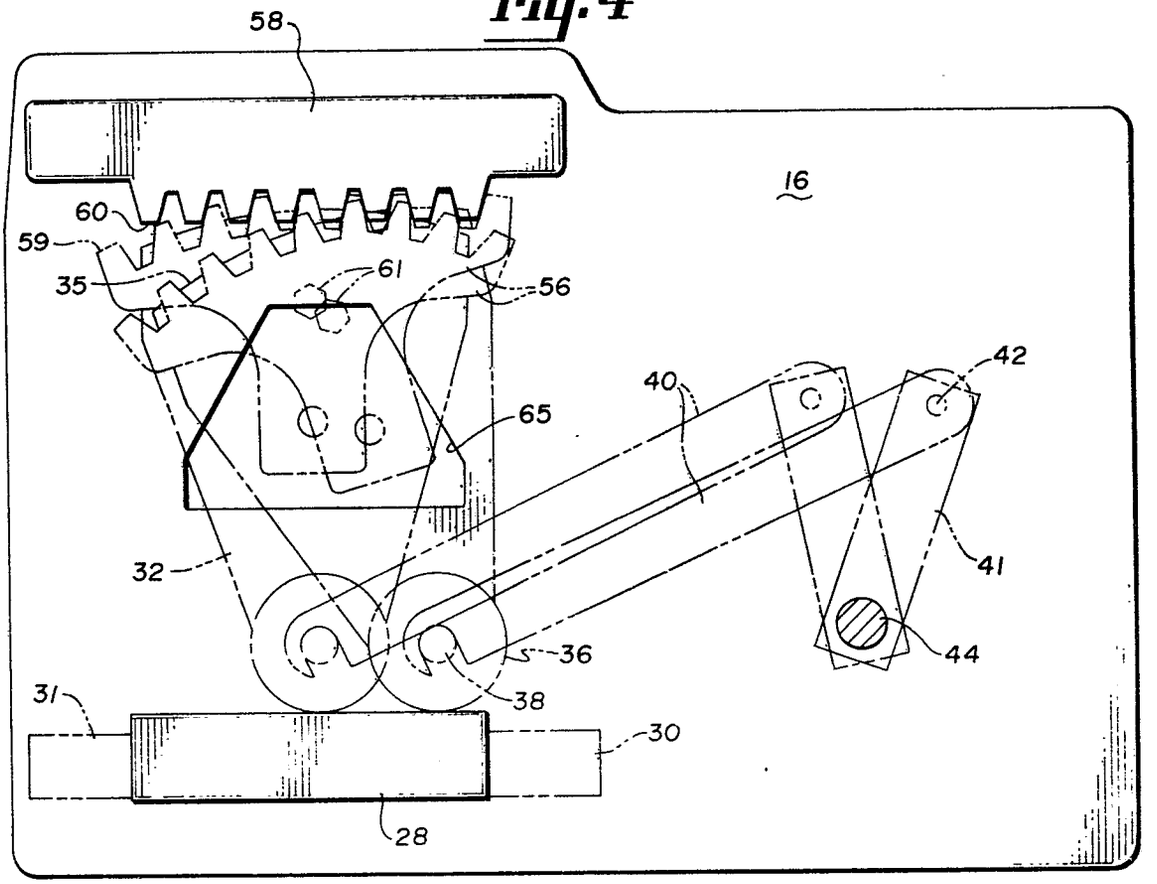


Fig. 4



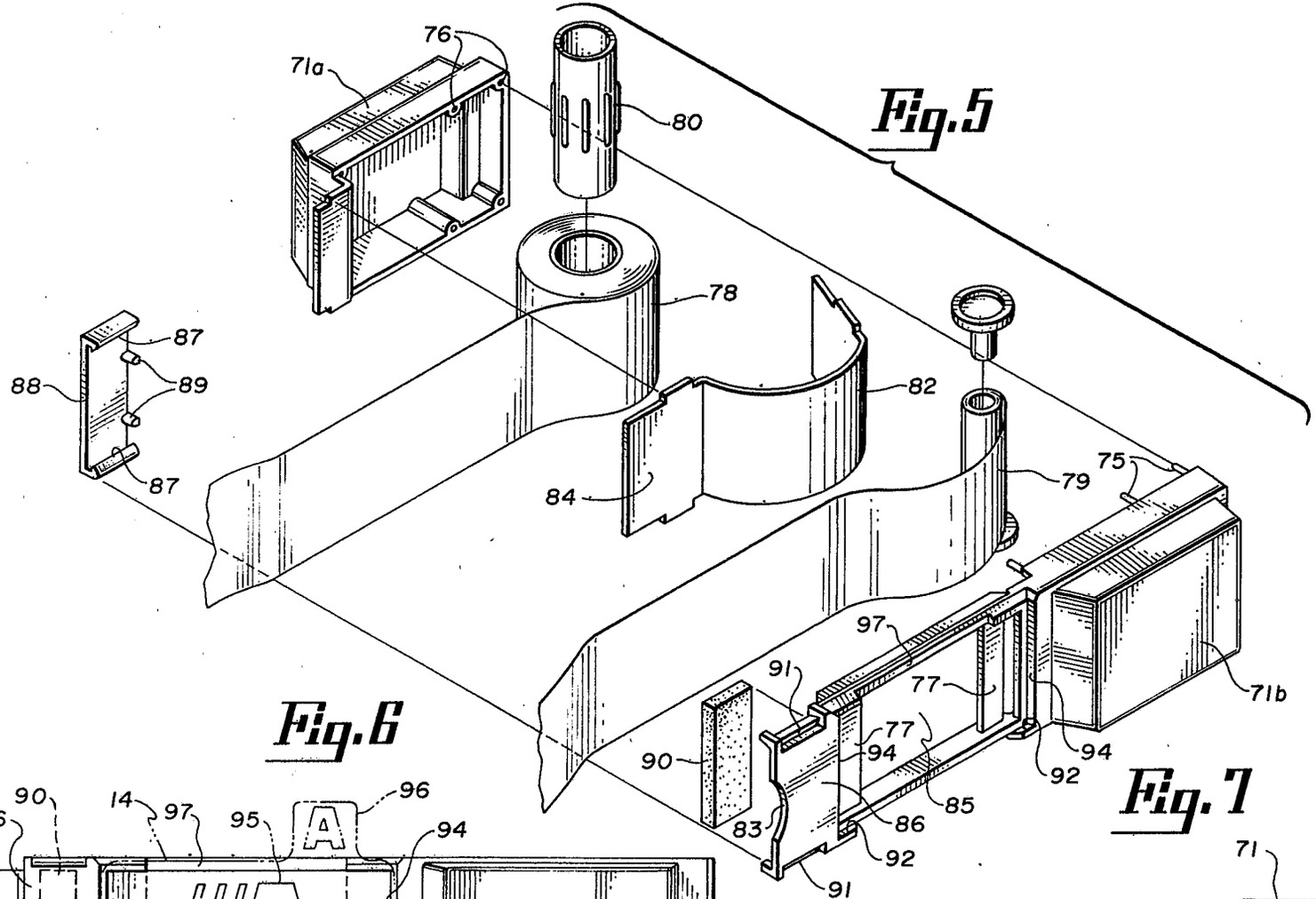


Fig. 5

Fig. 6

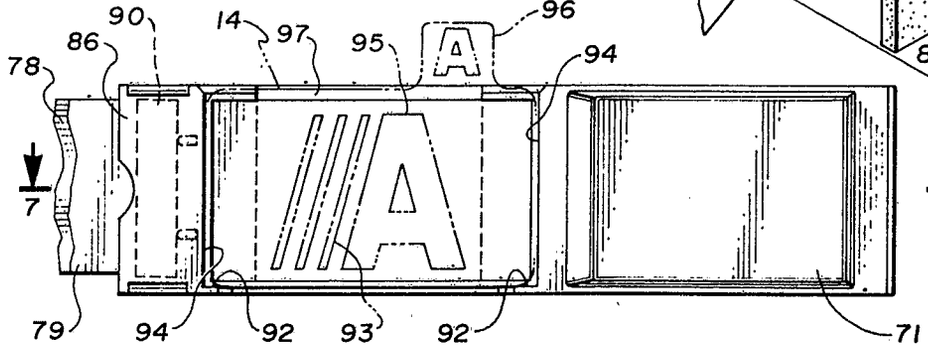
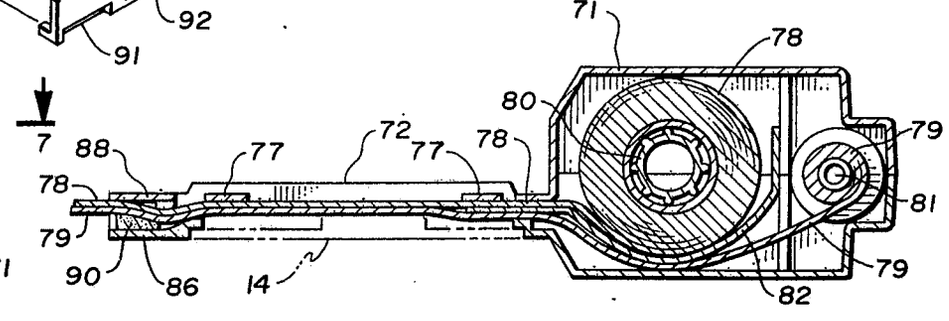


Fig. 7



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European Patent Office

EUROPEAN SEARCH REPORT

0054575
Application number
EP 80 10 8030

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	DE - C - 872 346 (ANTON HEINRICH) * The whole patent * --	1,7,8, 9,10	B 41 F 1/04 B 41 K 3/58
A	EP - A - 0 007 030 (ON APPLICANT'S NAME) * The whole patent * --	1,15	
A	CH - A - 572 398 (BACKLUND) * The whole patent * ----	1	TECHNICAL FIELDS SEARCHED (Int. Cl.³) B 41 F B 41 K B 41 J

CATEGORY OF CITED DOCUMENTS

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T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10-08-1981	LONCKE

EPO Form 1503.1 06.78