

[54] **DATA TERMINAL SYSTEM HAVING IMPROVED MEANS FOR PRODUCING AND DELIVERING FLEXIBLE RECORD SHEETS**

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 [22] Filed: **Apr. 5, 1971**
 [21] Appl. No.: **131,113**

[52] U.S. Cl. **355/13, 95/12, 271/71, 355/16, 346/110 R, 355/20**
 [51] Int. Cl. **G03g 15/00**
 [58] Field of Search..... **355/3, 11, 13, 20, 8, 16; 346/110 R; 95/12; 271/71**

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[57] **ABSTRACT**

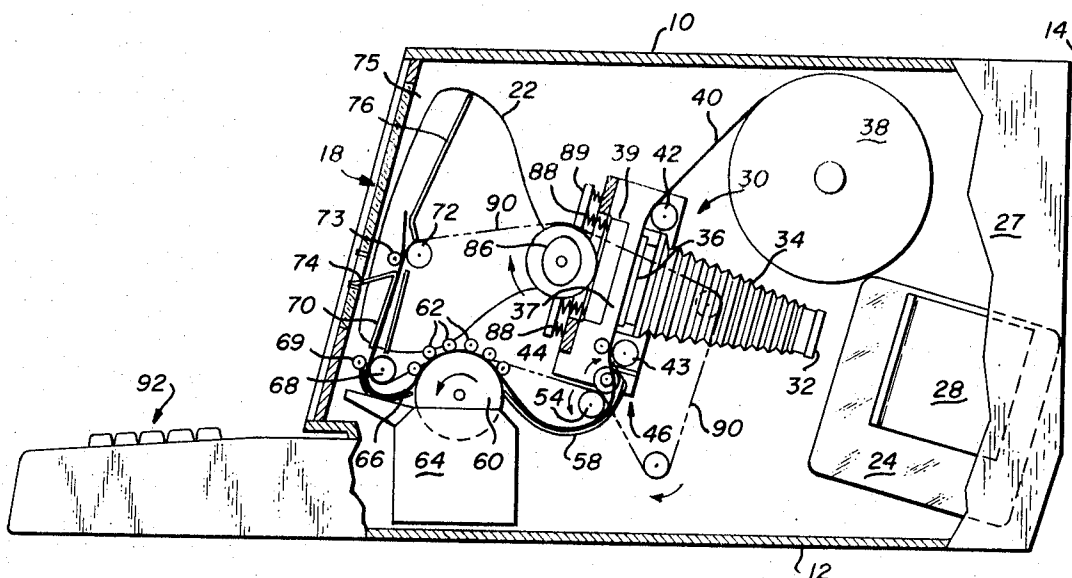
A data terminal system is disclosed comprising a housing having an aperture through which a flexible record sheet may exit, a first cathode ray tube mounted within the housing, and conductive means for transmitting an input signal to the first and second cathode ray tubes.

The system further comprises a photoconductive plate

having first and second sides, optic means for projecting an optical image displayed by the second cathode ray tube onto the first side of the photoconductive plate, a conductive base plate mounted in spaced juxtaposition with the second side of the photoconductive plate, the conductive base plate and the photoconductive plate defining an image transfer station therebetween, and means for applying a voltage across the second side of the photoconductive plate and the conductive base plate.

The system further comprises first feed means for intermittently feeding successive portions of an elongated strip of flexible dielectric-coated paper upon which a latent electrostatic image may be formed into the image transfer station, means for severing the successive portions of the elongated strip of flexible dielectric paper into individual flexible record sheets, toner means for developing the latent electrostatic images after the successive portions of the elongated strip of flexible dielectric-coated paper have been severed into individual record sheets, and second feed means for intermittently feeding the individual flexible record sheets from the image transfer station through the toner means and out through the housing aperture. Inverting means for inverting record sheets moving within the system's housing in a generally horizontal direction towards the exit aperture are also disclosed. The inverting means comprises a set of parallel rollers disposed in mutual engagement substantially parallel a generally upright housing front member which defines the exit aperture. At least one of the rollers is linked by a transmission drive means with a motor disposed within the system housing. The inverting means further comprises guide means for guiding the flexible record sheets moving in a generally horizontal direction upwardly into engagement with the set of rollers, and baffle means including a generally upright baffle disposed above the set of rollers in spaced juxtaposition with the upright housing front member.

19 Claims, 10 Drawing Figures



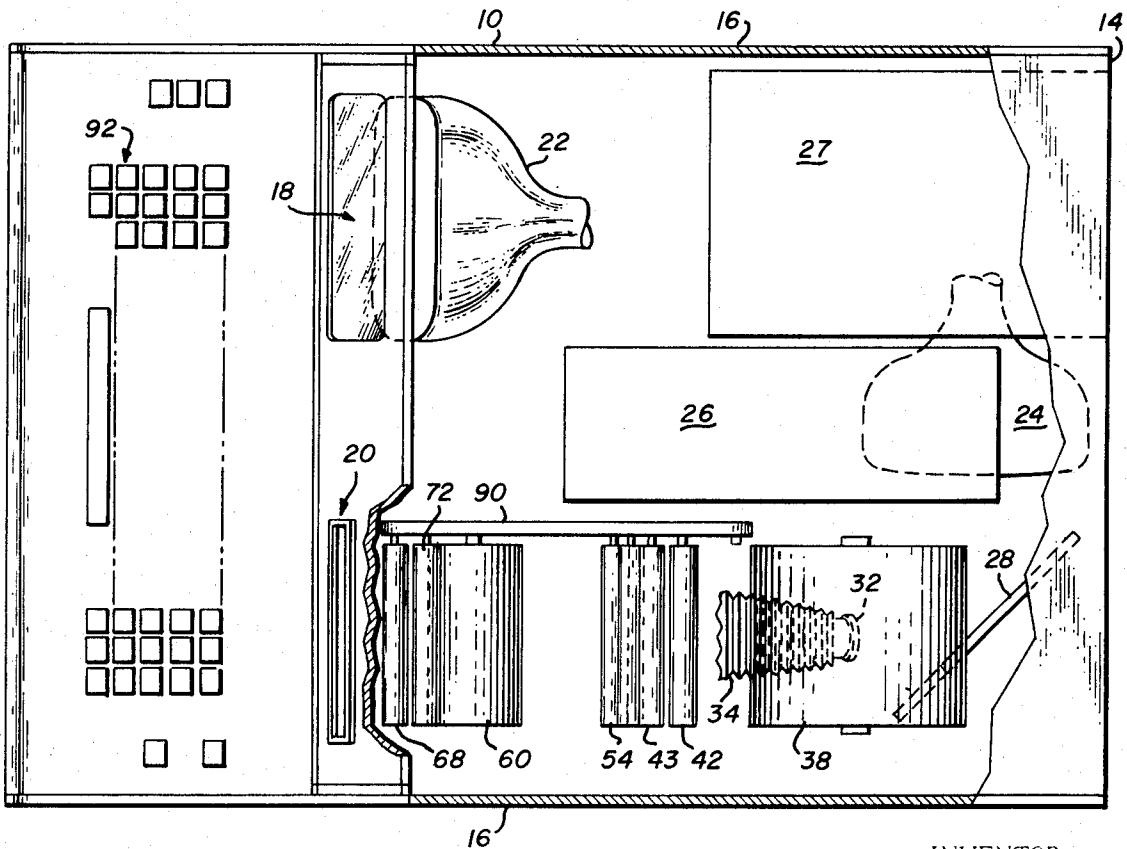
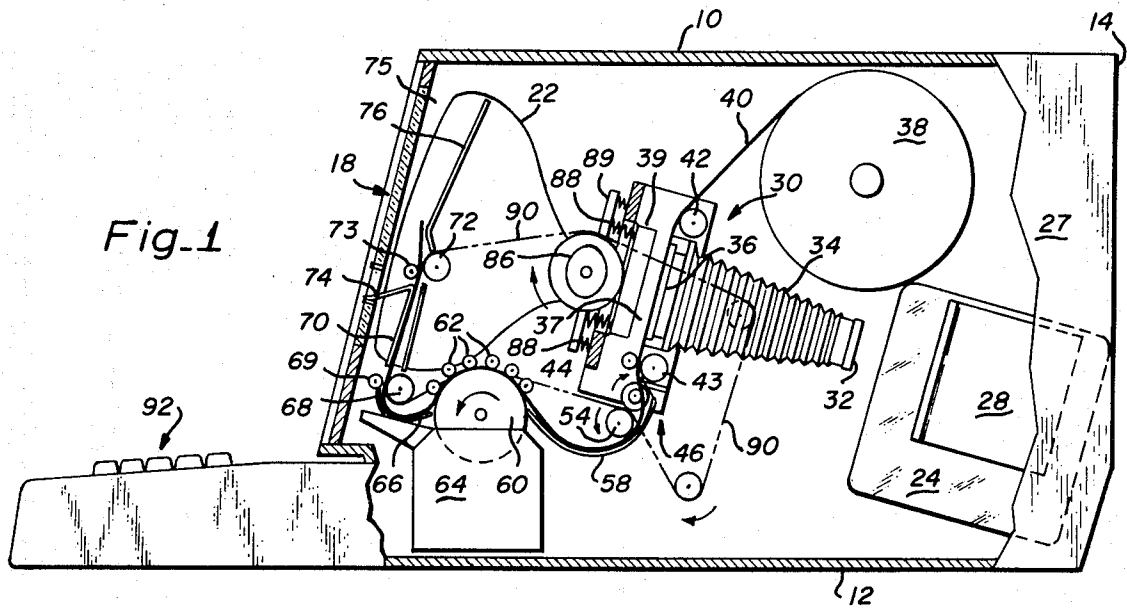


Fig. 2

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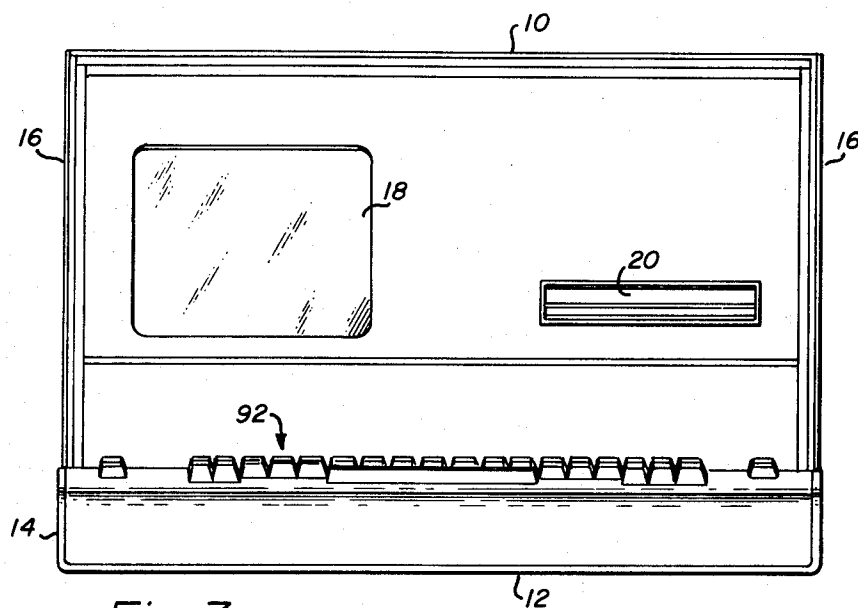


Fig-3

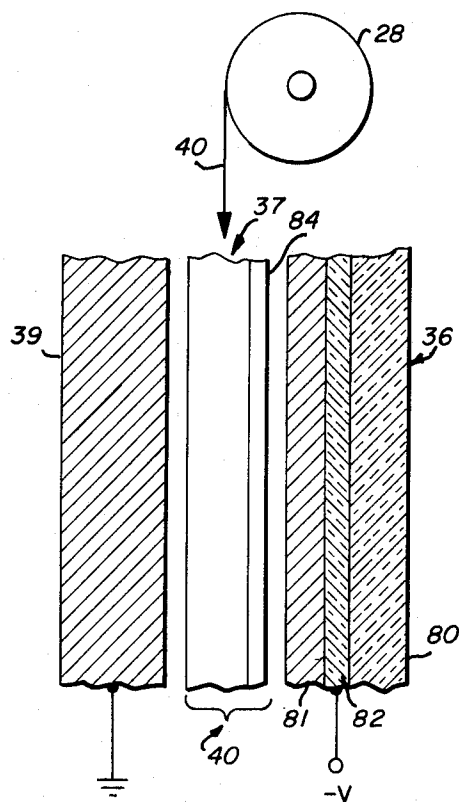


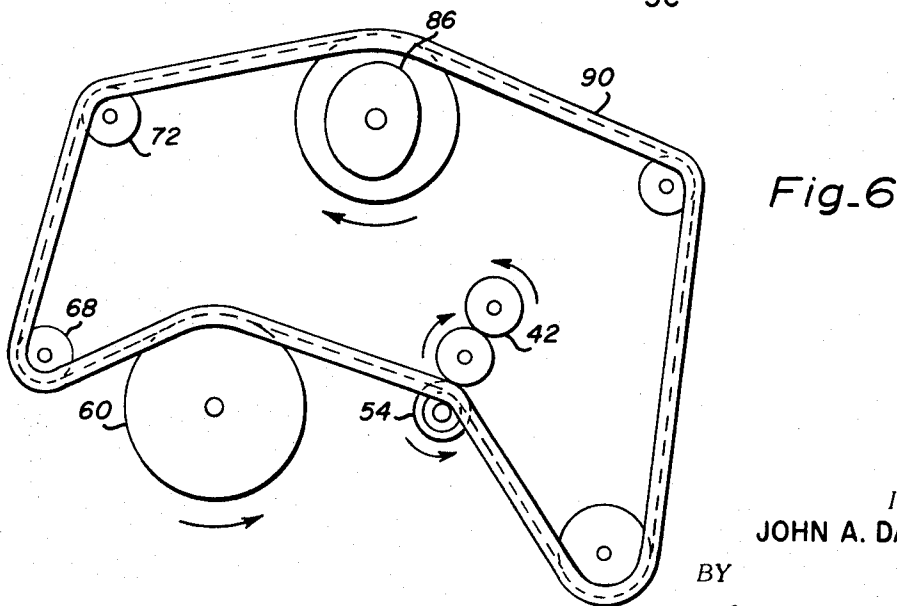
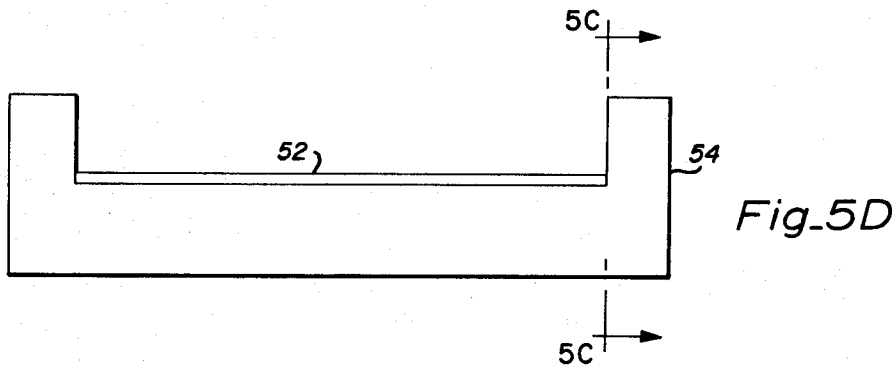
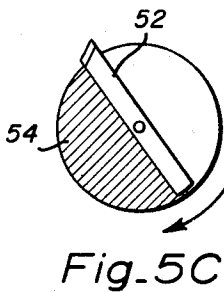
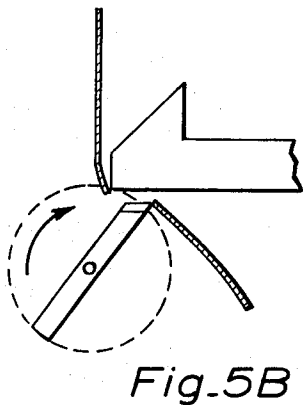
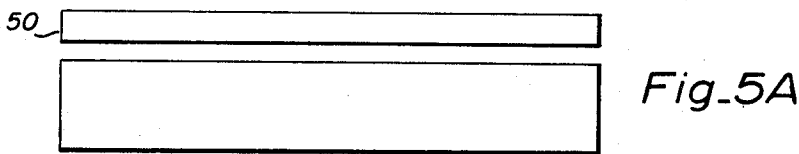
Fig-4

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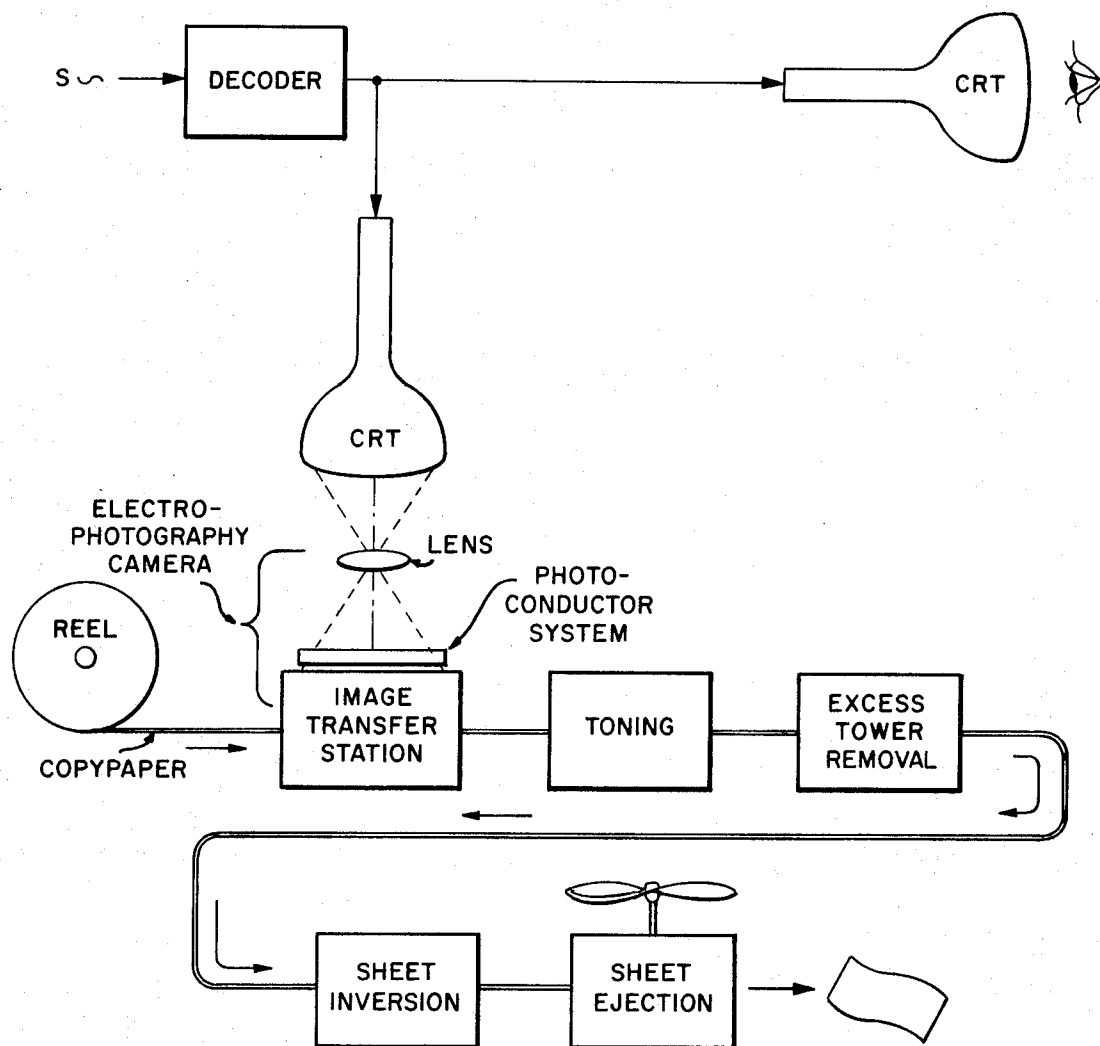


Fig-7

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DATA TERMINAL SYSTEM HAVING IMPROVED MEANS FOR PRODUCING AND DELIVERING FLEXIBLE RECORD SHEETS

BACKGROUND OF THE INVENTION

This invention relates generally to data terminal systems, and particularly to data terminal systems of the type having the capability of producing optical images on flexible record sheets.

Heretofore, some data terminal systems, such as television sets, have converted electrical input signals to transient images visible from the face of cathode ray tubes. Other types of data terminal systems, such as teleprinters and teletypewriters, have converted such input signals to fixed images visible from the face of imprintable flexible sheets of paper. It often occurs that one viewing such transient images from the face of cathode ray tubes has the need to make a permanent record of the viewed image. To date this has generally been accomplished by electrically coupling two independent systems of the distinct types just described. Such arrangement, however, has not proved satisfactory. For example, two systems so electrically coupled occupy a large amount of space. They also have duplicate components such as dual power supplies, decoders and housings. Furthermore, the printed records are delivered at a point remote from the transient image viewed from the cathode ray tube and thus remote from the viewer itself.

Accordingly, it is a general object of the present invention to provide a data terminal system having improved means for producing and delivering flexible record sheets.

More specifically, it is an object of the present invention to provide a data terminal system having means for converting an input signal such as a serial or parallel digital logic signals to a video signal, for converting the video signal to a transient optical image displayed on the face of a cathode ray tube, and for making a permanent copy of the displayed image on a flexible record sheet.

Another object of the invention is to provide a compact data terminal system of the type just mentioned housed within one integral housing.

Another object of the invention is to provide a data terminal system of the aforementioned type having the capability of speedily producing and delivering flexible record sheets.

Yet another object of the invention is to provide a data terminal system having means for displaying an optical image on the face of a cathode ray tube to a viewer, and for delivering a flexible record copy of the displayed image closely adjacent the cathode ray tube face with the side of the flexible record displaying the record image delivered facing the viewer.

SUMMARY OF THE INVENTION

Briefly described, the present invention is a data terminal system having a housing including a generally upright housing front member defining an exit aperture, a motor, and means for converting electrical input signals to optical images and for reproducing said optical images on the lower sides of flexible record sheets moving within the housing in a generally horizontal direction towards the exit aperture. Inverting means for

inverting the record sheets prior to their exit through the aperture are provided comprising a set of parallel rollers disposed in mutual engagement substantially parallel the upright housing front member and transmission drive means linking at least one of the rollers with the motor. Guide means are also provided for guiding the flexible record sheets moving in a generally horizontal direction upwardly into engagement with the set of rollers. Baffle means are provided which include a generally upright baffle disposed above the set of rollers in spaced juxtaposition with the upright housing front member.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatical side view of a data terminal system incorporating principles of the present invention.

FIG. 2 is a diagrammatical plan view of the data terminal system shown in Fig. 1.

FIG. 3 is a front exterior view of the system shown in FIGS. 1 and 2.

FIG. 4 is a fragmentary view in cross section of elements forming, and positioned with, an image transfer station of the data process system of FIGS. 1-3.

FIG. 5a is a diagrammatical view of two cutting elements of the cutting station in the data terminal system shown in FIGS. 1-3.

FIG. 5b is a diagrammatical view of the two cutting elements shown in FIGS. 5a.

FIG. 5c is a side view in cross section of one of the two cutting elements shown in FIGS. 5a and 5b.

FIG. 5d is a top view of the cutting element shown in FIG. 5c.

FIG. 6 is a diagrammatical view of a transmission system used in driving elements shown in FIGS. 1-3.

FIG. 7 is a block diagram of functional elements of the data terminal system shown in FIGS. 1-3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in more detail to the drawing, there is illustrated in FIGS. 1-3 a data terminal system incorporating principles of the present invention. The data terminal system comprises an integral housing which includes a top panel member 10, a bottom panel member 12, a rear panel member 14, two side panel members 16, and a generally upright housing front member 18. The upper portion of the front housing member is transparent and defines a slot 20.

Mounted within the system housing adjacent slot 20 is a cathode ray tube 22. This tube is oriented with its screen viewable from without the system housing through the transparent portion of front housing member 18. Another cathode ray tube 24 is located with the integral housing below power supply 26 and decoder 27 and is electrically coupled to cathode ray tube 22 as shown in FIG. 7. The screen of tube 24 is disposed adjacent mirror 28 which reflects light therefrom to lens 32 of an electrophotographic camera 30. Light from lens 32 passes through camera bellows 34 and is focused on photoconductive plate 36.

A reel of flexible, dielectrically-coated paper 38 is rotatably mounted above lens 32. An elongated strip of paper 40 is fed therefrom over idler roller 42 and between metered drive roller 43 and pinch roller 44.

Between idler roller 42 and metered drive roller 43, paper 40 is intermittently placed in contact with photoconductive plate 36 at an image transfer station 37 located between movable transfer base 39 and photoconductive plate 36. After passing over the metered drive roller, paper 40 is directed through a cutting station 46 which is shown in FIGS. 5a, 5b and 5c as comprising a fixed blade 50 and a rotatable blade 52 which is mounted to the planar surface of rotatably-driven cylinder 54 having a central, semicircular section thereof removed.

Cutting station 46 serves to sever individual sheets of predetermined length from elongated strips of flexible paper 40. For the purpose of clarity, the paper is shown in FIG. 1 as one continuous elongation until the point at which it strikes front housing member 18.

From cutting station 46 individual sheets of the flexible paper are guided by scoop 58 into contact with the upper surface of toner cylinder 60. A set of satellite rollers 62 insure snug engagement by the paper with a film of toner fluid overcoating the surface of cylinder 60. A portion of toner cylinder 60 is disposed within toner reservoir 64 from which the film of toner fluid is drawn.

After exiting toner cylinder 60 and satellite rollers 62, sheets of the flexible copy paper are directed by scoop 66 upwardly and into engagement with drive roller 68 and spring-loaded roller 69. From there the sheets pass between two generally upright converging guides 70 and into engagement with drive roller 72 and spring-loaded roller 73. This latter set of rollers propels the individual sheets upwardly into a sheet ejection chamber 75, wherein their leading edge contacts front housing member 18. This contact causes the upper portion of the sheets to bend towards the interior of the data terminal system housing thereby causing the lower portion of the sheets to bend away from the interior towards front housing member 18. The sheets which, of course, all under the influence of gravity, terminate their upward motion just prior to reaching top panel member 10 and then fall downwardly. The lower, leading edges thereof then strike baffle 75 which is inclined slightly downwardly towards slot 20. The lower, leading edges of the sheets will thus be bent towards the slot and carried therethrough while the surface of the generally vertical, falling sheets nearer the interior of the system will slide against generally upright baffle 76. A system intake fan, not shown, which is electrically coupled to motor M, elevates the air pressure within the data terminal system housing. This differential in the interior air pressure and the system ambient air pressure creates a slight flow of air above the top of baffle 76 downwardly through the sheet ejection chamber 75 and out of slot 16. The inertia of the sheets falling against baffle 74 plus this downward and outward flow of air causes the sheets to be ejected completely through the exit slot into the hand of an observer, a collection tray or other suitable receptacle.

FIG. 4 shows in greater detail some of the elements defining image transfer station 37. Photoconductive plate 36 is seen to comprise a transparent, glass support member 80, an opaque photoconductive layer 81, and a transparent, electrically-conductive planar electrode 82 sandwiched therebetween. Transfer base plate 39 is electrically coupled to ground whereas electrode 82 is at a negative potential with respect thereto. Within the

confines of the image transfer station is seen positioned dielectrically-coated paper with the dielectric coating 84 positioned adjacent photoconductive layer 81. It should be realized, of course, that the respective thicknesses of the various elements illustrated in this figure bear no relation to actual proportionalities. For example, photoconductive layer 81 is typically 40 to 60 microns thick, the glass support member some one-eighth inches thick and photoconductive layer 81 often less than 1 micron thick.

Referring once again to FIG. 1, cam 86 is seen to be mechanically linked to transfer base plate 39 by means of four springs 88 only two of which are shown for clarity. One end of each spring is affixed to base plate 39 and the other end to transfer plate 89, which in turn is linked to cam 86 by a cam follower, not shown. Rotation of cam 86 thus causes base plate 39 to periodically push paper 40 positioned in image transfer station 37 firmly against photoconductive layer 81 of photoconductive plate 36.

FIG. 6 illustrates the power transmission linkage utilized in driving portions of the just described system. Endless chain 90 is driven by sprockets connected to constant speed motor M. In turn, chain 90 engages sprockets connected to cylinder 54 as cutting station 46, sprockets connected to toner cylinder 60, sprockets connected to drive rollers 68 and 72 and to sprockets connected to cam 86.

FIG. 7 schematically illustrates the overall data terminal system. A digital input signal S is received from either keyboard 92 or from an extensive computer such as an IBM 360 system, and fed into the decoder which converts the digital signal to a video signal through the use of a well-known integrated circuit technique. The video signal is then fed to the directly viewable cathode ray tube and also, upon command, to the cathode ray tube optically aligned with the electrophotographic camera. The electrophotographic camera converts the displayed optical image to an electrostatic image which is transferred to the surface of the dielectrically-coated paper in the image transfer station. This electrostatic image is then toned, the excess liquid toner removed upon passage between rollers 68 and 69, and the paper inverted in the sheet ejection chamber. The sheet is finally ejected from the data terminal system adjacent the screen of the directly viewable cathode ray tube with the image side face up. The system thus has the capability of rapidly producing a record copy of the image transiently displayed on the screen of the directly viewed cathode ray tube at the command of the viewer. The record copy is ejected from the system at a point adjacent the screen with the image side thereof face up towards the observer whereby he may rapidly and conveniently compare the transient and record copy images.

It should be understood that the just described embodiment is merely illustrative of the principles of the invention, and that many modifications may be made thereto without departure from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. In a data terminal system having a housing including a generally upright housing front member defining an exit aperture, a motor, and means for converting electrical input signals to optical images and for

reproducing said optical images on the lower sides of flexible record sheets moving within said housing in a generally horizontal direction towards said exit aperture, means for inverting said record sheets prior to their exit through said aperture, said inverting means comprising:

a pair of parallel rollers disposed in mutual engagement substantially parallel said upright housing front member, the axis of one of said pair of rollers being disposed below the axis of the other of said set of rollers, said one of said pair of rollers also being disposed at a distance from said front member less than the distance said other of said pair of rollers is disposed from said front member; transmission drive means linking at least one of said rollers with said motor;

guide means for guiding said flexible record sheets moving in a generally horizontal direction upwardly into engagement with said set of rollers; and

baffle means including a first generally upright baffle disposed above said set of rollers in spaced juxtaposition with said upright housing front member.

2. Inverting means in accordance with claim 1 comprising means for elevating the air pressure within said housing above the ambient air pressure in which said system is located.

3. Inverting means in accordance with claim 1 wherein said baffle means also includes an inclined second baffle disposed below said set of rollers in spaced juxtaposition with said first baffle with one edge of said second baffle joined to said upright housing front member adjacent said exit slot to form an exit shoot.

4. Inverting means in accordance with claim 3 wherein said second baffle extends into said exit aperture.

5. A data terminal system comprising:

a housing having an aperture through which a flexible record sheet may exit;

a first cathode ray tube mounted adjacent said aperture for viewing from without said housing;

a second cathode ray tube mounted within said housing;

conductive means for transmitting an input signal to said first and second cathode ray tubes;

a photoconductive plate having first and second sides;

optic means for projecting an optical image displayed by said second cathode ray tube onto said first side of said photoconductive plate;

a conductive base plate mounted in spaced juxtaposition with said second side of said photoconductive plate, said conductive base plate and said photoconductive plate defining an image transfer station therebetween;

means for applying a voltage across said second side of said photoconductive plate and said conductive base plate;

first feed means for intermittently feeding successive portions of an elongated strip of flexible dielectric coated electrographic paper upon which a latent electrostatic image may be formed into said image transfer station;

means for severing said successive portions of said elongated strip of flexible dielectric paper into individual flexible record sheets;

toner means for developing said latent electrostatic images after said successive portions of said elongated strip of flexible dielectric-coated paper have been severed into said individual record sheets; and

second feed means for intermittently feeding said individual flexible record sheets from said image transfer station through said toner means and out through said housing aperture.

6. A data terminal system in accordance with claim 5 further comprising a motor mounted within said housing.

7. A data terminal system in accordance with claim 6 wherein said first feed means includes a first drive roller rotatably mounted adjacent said image transfer station and mechanically linked to said motor, and a pinch roller rotatably mounted in contact with said first drive roller.

8. A data terminal system in accordance with claim 6 wherein said severing means includes a rigidly mounted shear and a rotatably mounted shear disposed adjacent said rigidly mounted shear, and wherein said rotatably mounted shear is mechanically linked to said motor.

9. A data terminal system in accordance with claim 5 wherein said severing means is metered to sever said elongated strip of flexible dielectric paper into individual flexible record sheets of predetermined length.

10. A data terminal system in accordance with claim 9 wherein said second feed means includes a plurality of drive rollers mechanically linked to said motor and a plurality of mating rollers respectively disposed in pressure contact with said drive rollers to define a plurality of record sheet drive engagement points, the linear distance between any two successive record sheet engagement points being less than said predetermined length of said individual flexible record sheets.

11. A data terminal system in accordance with claim 5 wherein said housing has an upright front panel member which defines said aperture through which a flexible record sheet may exit.

12. A data terminal system in accordance with claim 11 wherein at least a portion of said upright front panel member is transparent, and wherein said first cathode ray tube is mounted adjacent said transparent portion, whereby said first cathode ray tube may be viewed from without said housing through said transparent portion.

13. A data terminal system in accordance with claim 11 wherein said upright front panel member defines a substantially horizontal slot.

14. A data terminal system in accordance with claim 13 wherein said second feed means includes a motor disposed within said housing and a pair of mutually abutting rollers disposed in juxtaposition with said slot and with at least one of said rollers mechanically coupled to said motor.

15. A data terminal system in accordance with claim 14 wherein said upright front panel member of said housing has a substantially planar inwardly-facing surface disposed above said slot, and wherein said pair of mutually abutting rollers is disposed adjacent said planar surface.

16. A data terminal system in accordance with claim 15 wherein the axis of one of said pair of rollers is located at a distance from said planar surface less than the axis of the other of said pair of rollers, and wherein said one of said set of roller is disposed below said other of said pair of roller whereby flexible record sheets may be driven upwardly through said set of rollers and against said planar surface and then fall out of said system through said exit aperture and thereby be inverted.

17. A data terminal system in accordance with claim 16 further comprising means to increase the air pressure within said housing to a level above the ambient air pressure of said system whereby air may be forced to flow out of said slot during system operation.

18. A data terminal system in accordance with claim 17 including an upright baffle disposed above said set of rollers adjacent said planar surface, said baffle and said planar surface of said front panel member defining a sheet ejection chamber.

19. A data terminal system in accordance with claim 18 wherein said housing comprises a top panel member and said baffel has a top edge, and wherein said top edge of said baffle is disposed in spaced relation from said top panel whereby air within said system may be caused to flow into the upper portion of said sheet ejection chamber, downwardly through said chamber and out of said system through said slot.

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