

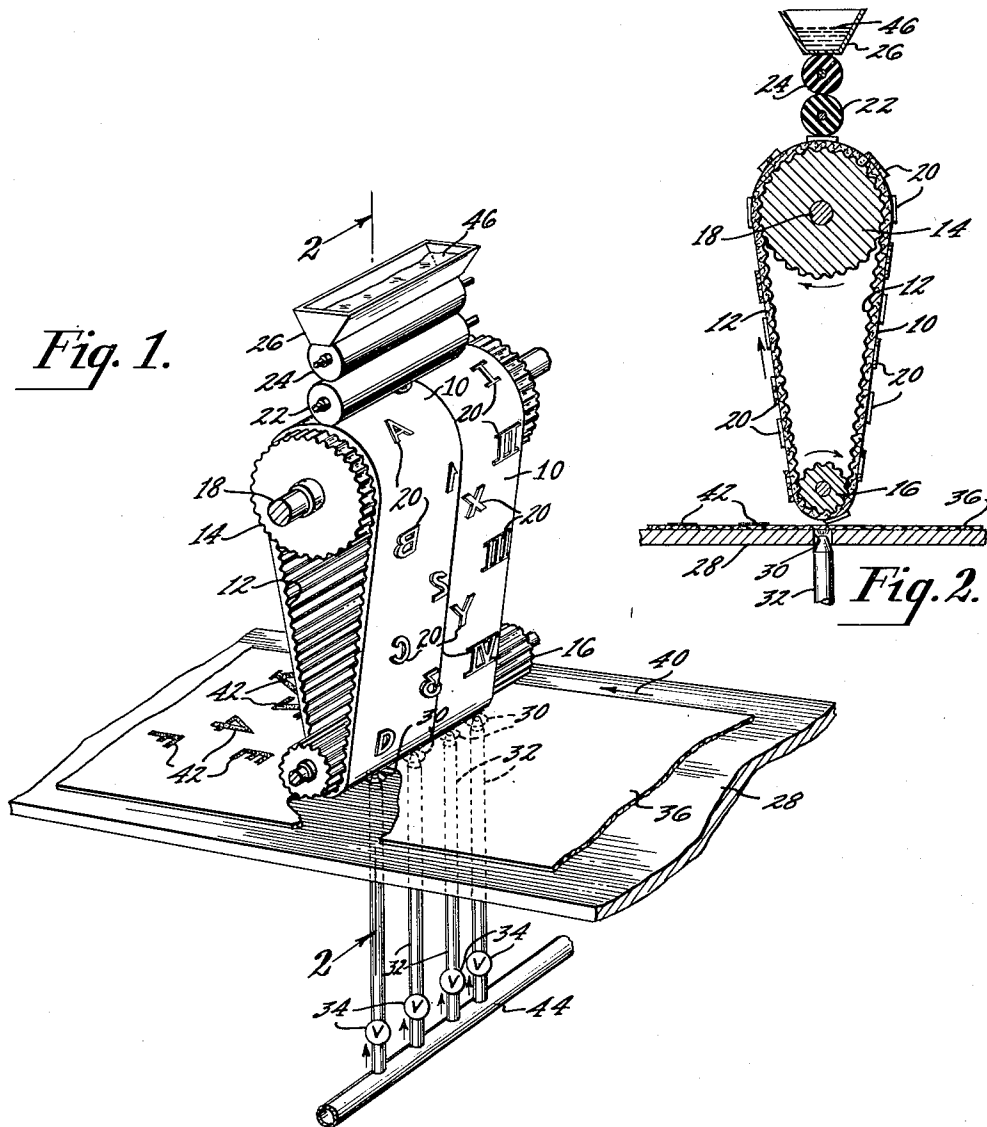
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HIGH SPEED RECORDER

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HIGH SPEED RECORDER

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This invention relates to recording or printing, and, more particularly, although not necessarily exclusively, to a novel high speed electro-mechanical recorder.

In order to overcome the mechanical inertia problems inherent in the so called flying printer and also to avoid the limitations imposed by the inertia of rotating character wheels, it has been suggested to use a continuously rotating wheel or drum. Prior art devices of which the flying printer is one example, impose serious limitations both as to the speed at which the printer and type wheel may be driven as well as to the factor of smudging and misregistration of the printed type due to the momentary frictional engagement of the printing web with the face of the inked print.

Conventional type drums or wheels, for use with high speed printers, require expensive type bodies whose useful life in continuous operation is often extremely limited. The type is normally hand engraved and necessitates continuous and constant care in order to avoid denting, scuffing, and/or fractures of the type body itself. The type faces must be accurately aligned when inserted and fixed onto the drum or wheel and the process of insertion and alignment when, as, and if removal is required, is not only expensive but time-consuming. Close tolerance for the many mechanical adjustments required have led to the search for the cheaper, simpler and more efficient device for high speed printing provided by the present invention.

In the computer art, to which many high speed printers find present day application, the conventional flying printer is slow and extremely inefficient. This is due mainly, to the fact that most of these printers are bulky and require a multiplicity of moving parts which require too high tolerances for inexpensive mass production and too much care for lengthy unattended operation.

It is an object of the invention to provide a novel means for causing a record receiving or printing web to be brought into contact with a transfer device such, for example, as a type bearing surface by a fluid jet.

It is a further object of the invention to provide a novel means for printing successively and at high speed a series of impressions on a continuous printing surface or web.

It is a still further object of this invention to provide a printing mechanism for a high speed printer which utilizes a rotating flexible means having intelligence characters thereon.

It is a still further object of this invention to provide an electro-mechanical printer which will overcome the mechanical inertia problems inherent in the flying printer.

It is a still further object of this invention to provide a high speed continuously moving printing device which will avoid the misregistration, smudging, and mistiming of many conventional printers.

A high speed electro-mechanical printer in accordance with the present invention may consist of a thin flat flexible belt having a series of intelligence characters formed on the outer periphery thereof. The belt is caused to rotate at a constant velocity over special sheaves.

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A stationary printing platen is mounted below one of the sheaves, with sufficient clearance there between to permit the free passage of a web of paper. A series of fluid jets within or beneath the platen is used to bring the paper into contact with the type on the belt. The type is linked and metered prior to its contact with the paper. The fluid jet is electronically timed to coincide with the rotation of the belt. Each vertical row of characters which is to be printed may have its own belt assembly associated therewith. As each horizontal row is printed, the paper is indexed in order to present a fresh space on the paper for the next row of characters.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, as well as additional objects and advantages thereof, will be best understood from the following description when read in connection with the accompanying drawing, in which:

Figure 1 is a view in perspective, partly cut away to show the fluid jet operation of the high speed printer.

Figure 2 is a view of a section of the device of Figure 1 along the lines 2—2.

Referring now to Figure 1, there is shown, by way of example, a "Gilmer" timing belt 10 which is commercially available. The belt 10 can be made in any length and lug pitch to suit particular conditions of application. The belt 10 consists essentially of multiple turns of a helically wound steel cable vulcanized within a thin flat flexible belt having lugs 12 or teeth molded transversely on its inner, or pulley contacting face. The pulleys or sheaves, for example, may be cylinders 14 and 16 with shallow grooves cut across their outer diameters to engage the lugs 12 on the belt 10.

The belt rotates over the upper and a lower sheaves 14 and 16 respectively. The upper sheave 14 or drive roll may be connected by means of the shaft 18 thereon to a conventional synchronous electric motor (not shown) so that the drive roll 14 is made to rotate at a constant velocity. Any conventional timing mechanism (not shown), which may for example be of the gas tube pulse operated variety or the brush commutator type can be used with the rotating belt 10.

The outer periphery or face of the belt has preformed thereon, intelligence characters 20, which may be for example, the letters of the alphabet, as indicated in Figure 1, including the numbers from "one" to "zero." The characters 20 are prearranged in vertical and horizontal rows and are affixed to the belt 10 either by molding, cementing, or heat treating so that positive printing may be accomplished for each character in either a vertical or horizontal row and in any predetermined order.

Immediately adjacent the drive roll 10 are a metering roll 22, an ink roll 24, and an ink trough 26, containing suitable ink or the like such as printers ink 46. Conventional metering and inking devices may be used and the relative position of the ink and metering rolls is immaterial.

The lower roller 16, or back-up wheel, is situated below the drive roll 14 and parallel therewith. Spaced at a predetermined distance below the periphery of the belt in the area where the belt rides over the back-up wheel 16, is a printing platen 28 which may simply be a polished metallic or plastic sheet. The stationary printing platen 28 is punched or fabricated with a series of holes 30 therein in order to permit passage of fluid projected in jets or pulses. The fluid is caused to pass through the holes 30 by means of a series of small vertical pipe-like orifices or tubes 32 which are situated beneath the platen 28. The holes 30 must be associated with the platen 28 in such fashion that the fluid jet used there-

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with, will always be immediately adjacent some predetermined character 20 on the belt 10 selected for printing.

Attached to the platen 28 in spaced relation to match the rows of 10 characters on the belt are the above mentioned series of tubes 32 which are operated to pulse the fluid jet through the properly selected hole 30 therein through valves 34 connecting each pipe to a main fluid supply line such as a compressed air line 44. The fluid jet is timed in synchronism with the rotation of the belt 10. Each tube 32 is provided with an electrically operated valve 34 of any known type. An electrically operated fluid valve is shown in United States Patent No. 1,770,493 granted to Richard H. Ranger July 15, 1930. By means of a conventional timing system which will electrically connect the various valves 34, a series of individual characters and/or a line of printed characters may be caused to be printed on the moving web 36 of paper at extremely high speeds and without smudging.

The air blast or jet can be timed for speeds in excess of the conventional mechanical type printing hammer or rotating type wheel.

A web 36 of paper or the like of proper width, is caused to be passed intermittently by any known means over the holes 30 in the platen 28 under the characters 20 on the belt 10 at a point where the belt circles the back-up wheel 16. After each row of characters is printed, the paper 36 is moved or indexed in a forward direction which, for the sake of illustration, is the direction as indicated by the arrow 40 in which the belt is caused to be rotated and advanced under the back-up wheel 16 and above the paper. This action brings the printed paper 42 from the feed roll (not shown) to the copy roll (not shown).

The flexible belt 10 may comprise either a single or a multiple unit assembly as is indicated in Figure 1 which shows two belts 10, in a width to suit the requirements of the application. A worn out or broken belt can be replaced or repaired easily, cheaply and with a minimum amount of labor and adjustment.

The problem of mechanical inertia has thus been overcome in a novel fashion and by means of a novel and extremely efficient and simple electro-mechanical arrangement.

Any convenient number of belts may be used depending on the particular arrangement that is thought to be necessary and/or a variety of belts of varying width may be efficiently operated. The particular belt drive of the present invention combines the desirable feature of a thin flat belt with the advantage of being virtually non-stretchable and of transmitting power and motion positively with no slip or speed variations.

What is claimed is:

1. Apparatus for the selective printing of characters comprising a type carrying member, means for movably supporting said member, parallel rows of raised type characters arranged longitudinally on said member, means for supplying ink to said type characters on said member, a stationary platen adapted to support a web of printable material, said platen being parallel to and

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spaced from said member, said platen having a plurality of aligned orifices therein, each one of said orifices being located to cooperate with a row of type characters, a conduit in communication with each orifice, a source of compressed air, said conduits being connected to said source of compressed air, and valve means in each of said conduits to effect printing of a selected character on a web supported on said platen.

2. Apparatus for the selective printing of characters comprising an endless flexible member, rotatable supporting pulleys for said member, parallel rows of raised type characters arranged longitudinally on said member, means opposite one of said pulleys for supplying ink to said type characters, a stationary platen adapted to support a paper web, said platen being parallel to said other pulley and spaced from said member, said platen having a plurality of aligned orifices therein, each one of said orifices being located to cooperate with a row of type characters, a separate conduit in communication with each orifice, a source of compressed air, said conduits being connected to said source of compressed air, and an electromagnetically operated valve connected in each of said conduits to effect printing of a selected character on a web supported on said platen.

3. Apparatus for high speed printing of a type in which a plurality of endless flexible belts carrying a series of intelligence characters on the peripheries thereof are caused to contact a printing surface comprising a plurality of rollers, means to drive said rollers at a constant velocity, a plurality of endless flexible belts driven over said rollers and having said intelligence characters embossed thereon, a platen for guiding a web of printable material into closely spaced relationship with said belts, said platen having a plurality of orifices adjacent said belts through which to project a plurality of fluid jets for momentarily instantaneously causing said web to contact said belts in a predetermined synchronously timed relation, a source of fluid under compression, means for connecting each jet to said source, control means located in each of said connecting means for controlling projection of said jets, and means for periodically indexing and advancing said web in synchronism with said jets.

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