Oct. 5, 1965 R. N. EICHORN 3,209,973

FEEDING APPARATUS FOR CONTINUOUS AND CUT FORMS

Filed Nov. 5, 1962 3 Sheets-Sheet 1

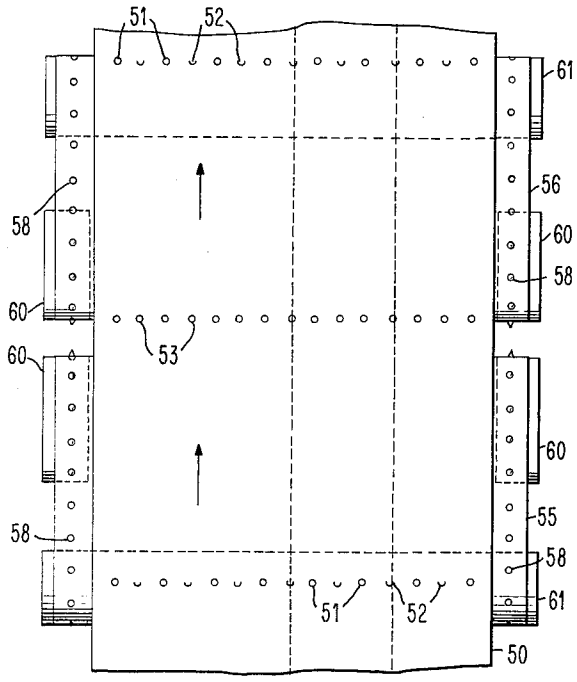


FIG. 1

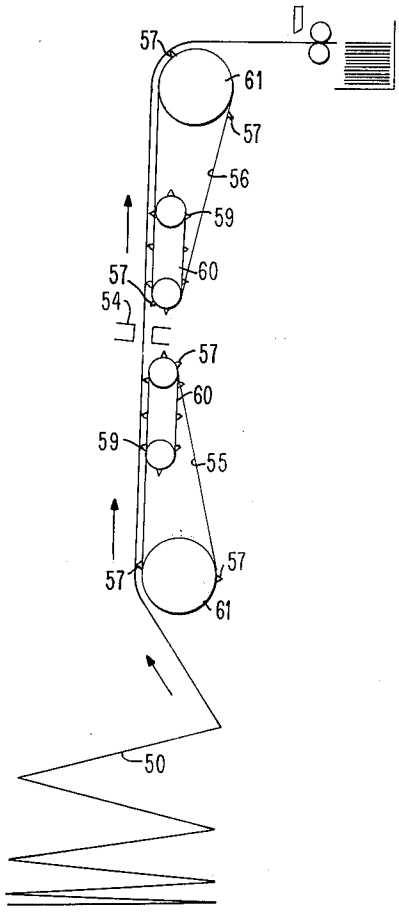


FIG. 2

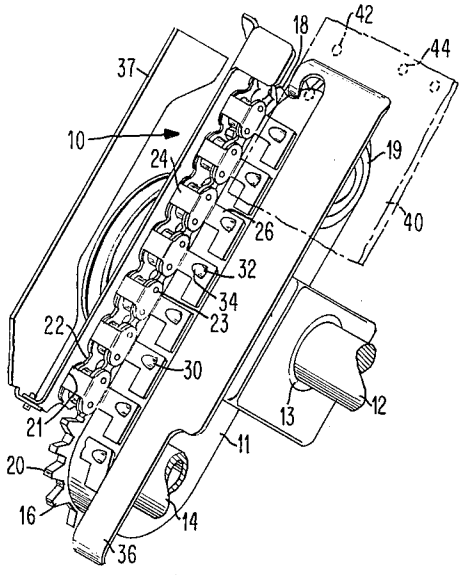


FIG. 3

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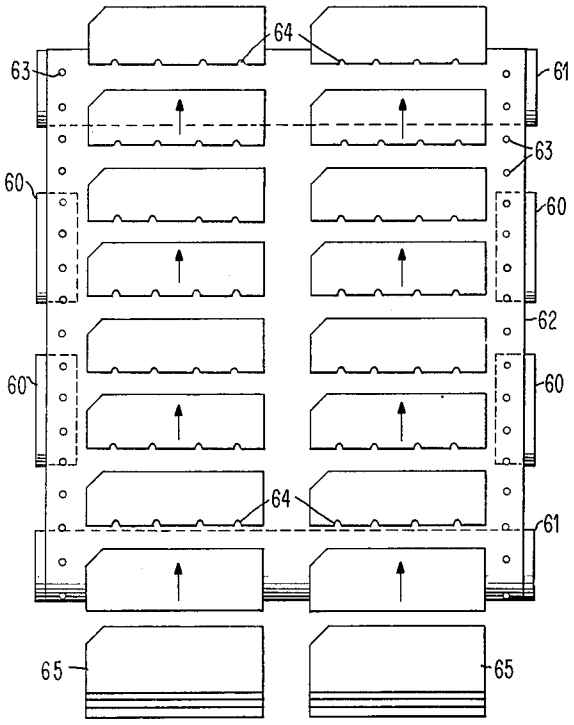


FIG. 4

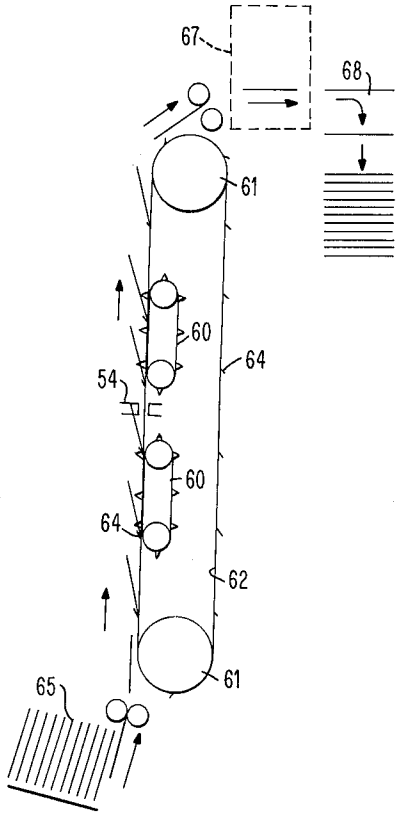


FIG. 5

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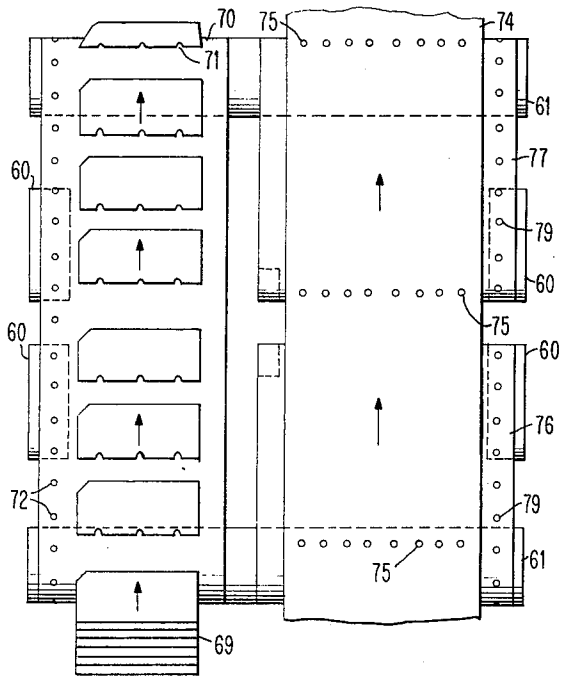


FIG. 6

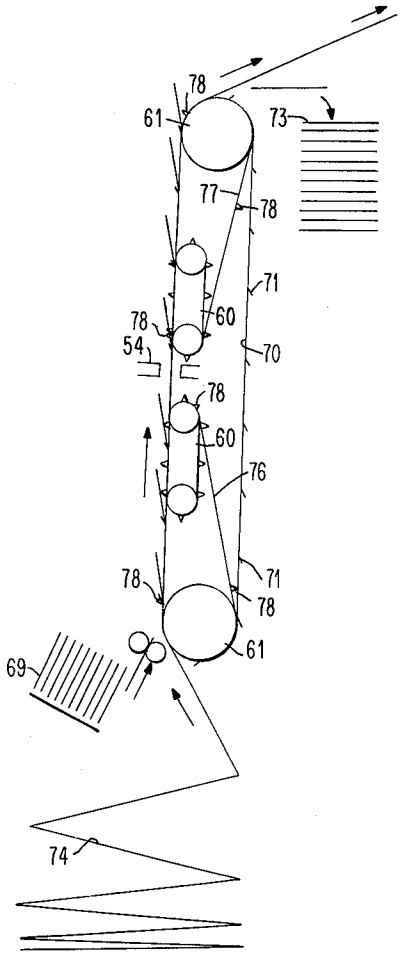


FIG. 7

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3,209,973

FEEDING APPARATUS FOR CONTINUOUS AND CUT FORMS

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2 Claims. (Cl. 226—74)

This invention relates to apparatus for feeding continuous and cut forms and more particularly to continuous forms and card carrier belts.

Conventional continuous paper forms are generally contained in a hopper folded over on themselves and from the hopper they are fed past a printing station of a printing machine by form feeding tractors which engage carrier holes along both edges of the forms. Individual card forms, such as machine processable tabulating cards, are generally handled in a continuous web form so that they can similarly be tractor fed past a print station after which the cards have to be burst apart and severed from their feed hole carrier strips which are connected to the side edges of the card forms.

As a result, printing machines are provided with a standard form feeding tractor arrangement which is presently capable of handling only the conventional type continuous forms or card webs having the feed hole carrier strips along their side edges. There are times, however, when it is advantageous and desirable to be able to process through a printing machine, or the like, individual precut forms or cards, and continuous forms or webs which do not have the conventional feed holes arranged along their side edges, such as continuous forms having feed holes which extend laterally across.

There exists, then, the need for a form feeding apparatus having a high degree of flexibility and one which is capable of being easily interchanged with the present conventional form feeding tractor drives. In fulfilling this need, it was found that through the use of carrier belts which could be fed by the form feeding tractors the desired flexibility could be obtained simply by using the tractors to feed conventional forms in the manner that they always have and by using the same tractors to feed special carrier belts which in turn are provided with suitable gripping means or pin feed means for engaging nonconventional continuous forms and cut forms or cards. The carrier belts are of the endless type and are provided with feed holes along both edges which engage the form feeding tractors.

In one embodiment of the present invention, a pair of endless belts are tractor fed and disposed transversely on the belts are rows of chads or pins which engage rows of feed holes disposed transversely across the continuous forms. In another embodiment, a single wide endless belt is tractor fed and rows of chad grippers are arranged along the belt in two columns to enable the feeding of two streams of cards or cut forms. In still another embodiment, three endless belts are arranged to enable the side by side feeding of both cards and continuous forms.

In all three embodiments the same conventional tractor arragnement is used and the interchangeability of the system allows for the handling of conventional and nonconventional continuous paper and card forms, cut forms and cut cards, envelopes, or any intermixture thereof. The belt transport of individual cut cards will permit accurate in-line punching and make the cards available for immediate distribution due to the elimination of the presently required bursting operation for continuous card forms. Also, all card edges will be smooth since no bursting is required and there are no

feed hole carrier strips to be severed from the sides, such as in continuous card forms.

Accordingly, a principal object of the present invention is to provide an improved feeding apparatus which is capable of feeding conventional and nonconventional continuous paper and card forms, cut forms and cut cards, envelopes, or any intermixture thereof.

A further object of the present invention is to provide a forms feeding apparatus provided with interchangeable carrier belts whereby a highly flexible forms feed arrangement is obtained.

A still further object of the present invention is to provide interchangeable tractor fed carrier belts which are provided with suitable means for engaging continuous forms and cut forms.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a plan view diagrammatically showing an arrangement embodying a pair of tractor driven carrier belts feeding a nonconventional continuous form.

FIG. 2 is a side view diagrammatically showing the arrangement of FIG. 1.

FIG. 3 is an isometric view showing a conventional tractor forms feed driving a carrier belt.

FIG. 4 is a plan view diagrammatically showing an arrangement embodying a wide tractor driven carrier belt feeding a double stream of cards.

FIG. 5 is a side view diagrammatically showing the arrangement of FIG. 4.

FIG. 6 is a plan view diagrammatically showing an arrangement embodying three tractor driven carrier belts feeding both a stream of cards and a continuous form.

FIG. 7 is a side view diagrammatically showing the arrangement of FIG. 6.

Referring to FIG. 3, the numeral **10** generally designates a conventional tractor forms feed which may be used to drive either the conventional continuous forms or the carrier belts a predetermined distance in order for printing or the like to take place on the form. The tractor contains a housing **11** which is generally supported on the machine by a support bar **12** extending through the opening **13** so as to slidably support the tractor. The tractor is also supported on a hollow rotatable drive shaft **14** which is in turn adapted to slide on a support bar (not shown) extending into the shaft. The hollow rotatable drive shaft **14** carries a sprocket gear **16**. Another sprocket gear **18** is mounted for rotation on a shaft and bearing arrangement **19**. The sprocket gears are provided with sprocket teeth **20** which engage and drive an endless chain **21**. The endless chain is composed of interconnecting links **22** and pin carrying links **24** pivotally connected by pins **23**. The pin carrying links **24** contain a bracket **26** for supporting pins **30**. The pins **30** contain a cylindrical portion **32** for driving the forms and belts. The pins **30** terminate in a spherical head **34** so as to make it easier to enter and withdraw from a perforation. Fixed to the top of housing **11** is a guide bed **36** over which the continuous forms and carrier belts pass. The top of housing **11** also forms a guide bed for the support brackets **26** so that they are at the same level as the guide bed **36**. This provides a smooth surface for either forms or carrier belts. In order to keep the continuous forms or belts down on the pins, a pivotable upper guide **37**, which is shown pivoted out of the way, is normally pivoted into position after the form or belt is placed on the pins. When in position the upper guide is spaced a small distance from the guide bed to insure positive engagement of the mar-

ginal edges of the perforations by the pins, yet permit the passage of the forms or belt. A carrier belt is shown at **40** which contains a plurality of equally spaced perforations **42** in the marginal edges so that they are adapted to be engaged by the pins **30**. The perforations and pins are spaced according to the desired alignment for printing and the like. The carrier belt **40** is shown provided with a row of laterally disposed feed pins **44** attached thereon and adapted to engage suitable feed holes disposed in the continuous forms to be fed by the carrier belt.

Referring to FIGS. 1 and 2, there is shown one embodiment of the present invention wherein a pair of endless belts are tractor fed and disposed transversely on the belts are rows of feed pins which engage rows of feed holes disposed transversely across the continuous forms. The continuous form **50** shown in FIG. 1 is of the non-conventional type wherein spaced rows of feed holes **51** extend transversely across the form. In the case of multiply forms suitable chad fasteners **52** are alternately disposed with the feed holes to hold the individual sheets together. Spaced between the rows of feed holes and chad fasteners are rows of holes **53** disposed transversely across the form. Alternate holes are used as feed holes and the holes in between are used when splicing forms together.

As shown in FIG. 2, the continuous forms **50** are fed from a zig-zag folded stack up through a print station **54** by means of a lower endless carrier belt **55** and an upper endless carrier belt **56**. The carrier belts are preferably made of "Mylar" material and have suitably fastened thereon rows of feed pins **57** disposed transversely across the belts and which engage the feed holes **51** in the continuous forms **50**. Each carrier belt is provided with equally spaced feed holes **58** extending along each marginal edge and which are engaged by the pins **59** of the forms feeding tractors **60**. Each carrier belt is mounted between an associated idler roll **61** and a pair of the tractors **60** which are in alignment with the feed holes along each marginal edge of the carrier belt. The tractors **60** are of the type above described and shown in FIG. 3 and they are driven by suitable connections with the printing machine. From the upper belt **56** the forms would pass out of the top of the printer and on to a cutter-sorter device to be stacked as cut forms.

It will be noted that the use of carrier belts makes it possible to handle various widths of the continuous forms **50** without adjusting or changing the position of the tractors **60**.

With the arrangement shown in FIG. 2, if it is desired to feed conventional forms having the marginal feed perforations the carrier belts are simply removed and the conventional forms threaded directly onto the tractors **60**.

Another arrangement shown in FIGS. 4 and 5 makes use of a single wide carrier belt **62** which is tractor fed through the marginal perforations **63** and which is provided with rows of chad grippers **64** arranged along the belt in two columns to enable the feeding of two streams of cut forms or cards **65**. As shown in FIG. 5, the single carrier belt **62** is mounted between the two idler rolls **61** and is threaded on the same arrangement of forms feeding tractors **60** that was employed in the arrangement shown in FIG. 2. The double stream of cards **65** are fed by a suitable pair of card feed units onto the belt where the chad grippers **64** engage the pairs of cards and carry them in alignment past the print station **54**. From the belt the cards may be fed to a punch unit **67** where punched information can be entered after which they are deposited in a suitable stacker **68**.

Referring to FIGS. 6 and 7, another arrangement is shown illustrating a double stream operation using both cards and forms. The cards **69** are shown being fed by a conventional card feed unit onto a single carrier belt **70** which is provided with transverse rows of chad grippers **71** which engage the cards and carry them past the print station **54**. A single row of feed perforations **72** along the left margin of belt **70** is threaded on two of the forms feeding tractors **60**. The same tractor arrangement is used as was used in the arrangement shown in FIGS. 2 and 5, with belt **70** extending between the idler rolls **61**. From the belt **70**, the cards may be stacked in a suitable stacker **73**. Simultaneously with the feeding of the cards, a continuous form **74** having transverse rows of pin feed perforations **75** is also fed past the print station **54** by a pair of endless belts **76, 77** which are provided with transverse rows of feed pins **78** to engage the perforations **75** in the form. A single row of feed perforations **79** along the right marginal edge of each of the belts **76, 77** is engaged by an associated one of the other two pin feed tractors **60**. From the belt **77** the forms are stripped off and passed on to a suitable cutter-sorter device. This type of dual operation is advantageous in that it will permit printing and punching cards on one stream and printing on a paper form on the other stream.

There has been clearly shown the great interchangeability that can be obtained by the use of the present tractor feed and carrier belt arrangement.

The same basic tractor feed arrangement is used in all cases to drive interchangeable carrier belts of different sizes or configurations and in this manner cut forms and continuous forms of varying widths may be handled singly or in combination. And if desired, the carrier belts may be removed and conventional continuous forms fed directly by the tractors. Such a flexible arrangement finds many useful applications in data processing systems.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. An apparatus for feeding continuous forms and cut forms concurrently past a work station which comprises,

successive pairs of forms feeding tractors having driving pins which are adapted to project into longitudinal marginal edge perforations of continuous forms to feed same past said work station,

a first pair of tractors being disposed to feed forms into said work station and a second pair of tractors being disposed to feed forms out of said work station,

idler rolls associated with said pairs of tractors,

first and second interchangeable endless carrier belts, said first belt being mounted between one tractor of said first pair of tractors and its associated idler roll and said second belt being mounted between one tractor of said second pair of tractors and its associated idler roll,

said first and second carrier belts having longitudinal marginal perforations along one edge which are engaged by the driving pins of said tractors whereby said carrier belts may be driven,

a plurality of spaced rows of protruding elements carried by each of said carrier belts,

each row of elements extending laterally across its associated belt and adapted to engage and drive continuous forms deposited on said first and second belts past said work station,

a third interchangeable endless carrier belt mounted between said idler rolls and on the other tractors of said first and second pair of tractors,

said third carrier belt having longitudinal marginal perforations along one edge which are engaged by the driving pins of said tractors whereby said third belt may be driven, and

a plurality of spaced rows of protruding elements carried by said third carrier belt,

each row of elements in said third belt extending laterally across same and adapted to engage and drive cut forms deposited on said carrier belt past said work station.

2. An apparatus for feeding continuous forms provided with transverse rows of pin feed holes and cut forms concurrently past a work station which comprises,

successive pairs of forms feeding tractors having driving pins which are adapted to project into longitudinal marginal edge perforations of continuous forms to feed same past said work station,

a first pair of tractors being disposed to feed forms into said work station and a second pair of tractors being disposed to feed forms out of said work station,

idler rolls associated with said pairs of tractors,

first and second interchangeable endless carrier belts, said first belt being mounted between one tractor of said first pair of tractors and its associated idler roll and said second belt being mounted between one tractor of said second pair of tractors and its associated idler roll,

said first and second carrier belts having longitudinal marginal perforations along one edge which are engaged by the driving pins of said tractors whereby said carrier belts may be driven,

a plurality of spaced rows of feed pins carried by each of said carrier belts,

each row of feed pins extending laterally across its associated belt and adapted to engage the pin feed holes in continuous forms deposited on said first and second belts to feed same past said work station,

a third interchangeable endless carrier belt mounted between said idler rolls and on the other tractors of said first and second pair of tractors so that said third belt is parallel with said first and second belts,

said third carrier belt having longitudinal marginal perforations along one edge which are engaged by the driving pins of said tractors whereby said third belt may be driven in synchronism with said first and second belts, and

a plurality of spaced rows of chad grippers carried by said third carrier belt,

each row of grippers in said third belt extending laterally across same and adapted to engage and drive cut forms deposited on said carrier belt past said work station concurrently with the feeding of said continuous forms past said work station.

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