

Jan. 2, 1962

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3,015,425

TRACTOR FEED FOR CONTINUOUS FORMS

Filed June 29, 1959

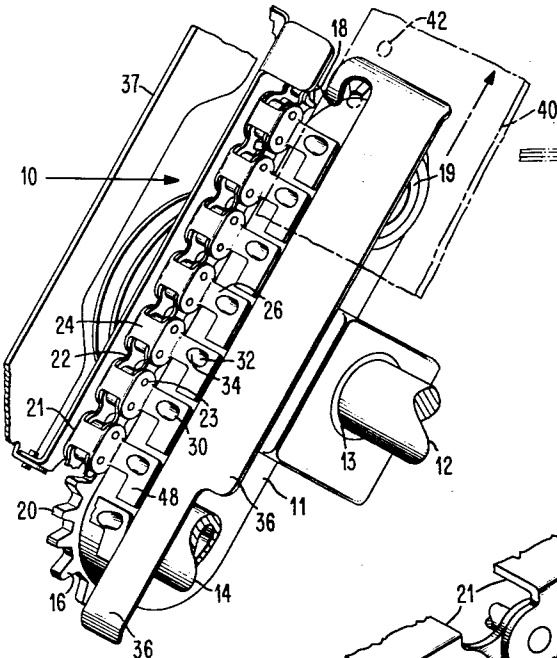


FIG. 1

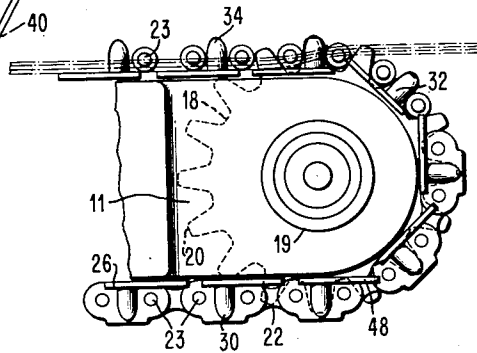


FIG. 5

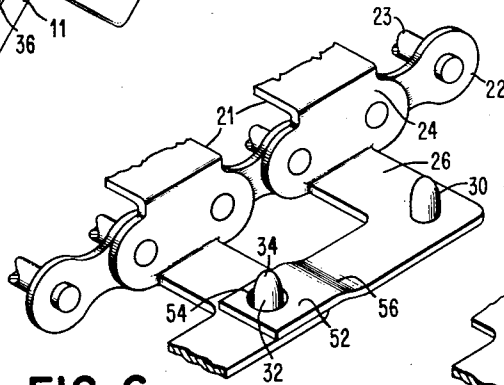


FIG. 6

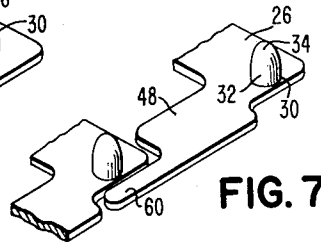


FIG. 7

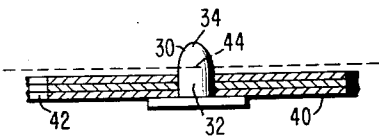


FIG. 2

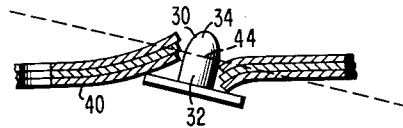


FIG. 3

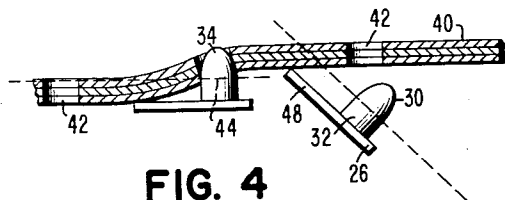


FIG. 4

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TRACTOR FEED FOR CONTINUOUS FORMS
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Filed June 29, 1959, Ser. No. 823,710
7 Claims. (Cl. 226-74)

This invention relates to a tractor for feeding continuous business forms and in particular to a tractor arrangement for stripping the forms from the tractor.

Continuous business record keeping forms are generally contained in a hopper folded over on themselves. These forms are fed from the hopper with the aid of form feeding tractors past a printing station for printing information on them. The form feeding tractors are interspersed at convenient locations to feed the forms to the next correct printing line. The forms generally follow a path substantially made up of connected straight lines, with the continuous forms tractors engaging the paper only over a short portion of the total path. In order for the paper to be pulled, the forms are provided with equally spaced perforations along the marginal edges. The tractors generally have sprocket gears for driving an endless sprocket chain which carries drive pins spaced by the same amount as the perforations in the continuous forms. This permits the pins to enter the path of the continuous forms, engage the perforations for only a short distance, and then separate from the forms.

Now, with improved methods for speeding up the reading of information data from cards or tape, computing from the data, and then printing the results on the forms, negligible problems existing at lower speeds become aggravated and result in major problems when operating at high speeds. One of these problems is the emerging or stripping of the pins from the perforations in the continuous forms without binding which frequently results in a jam. In order to drive the continuous forms, it is a requirement that the base of the pins have a cylindrical surface so as to form a cylindrical portion which can engage the marginal edges of the perforations in the continuous form. To minimize binding during entering and stripping, the pin terminates into a substantially spherical head. The line of demarcation between the spherical head and the cylindrical surface of the pin is approximately the parting or pitch line. Since the pins remain substantially perpendicular to the pin path as it changes from a rectilinear path to a curvilinear path, the pins tilt with respect to the continuous form path and the portion of the pin below the pitch line tends to elongate the perforation or bind in it. Now, it is important that the size of the perforation be about the same size as the pins in order to obtain engagement by the pins on the marginal edges of the perforations and to provide accurate alignment of the continuous form. Therefore, when the pins enter the curvilinear path the continuous form is stripped from the pins and there is a tendency for the cylindrical portion of the pins to tear, mutilate or otherwise injure the marginal edges of the perforation.

There have been many attempts to have the pins emerge from the perforations in the continuous form without the pins engaging or elongating the marginal edges of the perforations. One such device has to do with providing a bed plate which terminates into a gradually raising portion to guide the forms above its normal path and above the pins.

Another arrangement is to curve the pins and make them rotatable. While the pins are driving the form, the pins are turned so that the curve is transverse of the path of motion, and, as a result present a straight surface for driving purposes. However, as the pins progress into a curvilinear path, the pins are rotated so that the curved

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portion is in a direction opposite to the motion of the continuous forms. When in this position the pins somewhat withdraw or emerge from the perforations without excessively engaging the marginal edges of the perforations.

These and other arrangements have been attempted to prevent the mutilation of the perforations in continuous forms as the pins emerge or are withdrawn. All of the arrangements are expensive or are of limited effectiveness.

It is therefore an object of this invention to provide a simple, yet effective, means for assisting the pins in emerging or withdrawing from the perforations of a continuous form without wear, tear or mutilation of the perforations.

It is another object of this invention to raise the continuous forms above the pitch line of the driving pins before the pins enter the curvilinear path so that the driving portion of the pin is below the form when the pin starts to strip from the forms.

Briefly stated and in accordance with one aspect of this invention, a chain link arrangement is provided which is driven by a sprocket or the like, which chain carries a bracket for supporting driving pins for driving continuous forms, each bracket having a tab which raises the continuous forms above the pitch line of a following pin before it enters its curvilinear path of motion. Also, according to another aspect of the invention, a tab is provided on a bracket for supporting a pin, which tab extends to a position over a following pin so as to raise the forms at the following pin.

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 an isometric view showing the tractor forms feed driving the forms.

FIG. 2 is a side view of a normal pin driving the continuous forms.

FIG. 3 is a view showing a pin in its curvilinear path with the continuous forms below the pitch line of the pins.

FIG. 4 is a view showing the continuous forms above the pitch line of the pin before the pin enters its curvilinear path.

FIG. 5 is a side view showing the tab raising the continuous forms above the pitch line of the pins.

FIG. 6 is a view of another embodiment of the invention showing the tab extending over a following pin.

FIG. 7 is a view showing another embodiment of the invention.

Referring to FIG. 1 the numeral 10 generally designates a tractor forms feed which is used to drive the forms 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. 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

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 the forms. In order to keep the continuous forms 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 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 marginal edges of the perforations by the pins, yet permit the passage of the continuous forms. A continuous form is shown at 40 which includes several separate sheets interleaved with carbon. The continuous forms contain 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.

Reference is now made to FIG. 2 in which a standard pin is shown with the cylindrical portion 32 driving the plurality of sheets of paper interleaved with carbon which hereinafter will be referred to as the continuous form. Now, in order to obtain precision movement of the paper by the pins 30, there is very little play between the portions 32 and the marginal edges of the perforations 42. The parting line 44 between the spherical portion 34 and the cylindrical portion 32 of the pin will be referred to as the pitch line. Now, the continuous form 40 should remain below the pitch line 44 to obtain positive drive by the portions 32. When the endless chain and the pin carrying links begin to pass into the curvilinear path about the sprocket gear 18, the pins start to pivot and will follow substantially the same path as the curvilinear path. Therefore, the portion 32 on the pin begins to drive downwardly. The downward motion of the pin with respect to the form sometimes results in mutilation of the perforations as shown in FIG. 3. Furthermore, the suction created by the operation of the device itself tends to pull the torn bits of paper down into the mechanism and in some instances cause jamming.

In order to prevent the binding of the pins on the marginal edges of the perforations, just prior to the pins emerging from the perforations, means are provided to lift the continuous forms above the pitch line. By moving the continuous forms above the pitch line, only the spherical head will be exposed to the marginal edges. Now, it is important that the continuous forms be raised above the pitch line 44 prior to when the pins begin entering their curvilinear path, since a slight inclination of the portion 32 with respect to the marginal edges of the perforations causes binding. The downward pressure exerted by the portion 32 on the marginal edge of the perforation will either enlarge the perforation, as shown in FIG. 3, or mutilate the perforation. Therefore, in order to raise the continuous forms, a rearward extending tab 48 is provided on the bracket 26 as best seen in FIG. 4. As the pin 30 starts to separate or withdraw from the perforation as it enters its curvilinear path, one portion of the tab 48 will turn above the support line to a point above the pitch line. Therefore, the forms will be raised above the pitch line so that when the following pin begins to emerge or withdraw, the spherical edge 34 will be exposed to the marginal edges of the perforation so as not to create any binding. The tab 48 of a preceding pin thereby raises the form for the following pin and so on.

Now, it is intended that the tab 48 terminate as close as possible to a following support bracket 26 in order to raise the form at a location as close as possible to a following pin. Such an arrangement is preferred since it requires little modification to a standard tractor feed. Another method would be to dovetail the tab 48 and following support bracket 26. In such an arrangement a small tab 60 on the tab 48 can be positioned adjacent the side of a pin as in FIG. 7. Another arrangement for raising the form at the following pin is to extend the tab 48 to overlie the following pin as in FIG. 6. This can be accomplished by lowering the top of the housing 11 so

that the bracket 26 is below the bed 36 by a thickness equivalent to the tab. Therefore, by offsetting the tab as at 56, the extension 52 of the tab will be on the same level as the guide bed 36. Also, an enlarged opening 54 is provided in the extension 52 so that the extension can move in a curvilinear path with respect to a following pin without touching the pin.

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 the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A tractor forms feed for feeding continuous forms comprising a continuous chain formed of a plurality of links, some of the links having a support bracket, pins mounted on the support brackets and spaced to project into perforations in the continuous forms so that the forms can be driven by the pins, the pins having a portion for engaging the marginal edges of the perforations, the continuous forms having a substantially rectilinear motion, and the chain and pins having during a part of their movement a curvilinear motion so that the pins will emerge from the perforations, and a tab extending from each support bracket in a direction opposite to the direction of motion of the chain and adjacent to a following pin, the end of the tab associated with a preceding pin extending above the said portion of a following pin as said preceding pin moves into its curvilinear path, thereby to partially disengage said forms from said following pin.

2. A tractor forms feed for feeding continuous forms comprising a continuous chain formed of a plurality of links, some of the links having a support bracket, and pins mounted on the support brackets and spaced to project into perforations in the continuous forms so that the forms can be driven by the pins, each pin successively having a linear and then curvilinear motion, the brackets each having a tab extending opposite to the direction of the linear motion and adjacent a following pin such that during at least a part of the curvilinear motion of a preceding pin its tab will be shifted toward the forms to partially disengage the forms from the following pin.

3. A tractor forms feed for feeding continuous forms comprising a continuous chain formed of a plurality of links, some of the links having a support bracket, and pins mounted on the support bracket spaced to project into perforations in the continuous forms so that the forms can be driven by the pins, the pins having a driving portion and an entry portion separated by a parting line, each pin successively having a linear and then curvilinear motion, the forms having a substantially linear motion, the brackets each having a tab extending toward a following pin, the tab of a preceding pin protruding above the parting line of a following pin when said preceding pin moves with curvilinear motion to raise the forms above the parting line.

4. A tractor forms feed for feeding continuous forms comprising a continuous chain formed of a plurality of links, some of the links having a support bracket, and pins mounted on the support bracket spaced to project into perforations in the continuous forms so that the forms can be driven by the pins, the pins having a cylindrical portion and a spherical portion forming a parting line, each pin successively having a linear and then curvilinear motion, the forms having a substantially linear motion, the brackets each having a tab extending toward and co-extensive with a following pin, the tab of a preceding pin protruding above the parting line of a following pin when said preceding pin moves in its curvilinear path of motion to raise the forms above the parting line.

5. A tractor forms feed for feeding continuous forms comprising a continuous chain formed of a plurality of links, some of the links having a support bracket, pins mounted on the support brackets to project into perfora-

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tions in the forms, the forms having a substantially linear path of motion, the pins having during at least a part of their movement a curvilinear path of motion, and means on one pin for engaging the part of the forms at a following pin when the one pin enters its curvilinear path so as to partially disengage the forms from the following pin so that said following pin can fully disengage from the forms without binding.

6. In a tractor mechanism for feeding forms having a plurality of uniformly spaced perforations, the combination of an endless driven member, a plurality of pins operatively carried by said member successively in linear and curved paths and projectable into the perforations to drive each form in a generally linear direction, and disengaging members operably connected to at least some of the pins and projecting toward their respective succeeding pins, each disengaging member during at least a portion of the curved motion of its connected pin being shifted toward the form to displace and at least partially

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disengage the form from the corresponding succeeding pin.

7. The combination according to claim 6, wherein each disengaging member is substantially flat and extends in a direction generally at right angles to the axis of the corresponding pin and is rigidly connected to such pin, such that as each pin moves into its curved path the projecting end of the associated disengaging member will tend to swing in an arc to effect such partial disengagement.

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