April 15, 1969 L. A. SMITZER ET AL 3,438,323

ARTICLE CONTROLLED ROTARY ENDORSER

Filed Oct. 24, 1965 Sheet 1 of 2

Fig. 1

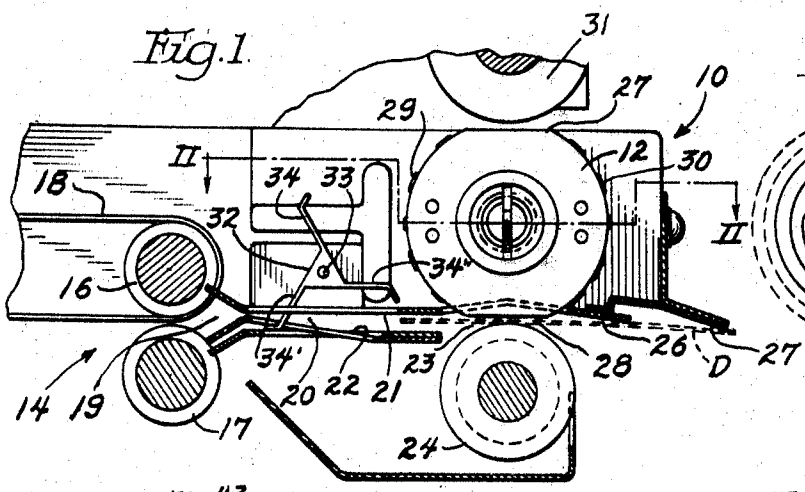

Fig. 5

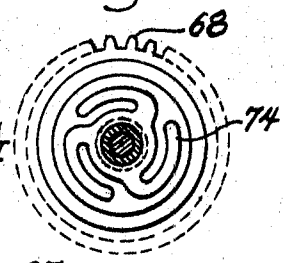

Fig. 4

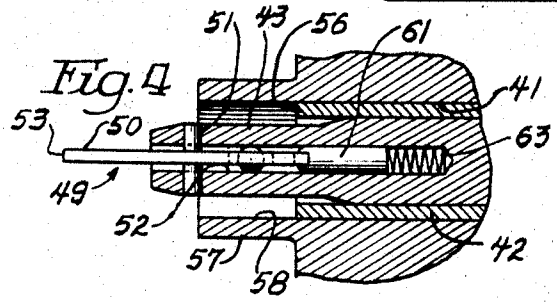

Fig. 2

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Filed Oct. 24, 1965 Sheet 2 of 2

Fig. 3.

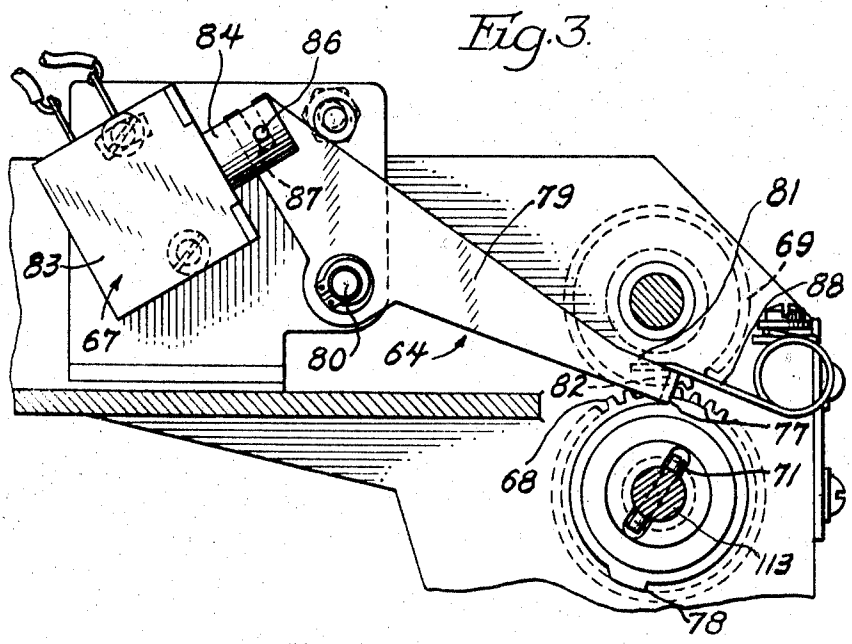


Fig. 7.

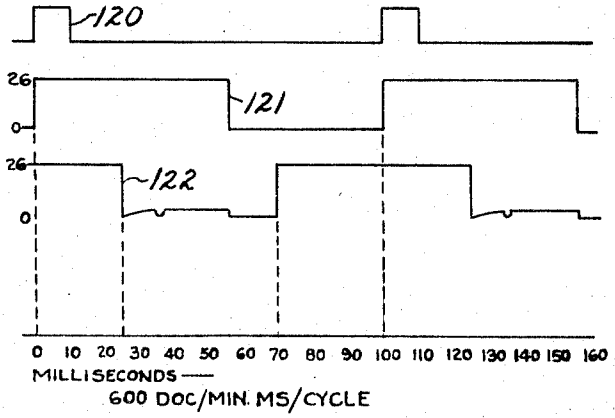
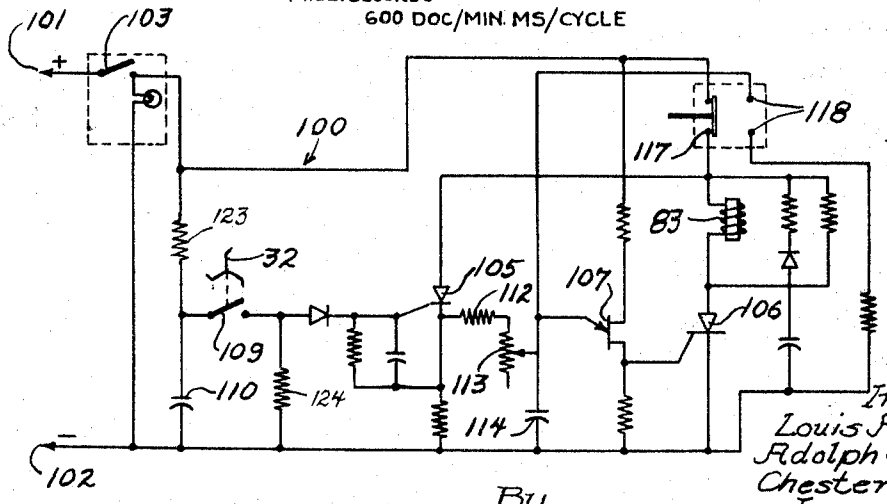


Fig. 6.



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3,438,323

ARTICLE CONTROLLED ROTARY ENDORSER

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ABSTRACT OF THE DISCLOSURE

Document endorsing apparatus having a die roller mounted on the unsupported end of a cantilevered shaft which is continuously engaged with a rotative source through a friction clutch. Rotation of the shaft is controlled by solenoid operated abutment means energizable through document actuated time delay means which enables placement of the endorsement at any location along the document.

This invention relates generally to endorsers and more particularly to improvements in endorsers regarding a die roller mounting arrangement and a die roller operating mechanism including means for selectively controlling the location on the documents or similar articles upon which the die roller acts in transferring indicia thereto.

While a number of different die rollers and mounting arrangements are known, a problem that has been frequently encountered in the use thereof has been the difficulty involved in replacing die rollers to change the indicia transferred thereby. The job may require special tooling and is often time consuming, thereby resulting in unnecessary down time of the machine and an unnecessary consumption of time and effort on the part of the operator.

In addition, known die roller operating mechanisms are generally unnecessarily complicated and without provision for selectively varying the location of the indicia on the faces of the documents, regardless of variations in the sizes of the documents.

The present invention involves an improved endorser wherein not only is replacement of the die roller facilitated, but also the die roller operating mechanism is simplified in construction, more dependable in operation and adapted to permit changes in location of the endorsement or other marking on the documents regardless of the sizes of the documents.

It is, therefore, an object of the present invention to provide an endorser embodying improved means for mounting and replacing the die roller.

It is another object of the invention to reduce the machine down time and the time and effort required in replacing the die roller.

Still another object of the invention is to simplify and increase the dependability of the operating mechanism of the die roller.

Another object of the invention is to provide means affording selectivity in the location of the endorsement or other indicia on the document regardless of the size of the document.

Still another object of the invention is to provide means for acting upon an article moving along a given path of travel a given period of time after the article reaches a given point in the path of travel.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings, in which preferred structural embodiments incorporating the principles of the present invention are shown by way of illustrative example only.

On the drawings

FIGURE 1 is a fragmentary side elevational view of an endorser constructed in accordance with the principles of the present invention with some parts removed and others cutaway in order to show the relative disposition of certain parts and salient features thereof;

FIGURE 2 is a horizontal sectional view taken substantially along line II—II of FIGURE 1;

FIGURE 3 is a vertical elevational view of portions of the die roller operating mechanism taken along line III—III of FIGURE 2;

FIGURE 4 is an enlarged fragmentary horizontal sectional view of a fast-acting latch assembly utilized in replacement of die rollers taken along line IV—IV of FIGURE 2;

FIGURE 5 is an elevational view of a biasing member of the die roller operating mechanism taken along line V—V of FIGURE 2;

FIGURE 6 is a schematic wiring diagram of a time delay and operating control circuit of the present invention; and

FIGURE 7 is a graphical representation showing the sequence of operation of the circuit shown in FIGURE 6.

As shown on the drawings

Referring to the general arrangement shown in FIGURE 1 of an endorser constructed in accordance with the principles of the present invention and identified generally at reference numeral **10**, a housing or frame **11** houses a die roller **12** rotatably mounted on a shaft **13** for transferring indicia such as an endorsement or other information or notation to documents such as checks or the like instruments as the documents pass through the endorser successively in moving along a given path of travel. The endorser **10** is a high speed unit capable of endorsing or otherwise marking a large number of documents in a short period of time.

The documents are supplied to the housing **11** by suitable transport means **14** which, in the illustrated embodiment, comprises a pair of supply rollers **16** and **17** and an endless transport belt **18**. The documents are fed in rapid succession from the transport means **14** into a throat **19** of a channel **20** which comprises a path of travel of the documents as they move through the housing **11**.

The channel **20** is bordered in part by guide flanges **21** and **22** which guide the documents into a printing couple or nip **23** between the die roller **12** and an impression roller **24**, as is exemplified in FIGURE 1 by the location of an illustrative document indicated at reference character D. On the side of the nip **23** opposite the throat or ingress area **19** are guide members **26** and **27** which form in part an egress area from which the endorsed documents are delivered from the housing **11**.

The die roller **12** has a pair of diametrically opposite flattened portions **27** and **28** formed thereon, between which are indicia bearing plates or surfaces **29** and **30** which actually transfer the information to the documents as the documents pass through the printing couple **23**. Generally both plates **29** and **30** will bear the same markings and only one of the plates will print on each of the documents. Thus the die roller **12** will generally rotate only 180° as each document passes through the printing couple **23**.

The leading edges of the documents, in passing through the channel **20** from left to right as viewed in FIGURE 1, can enter the printing couple **23** before the die roller **12** begins rotation as a result of the flattened portions **27** and **28** of the die roller. Thus the transferred information need not necessarily appear at the leading edges of

the respective documents but can be spaced rearwardly a selected distance from the leading edges.

The impression roller **24** serves as a backup for the die roller **12** as the documents are being printed, and in order to supply ink or other media to the die roller **12** an inking roll **31** is situated adjacent the die roller and in ink transfer engagement therewith.

As noted, the endorser **10** is of the automatic type and in accordance with the principles of the invention means are provided for controlling the operation or rotation of the die roller **12** in timed sequence with the passage of the documents through the path of travel or channel **20**. In order to initiate operation of the die roller **12** a switch is provided to sense the time relation of the leading edges of the documents as they pass successively through the channel **20**. In the illustrated embodiment the sensing switch comprises a paddle wheel **32** rotatably mounted on a shaft **33** and having a series of sensing fingers **34** extending from the central portion thereof in angularly spaced relation.

As the documents approach the paddle wheel **32** the fingers **34** are positioned as in FIGURE 1 with one of the fingers indicated at **34'** extending downwardly into the channel **20** to be engaged or tripped by the leading edge of the next successive document and turned or rotated to a position represented by the position of the finger identified at **34''**. Thus, as each document is fed into the housing **11** the paddle wheel or sensing switch **32** rotates about ⅓ revolution.

The transport system **14** feeds the documents into the housing **11** at a given constant speed, and the operating mechanism of the die roller **12**, to be described in detail hereinafter, conforms the peripheral or plate speed of the die roller **12** to the translatory speed of the transport system **14**.

It is often necessary or desirable to change the information marked on the documents and, as a result, to replace one die roller bearing given markings with another bearing other markings. As noted, an object of the invention resides in the provision of means facilitating replacement of the die rollers whereby machine down time during replacement is reduced and the effort required is minimized.

Accordingly, as shown in FIGURE 2, the die roller **12** is mounted on the shaft **13** at a free and unobstructed cantilevered end portion **36** thereof, and the shaft is journalled for rotation in bearing members **37** and **39** situated entirely at an opposite end portion **40** thereof.

Because of the relative high pressure of the rollers **12** and **24** at the printing couple **23** and the resultant moment acting upon the cantilevered end **36** of the shaft **13**, the bearing members **37–39** are constructed and arranged so as to reduce deflection of the shaft as well as to provide the necessary bearing effect. Thus, bearing members **37** and **39** are anti-friction or roller bearings spaced axially with respect to one another along the end portion **40** of the shaft **13** while bearing member **38** is of the sleeve type and interposed between the roller bearings **37** and **39**. As a result of this arrangement the shaft **13** is in effect rigidified and deflection thereof is minimized.

The die roller **12** is of a generally cylindrical configuration and has formed therein extending centrally axially thereof a bore **41** which houses a sleeve **42**. The die roller **12** is mounted on the end portion **36** of the shaft in telescopic relation over an outboard end **43** thereof. In order to lock the die roller **12** to the shaft **13** for corotation therewith a plurality of axially extending locking lugs **44** are formed on a radial wall **46** of the die roller **12** and are received in a corresponding plurality of locking recesses **47** formed in a roller locking collar **48** fixedly secured to the shaft **13**.

The inside diameter of the roller sleeve **42** is oversized with respect to the outside diameter of the end portion **36** of the shaft **13** merely sufficiently to provide a good sliding relationship therebetween. In order to lock the die roller **12** on the shaft **13** with respect to axial movement, a fast-acting latch assembly **49** is mounted on the end **43** of the shaft, which assembly is characterized as comprising a latch lever arm **50** mounted for pivotal movement on a pin **51**.

In order to afford movement of the lever arm **49** an axially extending recess **52** is formed in the end **43** of the shaft **13** and the lever arm **49** resides substantially therein. A projection **53** extends from the lever arm to facilitate pivotal movement thereof merely by finger pressure of the operator. In order to prevent axial movement of the die roller **12** the lever arm **49** has formed at the inboard end thereof an abutment shoulder **54** which, in the locked position of the lever arm **50** shown in FIGURE 2, abuts an end **56** of the die roller sleeve **42**. It will be noted that the sleeve end **56** is situated inboardly of an outer end **57** of the die roller **12**, and pivotal movement of the lever arm **50** within the end **56** is accommodated by the space between the shaft **12** and an inner wall **58** of the die roller end **57**.

When a die roller is being inserted on the shaft **13** the lever arm **50** is pivoted into general alignment with the shaft, and in such aligned position the overall transverse dimension of the lever arm **50** is less than the inside diameter of the die roller sleeve **42**. After the die roller has been slipped completely onto the shaft **13** and the lugs **44** have been inserted into the recesses **47**, the lever arm **50** is pivoted to the locked position thereof shown in FIGURE 2, and in order to maintain the lever arm in this locked position during operation of the endorser **10** the abutment wall **54** thereof has formed therein a notch **59** for receiving a complementarily tapered end **60** of a locking pin **61**. The pin **61** is housed in a bore **62** formed in the shaft **13** and is biased in the direction of the lever arm shoulder **54** by means of a spring **63**.

Accordingly, when the lever arm **50** is moved to its locked position its movement thereafter is impeded by the pin **61**, but it will be appreciated that only finger pressure is required to unlock and pivot the arm **50** in replacing the die roller **12**.

In order to rotate the die roller **12** in timed sequence with the passage of the documents through the printing couple **23**, a die roller operating mechanism indicated generally at **64** is situated at the end portion **40** of the shaft **13** and comprises a friction clutch assembly **66** and a clutch actuator **67**. The clutch assembly includes a drive gear **68** mounted on the shaft **13** and freely rotatable with respect thereto. The drive gear **68** is continuously driven at a constant speed by means of a gear **69** (FIGURE 3) which is, in turn, driven by suitable means such as, for example, electric motor means.

Situated on the shaft **13** adjacent drive gear **68** is an indexing sleeve **70** which is locked to the shaft for corotation therewith by means of a locking pin **71**. A radial side wall **72** of the drive gear **68** is urged into abutting frictional engagement with a complemental radial wall **73** of the indexing sleeve **70** by means of a biasing member **74** mounted on the shaft **13** outboard of the drive gear **68** and separated therefrom by a collar **76** frictionally engaging the drive gear **68** at a face **75** and freely axially slidable on the shaft **13** and adapted for corotation therewith by the flat **85**.

Thus, the drive gear **68** constantly tends to rotate the indexing sleeve **70** along with the shaft **13** and the die roller **12**. The indexing sleeve **70**, which is corotatably locked to the shaft **13**, has formed thereon a pair of diametrically opposite radial shoulders or abutment surfaces **77** and **78**, and mounted on the housing **11** for cooperation with these shoulders is a die latch lever arm **79** of the actuator **64**. The arm **79** is mounted for pivotal movement on a fixed shaft **80** and formed at one end **81** thereof is an inturned flange **82** engageable with shoulders **77** and **78** in a given angular position of the indexing sleeve **70** as shown, for example, in FIGURE 3.

As a result, the arm **79** is rockable and connected thereto in order to provide such rocking motion is a solenoid **83** including a reciprocally movable operating rod **84** connected to the arm **79** through a pin and groove **86** and **87** respectively.

When the solenoid **83** is de-energized a biasing member in the form of a torsion spring, which is mounted on the housing **11**, urges the flange **82** of the arm **79** into abutting engagement with one of the shoulders **77** and **78** of the indexing sleeve **70**, thereby preventing rotation of the sleeve, which is continuously urged into counterclockwise rotation as viewed in FIGURE 3 by the rotation of the drive gear **68**. Upon momentary energization of the solenoid **83**, however, the arm **79** is rocked to immediately move the flange **82** out of engagement with the abutting shoulder of the indexing sleeve **70**, whereupon the sleeve immediately rotates with the drive gear **68** for one half revolution, that is, until the flange **82** abuts the opposite shoulder of the indexing sleeve.

In accordance with the principles of the invention the solenoid **83** is momentarily energized or pulsed in timed relation to the passage of the documents successively through the path of travel or channel **20**. As will be described more fully hereinafter, as the leading edge of a document abuts that finger **34** of the paddle wheel or sensing switch **32** which extends downwardly into the path of travel an electric circuit means is actuated which, by incorporating a time delay system, causes a pulsation of the solenoid **83** to enable the die roller **12** to rotate a given and selectively variable time period after the engagement of such downwardly extending finger of the paddle wheel **32**. The period of delay is, of course, desirably a function of the speed of the document as determined by the speed of the transport system **14**, and also a function of the desired location of the printed matter on the document with respect to the leading edge thereof.

More specifically, the electric circuit means, which is identified generally in FIGURE 6 at reference numeral **100**, is designed to apply a fixed width pulse to the solenoid **83** within a given time after a pair of contacts are closed. The input power is delivered to the circuit **100** through terminals **101** and **102** and a switch **103** which is the On-Off switch of the endorser **10**.

Initially, a pair of silicon controlled rectifiers **105** and **106** are in the Off, or non-conducting state, and also a unijunction transistor **107** is in the normal condition. A document passing through the path of travel or channel **20** will close the contacts of switch **32**, which is the paddle wheel switch, as indicated by reference numeral **109**. This applies the voltage across a capacitor **110** to the gate of the silicon controlled rectifier **105**, turning it On, thereby applying voltage to the R-C timing network consisting of a resistor **112**, a variable resistor **113** and a capacitor **114**.

Capacitor **114** charges at a rate determined by the resistor **112** and the variable potentiometer **113**. When capacitor **114** reaches the required emitter breakover voltage of the unijunction transistor **107**, the emitter of silicon controlled rectifier **106** conducts to apply a pulse to the gate of the silicon controlled rectifier **106** to render it conductive. The silicon controlled rectifier **106** applies power to the solenoid **83** which releases the clutch **66** to rotate the die roller **12**. A few milliseconds after the die roller shaft begins to rotate, by way of example, 20 milliseconds, a cam **99** on the die roller shaft **13** actuates a snap action switch (not shown), thereby opening a contact **117** to stop the current delivered to the solenoid **83**, and the silicon controlled rectifiers **105** and **106**. This action will reset both silicon controlled rectifiers **105** and **106** to the non-conducting state. Contacts **118, 118** close momentarily, discharging the capacitor **114** to ensure accurate operation of the timing circuit **100** from cycle to cycle.

Resistors **123, 124** prevent capacitor **110** from recharging until switch **109** has opened, so that if a long document keeps switch **109** closed longer than one complete endorsing cycle, a new cycle *may not* be initiated upon the same long document.

FIGURE 7 is a graphical representation showing the various sequences which occur during the operation of the time delay circuit shown in FIGURE 6. The pulses generated by the switch **109** is represented by a curve **120**, while the pulse generated by the silicon controlled rectifier **105** is represented by a curve **121**. Another curve **122** represents the voltage drop across the silicon controlled rectifier **106**, which is initially in the non-conducting state.

When the time delay circuit **100** of FIGURE 6 is initially energized by a document closing the switch **109** the pulse **120** is generated. This pulse **120** is sufficiently long to ensure energization of the silicon controlled rectifier **105**. The pulse **121** indicates the time the silicon controlled rectifier **105** is energized.

After a predetermined time interval, as determined by the R-C timing circuit of resistor **112**, potentiometer **113** and capacitor **114**, the silicon controlled rectifier **106** is rendered conductive. This action is indicated by the pulse **122** at the point **25** on the time scale. The silicon controlled rectifier is maintained conductive to point **70** on the time scale, whereafter it is de-energized by the cam-actuated switch with contacts **117** and **118**, as mentioned hereinabove. The time interval between the points **70** and **100** on the time scale represents a "wait" period, thereby indicating the interval between each document being processed.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably come within the scope of our contribution to the art.

We claim as our invention:

1. In an endorser for documents and similar articles,

means forming a path of travel for the documents,

means for transporting the documents successively along said path of travel at a given speed,

means including a die roller adjacent one point of said path of travel and a drive shaft rotatably mounting said die roller for transferring indicia from the die roller to the documents as the documents pass the die roller, and

means for alternately rotating said shaft and said die roller at a speed conforming to said given speed and braking said shaft and said roller in timed sequence comprising

a drive gear carried on said shaft for relative rotation therewith,

means for driving said gear at a constant speed conforming to said given speed,

an indexing sleeve mounted corotatably on said shaft next to said drive gear,

said gear and said sleeve having mating frictional surfaces engaging one another whereby said gear tends to rotate said sleeve at said given speed,

an abutment surface formed on said sleeve extending axially of said shaft,

a pivotally mounted lever arm having a cooperating abutment surface formed thereon movable from a first position whereby said abutment surface is engaged to brake said sleeve to a second position whereby said abutment surface is disengaged to release said sleeve to rotate with said gear,

a solenoid connected to said lever arm and operable to move said abutment surface thereof between said first and second positions, electric circuit means including,

first switch means connected to said solenoid and situated ahead of said die roller with respect to said path of travel,

said first switch means being responsive to the position of the leading edge of the document as it passes along said path of travel to generate a signal for controlling the operation of said solenoid,

time delay means operatively connected between said first switch means and said solenoid for delaying said signal from said first switch means to said solenoid for a given period of time after it is generated,

a cam surface on said drive shaft, and

second switch means cooperating with said cam surface for further controlling said solenoid to move said lever arm to said first position before the trailing edge of said document passes said first switch means.

2. In an endorser for documents and similar articles,

means forming a path of travel for the documents,

means for transporting the documents successively along said path of travel at a given speed,

a die roller for transferring indicia to the documents,

said die roller having a cylindrical shaped bore formed therein axially thereof and extending therethrough adjacent one point of said path of travel,

means for mounting the die roller to facilitate replacement thereof with another to change the indicia transferred comprising;

a die roller mounting shaft,

bearing means journaling said shaft only at one end portion thereof,

said other end portion of said shaft being outboard of said bearing means and cantilevered and shaped complementarily to the bore of the die roller to slidingly receive and to provide the sole support for said die roller,

means for alternately rotating said shaft and said die roller at a speed conforming to said given speed and for braking said shaft and said roller in timed sequence comprising,

a drive gear carried on said shaft for relative rotation therewith,

means for driving said gear at a constant speed conforming to said given speed,

an indexing sleeve mounted corotatably on said shaft next to said drive gear,

said gear and said sleeve having mating frictional surfaces engaging one another whereby said gear tends to rotate said sleeve at said given speed,

an abutment surface formed on said sleeve extending axially of said shaft,

a pivotably mounted lever arm having a cooperating abutment surface formed thereon movable from a first position whereby said abutment surface is engaged to brake said sleeve to a second position whereby said abutment surface is disengaged to release said sleeve to rotate with said gear,

a solenoid connected to said lever arm and operable to move said abutment surface thereof between said first and second positions,

electric circuit means including,

switch means connected to said solenoid and situated ahead of said die roller with respect to said path of travel,

said switch means being responsive to the position of the leading edge of the document as it passes along said path of travel to generate a signal for controlling the operation of said solenoid,

time delay means operatively connected between said switch means and said solenoid for delaying the signal from said switch means to said solenoid for a given period of time after it is generated,

fast-acting latch means mounted on the outboard end of said other end of said shaft for cooperating with a shoulder formed on the die roller for releasably maintaining the die roller on said shaft,

said latch means having a lever arm pivotably mounted on said shaft and movable from a first position whereby the transverse dimension of said lever arm is no greater than the diameter of said other end of said shaft to permit the die roller to be slipped over the lever arm during mounting or removal of the die roller,

to a second position whereby the transverse dimension of said lever arm is greater than the diameter of said other end portion of said shaft to prevent the die roller from sliding off the shaft, and

means biasing said lever arm to said second position thereof.

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