United States Patent

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[54] **DOCUMENT FEED MECHANISM**
3 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **271/41**
[51] **Int. Cl.** **B65h 3/06,**
B65h 7/18
[50] **Field of Search** 271/41, 36

[56] **References Cited**
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ABSTRACT: The invention pertains to a document feeding mechanism for selectively lowering a document deck to engage a feed roll to effect sequential feeding of documents from the hopper. The document supporting bed is controlled by a cam driven articulated pivot latch which is magnetically actuated to cause the articulated portions to be locked to one another for pivoting as a unitary structure.

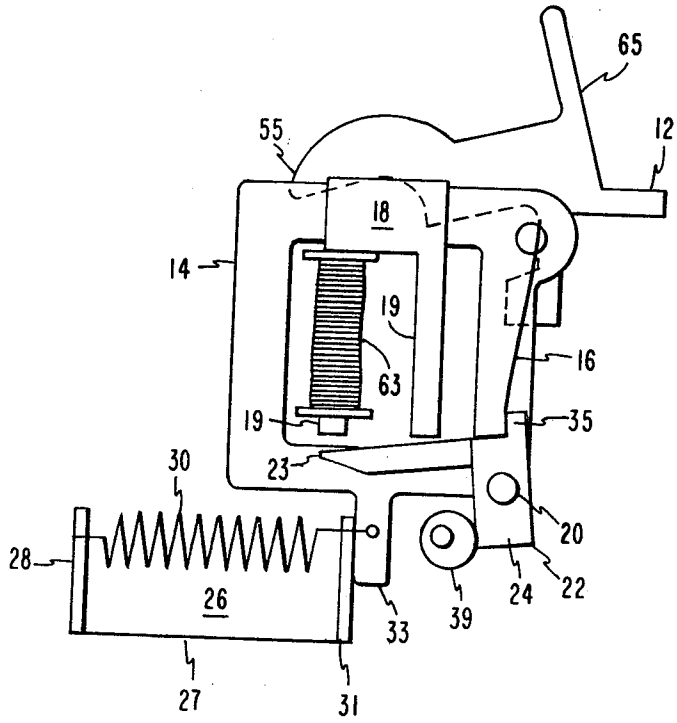
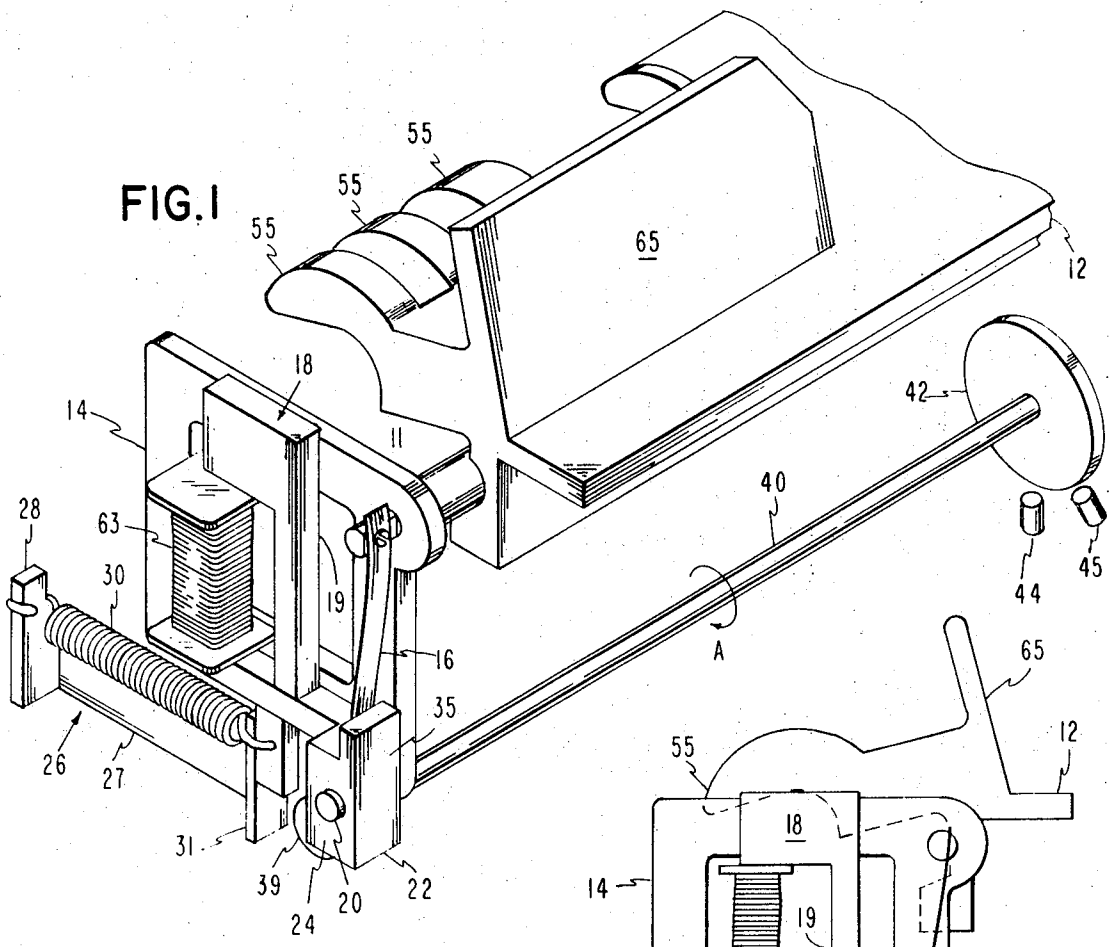


FIG. 1



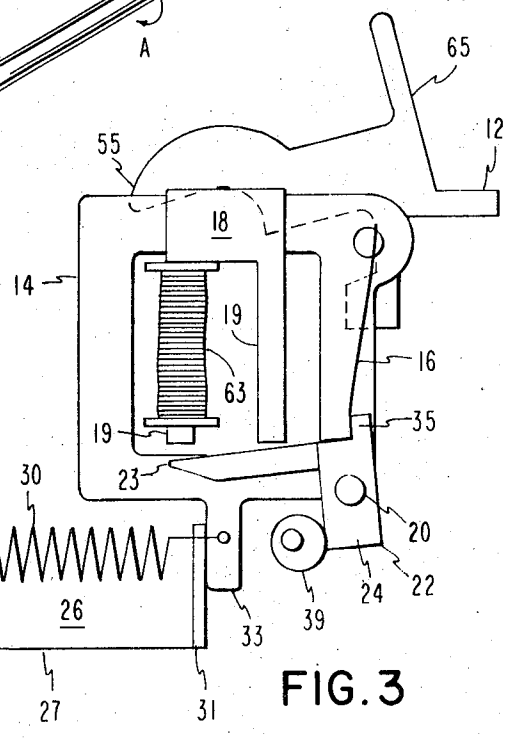


FIG. 3

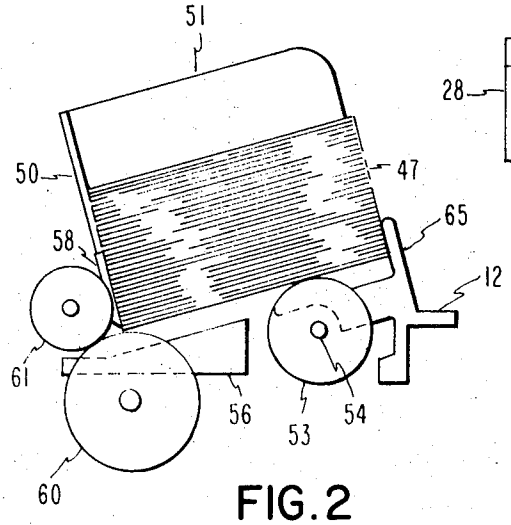


FIG. 2

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DOCUMENT FEED MECHANISM

BACKGROUND OF THE INVENTION

When processing unit record documents such as cards through high speed processing machinery the documents must be rapidly and timely supplied by a feeding mechanism in a predetermined manner, usually singly in sequence and without damage. This is accomplished either by feed knives or friction rolls or belts. With elevated speeds and the consequent high initial acceleration the use of feed knives is likely to damage the documents. The alternative feed rolls or belts must be selectively brought into engagement with the document stack and overcome the friction between adjoining documents to shear the endmost document from the remainder of the stack. The control of the feed must be positive in effecting sufficient frictional engagement causing neither irregular or interrupted document feeding. The control must be positive and not subject to erratic functioning which would permit uncontrolled actuation resulting in document jams or erroneous operation.

SUMMARY OF THE INVENTION

In the document feeding device of the present invention, a continuous running feed roll drives one card at a time from the stack supported in the hopper. The feed roll is permitted to engage the document to be delivered by magnetic actuation which locks together articulated portions of a latch structure for unitary pivotal movement. One portion of the latch structure is fixed to the pivotable document supporting bed plate and the other portion has a cam follower surface. Accordingly when the latch structure pivots as a unit a document is engaged and fed into the device by the exposed feed roll. An emitter disc is secured to a common shaft with the cam and has associated therewith emitter pickups which initiate and terminate energization of the electromagnet in response to feed commands. Since the cam rotates at a speed which is a multiple of the feed rate of the associated device it is unnecessary to lose a full cycle if a delay occurs in the feed command since the latter can be executed during the next subsequent revolution of the cam.

It is an object of the invention to provide an improved document feeding apparatus which is positive in control action while simplified in structure. It is a further object of this invention to provide a document feed control actuable without the loss of a full cycle should a delay in the feed command occur.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view partly broken away of a portion of a parallel feed hopper including a pivot latch mechanism. FIG. **2** is a side elevation partly in section of a hopper utilizing the mechanism of FIG. **1**. FIG. **3** is a side elevation of the latch mechanism of FIG. **1**.

DETAILED DESCRIPTION

As seen in FIG. **1** a bed plate shaft assembly includes a shaft **11** to which is secured a front bed plate **12**, a latch frame **14** and a latch arm spring **16** to form a unitary structure. The latch frame **14** has secured rigidly thereto a pivot pin **20** and an electromagnet core **18** with depending legs or core elements **19**, one of which is surrounded by coil **63**. Journaled about pivot pin **20** is an oscillating latch arm **22** in the form of a bellcrank wherein one projection arm **23** serves as an armature confronting the electromagnet poles or core elements **19** and the other leg **24** presents a cam follower surface. A bed plate spring bracket **26** is secured along the web portion **27** thereof to the machine frame. Bracket **26** presents a flange **28** to which one end of main spring **30** is secured and a flange **31** which serves as an abutment against which the downwardly depending projection **33** of latch frame **14** is retained. An aperture in a depending projection **33** receives the opposite end of spring **30** with the biasing force of the spring exerted to normally retain projection **33** against the flange **31**. The latch arm spring **16** is positively secured at one end to bed plate

pivot shaft **11** with the opposite free end abutting the upper projection **35** of the pivot latch **22** to bias the pivot latch leg **24** into engagement with eccentric cam **39**. The eccentric cam **39** is secured to the cam shaft **40**, rotated by a drive means not shown and has positively fixed thereto at its opposite end an emitter disc **42**. The cam shaft assembly rotates in the direction of arrow A causing the emitter or emitter disc **42** to move past the emitter pick ups **44** and **45**.

As seen in the schematic vertical section of FIG. **2**, a card deck **47** is supported within the hopper, inclined against a rear sidewall **50** and further confined between a pair of end walls **51**, one of which is shown. A series of continuously running feed rolls **53** secured to a common shaft **54** are interdigitated between the support tabs **55** to permit the support tabs to hold the card deck immediately above and out of engagement with feed rolls **53**. The card deck **47** receives further support on the rear bed plate **56** while the hopper is provided with a throat knife **58** to insure delivery of one document at a time from the hopper to document guideway of the associated machine. Documents or cards initially moved through the throat beneath throat knife **58** by the driving force of the frictionally engaged feed rolls **53** thereafter are confined between the throat roll **60** and nudge roll **61** which assume control of the card and drive the card at the transport speed of the machine.

In operation the main tension spring **30**, holding frame projection **33** against the stop of bracket flange **31** maintains the bed plate shaft **11** and front bed plate **12** in a rotational position whereat the support tabs **55** maintain the card deck **47** within the hopper in an elevated disengaged position with respect to feed rolls **53**. Continuously driven cam shaft **40** causes cam **39** to drive the oscillating latch arm **22** against the biasing force of leaf spring **16** and pivot the armature **23** downward once during each rotation of the cam. During the fall of cam **39** latch arm **22** pivots allowing armature **23** to approach the pole faces of core elements **19**, but at the low point of the cam a slight clearance is maintained between the armature and pole faces to prevent impact during each rotation of cam **39** which occurs while coils **63** are deenergized. The emitter pickup **44**, which causes the magnet coil **63** to be energized, is positioned in a selected angular position prior to the low point of the cam profile to permit the magnetic force to build to the required value at the low point of cam **39**. When a feed command is issued the next passage of the emitter past the emitter pickup **44** causes the electromagnet coil **63** to be energized and attract the armature **23** to the magnet pole faces of the core legs **19** thereby securing oscillating latch arm **22** to latch frame **14** as a unitary rigid portion of the bed plate shaft assembly. Oscillating latch arm **22**, latch frame **14** and rear bed plate **12** now pivot as a unit causing the support tabs **55** to pivot downwardly exposing the upper driving surface of the feed rolls **53** to contact the lowermost card present in deck **47** and drive it beneath throat knife **58** to effect delivery from the hopper. When cam shaft **40** has rotated to the position to bring the emitter to a position confronting emitter pick **45**, a signal is issued deenergizing the electromagnet coil **63** and freeing oscillating latch arm **22** for movement independent of the bed plate shaft assembly, whereupon the main tension spring **30** restores the latch frame projection **33** to abutting relation with bracket flange **31** and rear bed plate **12** is positioned with bed plate tabs **55** positioned to support card deck **47** above and out of engagement with the feed rolls **53**. The signal from emitter pickup **45** occurs at a position of angular displacement prior to the bottom center position of cam **39** to allow the magnetic field to decay sufficiently to effect release of the armature at such bottom center position of the cam, thereby minimizing the impact forces as the frame projection **33** restores to a position of abutment with flange **31**.

During each feed cycle the upwardly extending projection **65** of rear bed plate **12** pivots toward card deck **47** to provide a joggling action of the cards. This provides a card joggling capability that functions during each feed cycle.

The cam shaft **42** rotates at a rate that is some multiple of the desired document feed rate. As the consequence if there is

a delay in the command for the next feed cycle, a feed command when issued will be executed on the next subsequent rotation of the cam shaft and accordingly only a fraction of a feed cycle is lost as a result of such delay. By way of example, if the cam rotates at a speed four times the normal feed rate of the hopper mechanism, a delayed feed command will cause a card to be fed during the next succeeding rotation of the cam which occurs during each quarter of the normal feed cycle. As a result only a quarter cycle is lost rather than a full cycle where a slight delay occurs in the feed command. Thus, depending upon the multiple of the feed rate at which the cam shaft operates, the delay occasioned by a late command from the associated processor is only one third, one fourth, one fifth, etc. of a normal document feed cycle.

I claim:

1. Apparatus for feeding documents from a stack comprising:

a hopper;

a continuously driven feed member;

a pivotable means including a document supporting bed member selectively pivotable between a first position whereat a document stack supported on said bed member is retained above and out of engagement with said feed member and a second position permitting the lowermost document of said stack to engage said feed member whereby such document is sheared from said stack and delivered from said hopper;

a first element secured to said pivotable means for movement in unison therewith;

a second element pivotally secured to said first element;

drive means engaging and periodically pivoting said second element; and

electromagnet means mounted on said first element and selectively actuable to retain said elements fixed with respect to one another to cause said drive means to pivot said first and second elements in unison.

2. The apparatus of claim 1 wherein said second element comprises a bell crank pivotally connected to said first element with one arm that forms an armature adjacent the pole of said electromagnet and the other arm presents a cam follower surface and said drive means which engages said second element comprises a cam, whereby said second element is pivoted by each rotation of said cam and said first member, bed member and bell crank are pivoted as a unitary structure by said cam when said electromagnet is actuated.

3. The apparatus of claim 2 further comprising first biasing means urging said document supporting bed member toward said first position and second biasing means urging said bell crank and other arm toward engagement with said cam.