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Landis et al.

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[54] **INTERMITTENT DRIVE MECHANISM**

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[73] Assignee: **NCR Corporation,** Dayton, Ohio

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[52] **U.S. Cl.** **242/55,** 242/67.2

[51] **Int. Cl.** **B65h 75/02**

[58] **Field of Search** ..... 242/55, 67.2, 67.3 R

[56] **References Cited**

UNITED STATES PATENTS

1,310,195	7/1919	Lockwood	242/67.2
2,872,188	2/1959	Harkins	242/55
3,284,017	11/1966	Merrill	242/55 X

FOREIGN PATENTS OR APPLICATIONS

346,223	4/1931	Great Britain	242/67.2

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[57] **ABSTRACT**

An intermittent drive mechanism including a rotary support member, a plurality of equally spaced stud members mounted circumferentially on the support member and a drive arm resiliently urged into engagement with the stud members. Rotation of the support member will rotate the stud members through an operative and inoperative position wherein the drive arm is moved a predetermined distance by the stud members when rotated to an operative position and is returned to its home position upon rotation of the stud members to an inoperative position.

10 Claims, 3 Drawing Figures

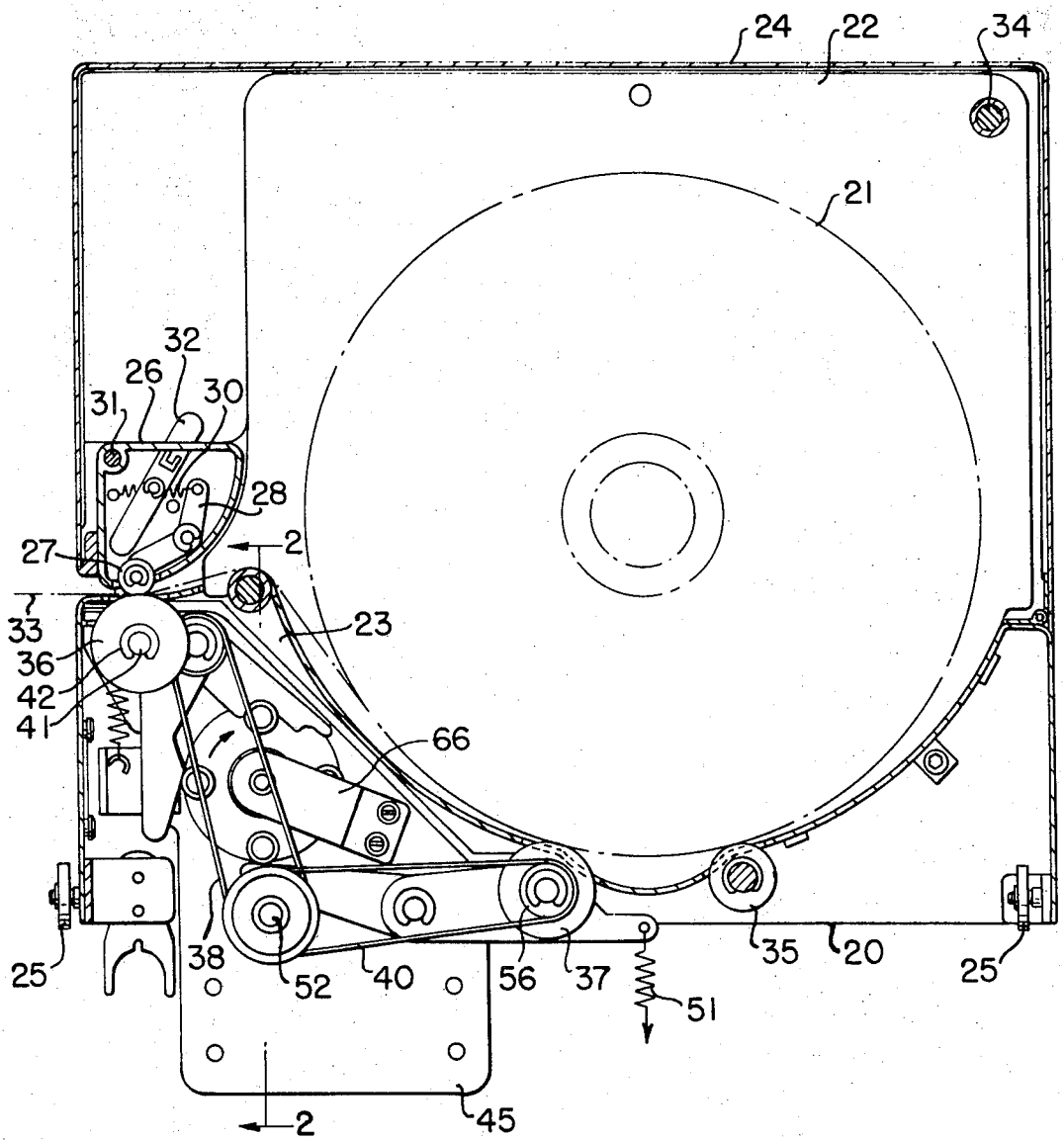


FIG. 1

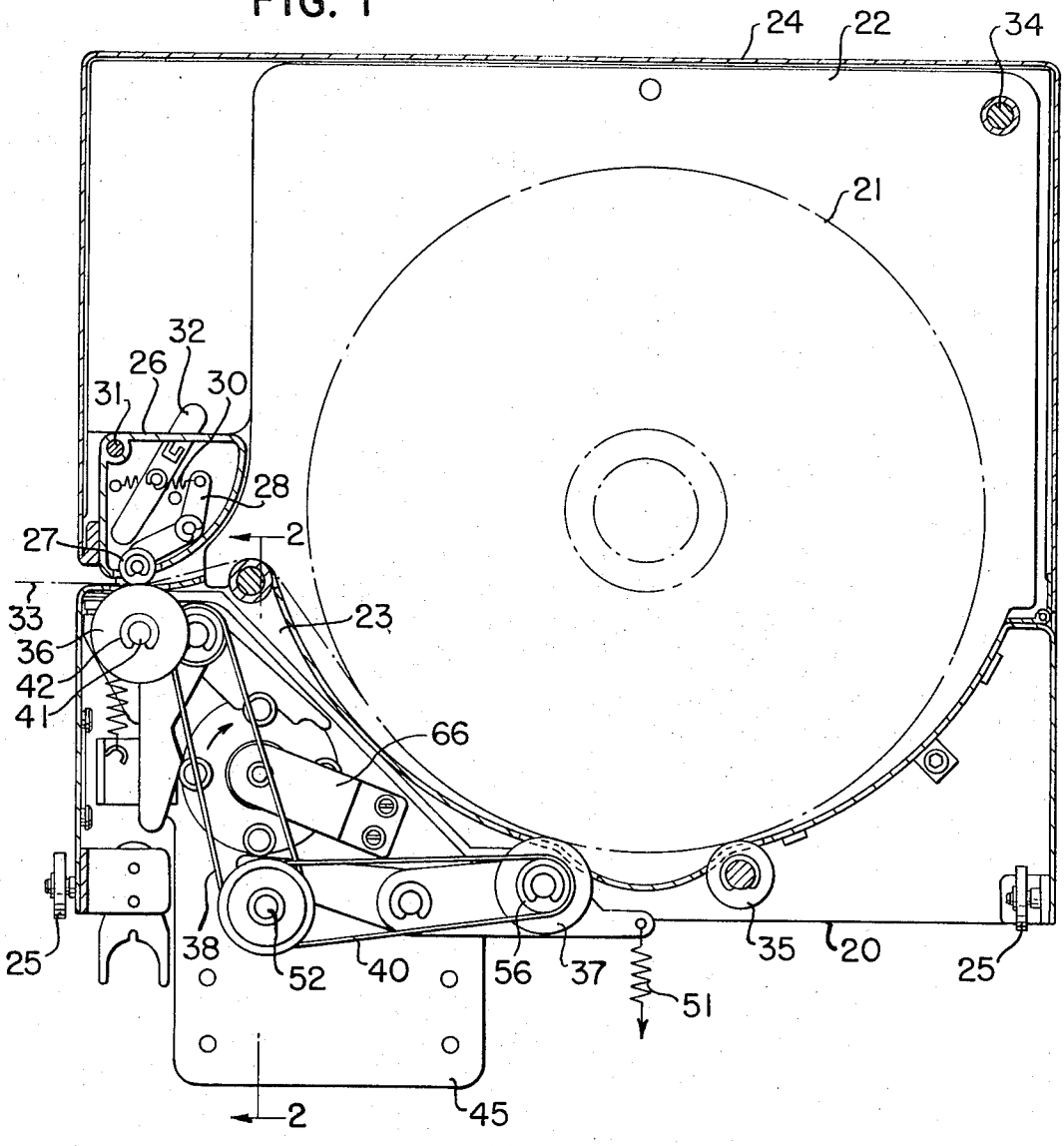

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FIG. 3

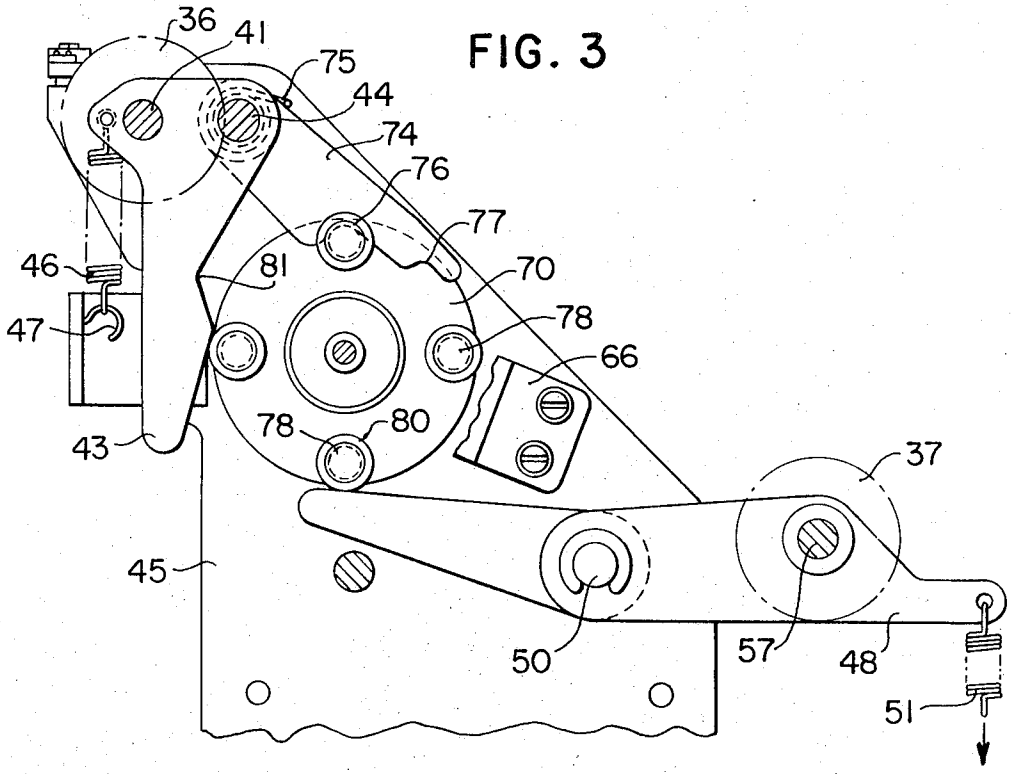
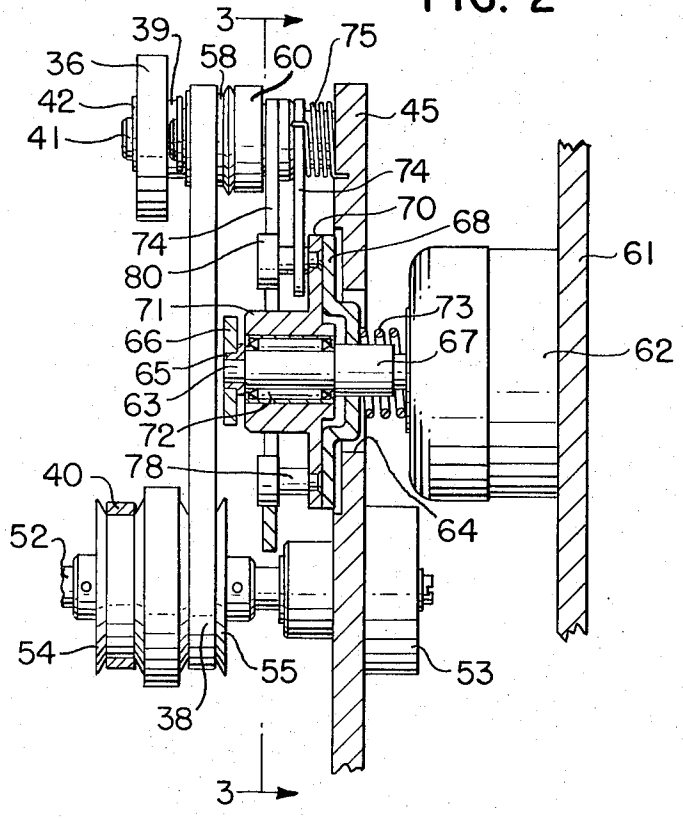

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FIG. 2


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INTERMITTENT DRIVE MECHANISM

BACKGROUND OF THE INVENTION

In general this invention relates to an actuating mechanism which functions to intermittently move a pair of drive rollers into and out of an operating position, each drive roller moving in a direction perpendicular to each other. The mechanism is utilized with a merchandise tag printer in which a roll of tag stock is selectively fed into the printer for the printing of coded information thereon. Rolls of different size tag stocks are used with the printer. Depending on the size of the tag stock required to be printed, the selected roll of tag stock is shifted into position adjacent the printer and the drive rollers are then operated to engage and feed the tag stock into the printer. High speed operation of the printer requires that the movement of the drive rollers between an engaging and disengaging position with the tag stock be of a very short duration. Therefore it is an object of this invention to provide a simple and reliable actuating mechanism which is capable of moving a plurality of drive members into and out of an operative position in a positive manner and with a minimum amount of time. Another object of this invention is to provide an actuator mechanism which is capable of moving a plurality of drive members each in a direction which is not parallel with any of the other drive member movements.

SUMMARY OF THE INVENTION

In order to fulfill these objects, there is provided a mechanism for actuating a plurality of drive arms which includes a rotatably-mounted indexing plate supporting a plurality of equally spaced circumferentially mounted stud members. Each drive arm associated with the indexing plate is constantly urged into engagement with one of the stud members. Rotation of the indexing plate will move the stud members through two positions in which the drive arms are cammed by the stud members between an operative and inoperative position. The drive mechanism for the indexing plate includes a rotary solenoid, a slip and a one way clutch member and a latching detent for controlling the length and direction of movement of the indexing plate.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a portion of a tag stock supply bin showing the actuation system for moving the drive rolls into and out of a feeding engagement with the roll of tag stock.

FIG. 2 is a sectional view taken on lines 2—2 of FIG. 1 showing details of the actuating mechanism.

FIG. 3 is a sectional view taken in lines 3—3 of FIG. 2 showing further details of the actuating mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a supply bin **20** for use with a tag printer which includes a plurality of rolls **21** of different size tag stock. Each roll is rotatably mounted on a side plate **22** which in turn is rotatably mounted on a fixed plate **23** secured to the bin **20.** A cover **24** is rotatably secured to the rear of the bin. A pair of rollers **25** mounted on the bin allows the bin to be shifted so that the required roll of tag stock will be positioned adjacent the tag printer (not shown).

Associated with each of the rolls **21** of tag stock is a tag feed idler assembly comprising a housing **26** within which is rotatably mounted an idler wheel **27** mounted on a lever **28.** The lever **28** and the idler wheel **27** are urged in a counter-clockwise direction by a spring **30** mounted between the lever **28** and the housing **26.** The housing **26** is rotatably mounted on a stud **31** which in turn is secured to the fixed plate **23.** A lever **32** functions to hold the idler assembly in a position wherein the idler wheel **27** will be rotated by the spring **30** to an engaging position with the strip **33** of tag stock. Whenever a new reel of tag stock is to be inserted, the lever **32** is depressed allowing the housing **26** to be rotated in a counter-clockwise direction while the plate **22** is rotated clockwise about a stud **34** to facilitate the mounting of the reel. After the mounting of the reel, the housing **26** is returned to its lower position preparatory to a feed operation. An idler wheel **35** (FIG. 1) is mounted adjacent each reel and functions to carry half the weight of a full reel of tag stock, thereby lowering the torque required of the tag feed system.

The tag feed system includes a pair of drive rollers **36, 37** (FIGS. 1 – 3, inclusive) which are driven by belts **38, 40** respectfully. The drive roller **36** coacts with the idler wheel **27** to feed the tag stock **33** from the roll **21** while the drive roller **37** engages the bottom of the roll **21** thereby easing the drive requirements when the reel is full.

The drive roller **36** (FIG. 3) is secured to a hub **39** (FIG. 2) rotatably mounted on a shaft **41** by means of clip **42.** The shaft **41** is secured to an arm member **43** which in turn is rotatably mounted on a shaft **44** secured to a mounting plate **45.** A spring **46** mounted between a hook **47** secured to plate **45** and the arm **43** normally urges the arm and the roller **36** counter-clockwise about the stud **44** and away from engagement with the idler wheel **27** (FIG. 1).

The drive roller **37** is rotatably mounted on a shaft **57** secured to an arm member **48** which in turn is rotatably mounted on a shaft **50** secured to plate **45.** A spring **51** mounted between the arm **48** and a portion of the framework (not shown) normally rotates the drive roller **37** clockwise about the shaft **50,** thereby withdrawing the roller from engagement with the roll **21** of tag stock.

The drive system for the rollers **36, 37** includes a motor driven drive shaft **52** (FIG. 2) rotatably mounted in a bearing **53** secured to the plate **45.** Pinned to the drive shaft **52** are a pair of pulley members **54, 55.** The belt **40** engages the pulley **54** and a hub member **56** (FIG. 1) to which the drive roller **37** is secured. The hub member **56** is rotatably mounted on the shaft **57.**

The belt **38** is mounted between the pulley **55** and a hub member **58** (FIG. 2) rotatably mounted on shaft **44.** Secured to the hub **58** is a gear member **60** which engages a similar gear member (not shown) on hub **39.** Rotation of The drive shaft **52** is adapted for rotation in either direction to accommodate a feed or retrieve operation with respect to the tag stock **33.**

The mounting plate **45** is secured to the support framework and is located adjacent the tag printer. Transverse movement of the bin **20** (FIG. 1) with respect to the tag feed mechanism will position the appropriate reel of tag stock adjacent the tag feed mechanism. The drive roller **36** will, at this time, have been rotated from an engaging position with the idler roll **27**

by an actuating mechanism which will now be described.

As best shown in FIG. 2, mounted on a side frame 61 of the machine is a rotary solenoid 62 having a drive shaft 63 extending through a slot 64 located in the mounting plate 45. The end of the shaft 63 is journaled within a bushing 65 mounted within a support arm 66 (FIGS. 1 and 2) secured to plate 45.

Mounted on the drive shaft 63 is a square hub 67 on which is mounted a slip clutch disc 68. The slip clutch disc engages an index plate 70 (FIGS. 1 and 2) having a hub 71 which engages a one-way roller clutch 72 mounted on the shaft 63. The roller clutch 72 is a device which acts like a roller bearing when it travels in one direction but locks on the shaft 63 when it travels in the other direction. The rotary solenoid 62 is of the type which has, in this example, a 45° stroke and a 0.060 inch axial stroke which is transmitted by a compression spring 73 to the slip clutch 68 which in turn rotates the index plate 70. Rotation of the drive shaft 63 by the energizing of the solenoid 62 in a clockwise direction as viewed in FIG. 1 will lock the roller clutch 72 onto the shaft 63, which then rotates the index plate 70. Thus the index plate is rotated in a clockwise direction by the roller clutch 72 and the slip clutch 68.

As soon as the solenoid 62 completes its 45° rotation, it is deenergized. When this occurs, the index plate 70 attempts to overtravel due to its own inertia which movement is checked by the drag of the slip clutch 68 and by the latching angle of a spring actuated detent member 74 (FIG. 3) rotatably mounted on the shaft 44. The detent member 74 is normally urged in a clockwise direction as viewed in FIG. 3 by a torsion spring 75, thereby positioning one of two shoulder portions 76, 77 for engagement with one of four stud members 78 mounted on the index plate. The solenoid drive shaft 63, upon the deenergizing of the solenoid 62, will be rotated counter-clockwise to its home position (FIG. 3) by a solenoid return spring (not shown) located within the solenoid housing, thereby disengaging the roller clutch 72 from the shaft 63, thus disabling the index plate 70 from the rotation of the shaft 63. The slip clutch disc 68, however, secured to the drive shaft 63, will rotate the index plate in a counter-clockwise direction until a stud 78 engages one of the shoulders 77, 76, of the detent member 74, thus stopping the index plate 70. The clutch disc 68 will continue its counter-clockwise movement and slip against the index plate 70 until the solenoid drive shaft 63 reaches its home position. It will be seen from this construction that the limited overtravel of the index plate 70 together with the return drive of the slip clutch disc 68 against the positive stop of the latching detent member 74 insures an exact movement of the index plate 70. The length of movement of the index plate 70 is determined by the number of studs 78 that are mounted on the index plate. With the four studs that are used in the present embodiment, the step of the index plate, as disclosed previously, is 45 degrees. In any case, the length of movement is always equal to one-half the arcuate distance between two studs.

As shown in FIG. 3, each of the arm members 43, 48 are urged in a direction by springs 46, 51 to move an end portion of each of the arms into engagement with a bearing member 80 mounted on the end of one of the studs 78. Upon rotation of the index plate 70, the arms 43, 48 will be rocked about their pivot point by the rotational movement of the studs 78 to move the drive rollers 36, 37 into engagement with the tag strip 33 to initiate a feed operation. This movement will position a stud 78 against the shoulder 76 of the detent member 74. This condition is shown in FIG. 3. Upon completion of the tag feed operation, the index plate 70 is rotated further clockwise 45 degrees to position a stud 78 against the shoulder 77 of the detent member 74 and against a recessed portion 81 of arm 43. This movement will also move a stud 78 along the edge of arm 48, thus allowing the springs 46, 51 to rock the arms 43, 48 and the drive rollers 36, 37 from engagement with the tag stock 33, thus terminating a feed operation. A subsequent operation of the solenoid 62 will move the arms back to the position shown in FIG. 3 to initiate a feed operation.

It will be seen from this construction that the cyclic movement of the rollers with respect to the tag stock is positive and is capable of a very short operating cycle. This condition allows for the selection and feeding of different size tag stocks in a minimum of time, thus allowing the tag printer to operate at peak efficiency.

While only four studs are shown mounted on the index plate 70 operating two arms, it is obvious that any number of studs and arms may be accommodated utilizing this type of construction. The position of the arms is not critical with respect to the path of movement of the studs, thus allowing the arms to be located in any position with respect to each other.

While the form of mechanism shown and described herein is admirably suited to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the form or embodiment disclosed herein, for it is susceptible of embodiment in various other forms, all coming within the scope and spirit of the invention.

What is claimed is:

1. A drive mechanism comprising:
   a. a rotatably mounted support member;
   b. a plurality of spaced apart drive members circumferentially mounted on said support member;
   c. an actuating member rotatably mounted for movement between an operative and inoperative position, said actuating member positioned adjacent the path of movement of said drive members;
   d. means for normally rotating said actuating member into engagement with one of said drive members;
   e. and means for sequentially rotating said support member a predetermined distance to move the drive members through an operative and inoperative position whereby the actuating member is moved through an operative and inoperative position by said drive members.

2. The drive mechanism of claim 1 in which each of said drive members comprises a stud member, said stud member being spaced apart sufficiently to allow said actuating member to move through an operative and inoperative position upon the sequential rotation of said support member.

3. The drive mechanism of claim 2 in which said actuating member comprises a lever member having an end portion which is moved into engagement with said stud members by said normally rotating means, said lever member being rotated through an operative and inoperative position by movement of the stud members upon the sequential rotation of said support member.

4. The drive mechanism of claim 3 in which said sequentially rotating means includes a reciprocally movable cyclically operable drive means engaging said support member and a uni-directional control means engaging said stud members whereby said stud members will be rotated a predetermined distance in one direction only upon operation of said drive means.

5. A mechanism for moving a plurality of drive rollers between an operative and inoperative position comprising:

a. a rotatably mounted disc member;

b. a plurality of equally spaced stud members circumferentially mounted on said disc member;

c. a plurality of lever members rotatably mounted adjacent said disc member, each of said lever members rotatably supporting a drive roller and having an end portion positioned adjacent one of said stud members;

d. resilient means engaging each of said lever members for rotating said lever members in a direction whereby the end portion of said lever members engages one of said stud members;

e. means for rotating said disc member a predetermined distance in one direction including a rotary drive member adapted for reciprocal movement through a predetermined distance;

f. clutch means mounted on said drive member and engaging said disc member, said clutch means adopted to reciprocally rotate said disc member through said predetermined distance;

g. and detent means engaging one of said stud members and adapted to block movement of said disc member in one direction whereby upon successive operations of said rotary drive member, said stud members will move said lever members through an operative and inoperative position.

6. The mechanism of claim 5 in which said stud members are spaced sufficiently apart to allow the end portion of each lever member to be engaged by adjacent stud member on every other operation of said rotary drive member whereby the lever member will be moved through an operative and inoperative position on successive operation of said drive member.

7. The mechanism of claim 5 in which said drive member comprises a rotary solenoid adapted, upon operation, to rotate said disc member a distance equal to one-half the arcuate distance between two studs.

8. The mechanism of claim 7 in which said detent means include

a. a rotatably mounted detent arm positioned adjacent said disc member, said detent arm having a plurality of blocking surfaces;

b. and spring means engaging said detent arm, said spring means adapted to move said detent arm in a direction to position one of the blocking surfaces adjacent one of said stud members whereby said disc member will be rotated by said solenoid in one direction only.

9. An intermittent drive mechanism comprising:

a. a rotatably mounted disc member;

b. four equally spaced stud members circumferentially mounted on said disc member;

c. a pair of arm members each rotatably mounted adjacent said disc member in a plane perpendicular to each other, each of said levers supporting a drive roller and having an end portion positioned adjacent one of said stud members;

d. spring means engaging said arm members and adapted to rotate each of the end portions of the arm members into engagement with one of said stud members;

e. and means for rotating said disc member a distance equal to one-half the arcuate distance between the stud members whereby both arm members are rotated by said stud members through an operative and inoperative position upon successive operation of said rotating means.

10. The intermittent drive mechanism of claim 9 in which said rotating means include

a. a rotary solenoid adapted for reciprocal movement through a distance equal to one-half the arcuate distance between the stud means;

b. clutch means mounted on said solenoid and engaging said disc member for reciprocally rotating said disc member through said distance;

c. and detent means engaging said stud member in a blocking relationship to allow said stud members to be rotated in one direction by said clutch means whereby said stud members will move said arm members through an operative and inoperative position upon successive operations of said rotary solenoid.

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