United States Patent

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[31] **PV 2613-68**

[54] ARRANGEMENT FOR GENERATING A NOT UNIFORM MOTION OF PRIMARY GRIPPING DEVICES PARTICULARLY FOR PRINTING MACHINES

2 Claims, 8 Drawing Figs.

[52] U.S. Cl. 271/51
[51] Int. Cl. B65h 5/12
[50] Field of Search 271/51, 82

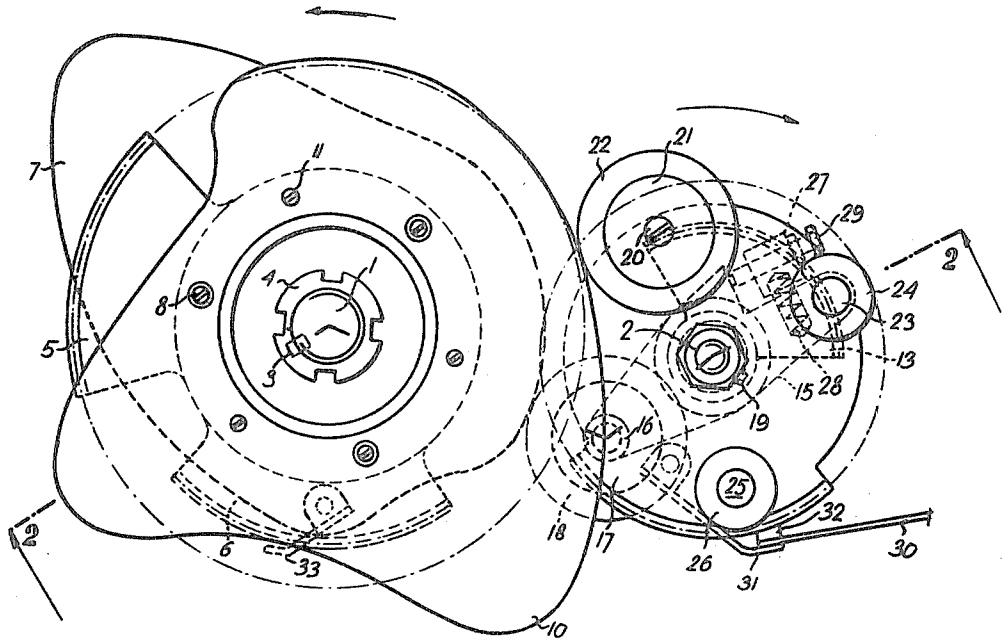
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Attorney—Richard Low

ABSTRACT: Intermittent feed means for printing machines and the like having a rotating cylinder and a rotating primary gripping feed arranged along a parallel axis thereto. The combination includes a drive shaft extending from the rotary cylinder having mounted thereon a first contoured cam and a pair of axially aligned segment gears. A mounting shaft extends from the rotating gripper feed and also has mounted thereon a pair of axially aligned gears. The gears on one shaft correspond to the gears on the other shaft. A pair of cam followers are fixed to one of the segment gears mounted on the rotating gripper shaft, the cam followers being adapted to engage their corresponding cam. A lever pivotally mounted at its center about the rotary gripper shaft is provided with still another pair of rollers at each of its ends and is spring biased with respect to the segment gear mounting the first mentioned cam followers. The driving shaft contains a control cam adapted to engage one of the rollers on the rotating lever arm. Rotation of the drive shaft causes the first cam and its three engaging cam follower rollers to effect an intermittent nonuniform motion in the rotary gripping feed while the fourth cam follower riding on the second of the cams regulates the engagement and timing of the first three cams.



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Fig. 1

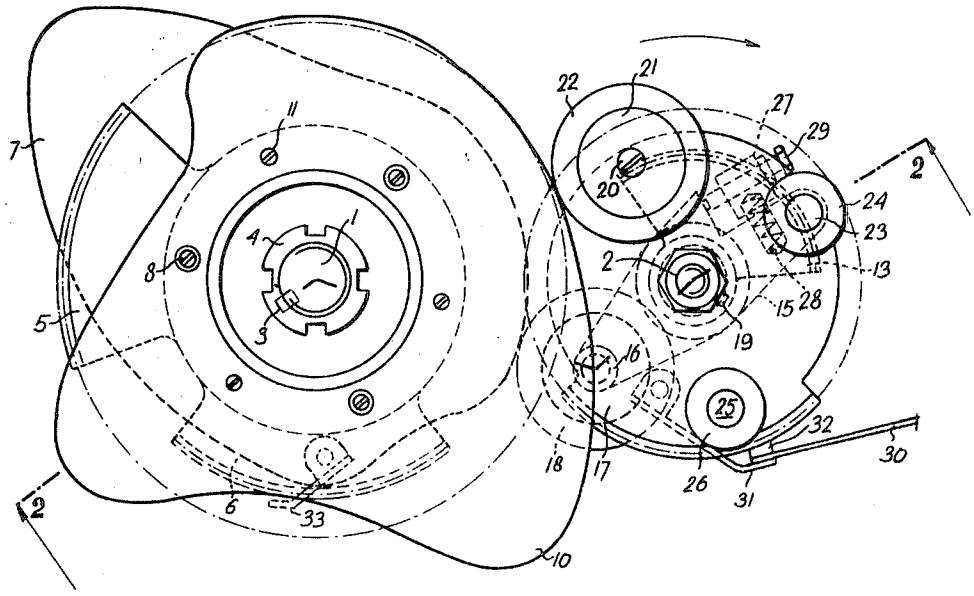
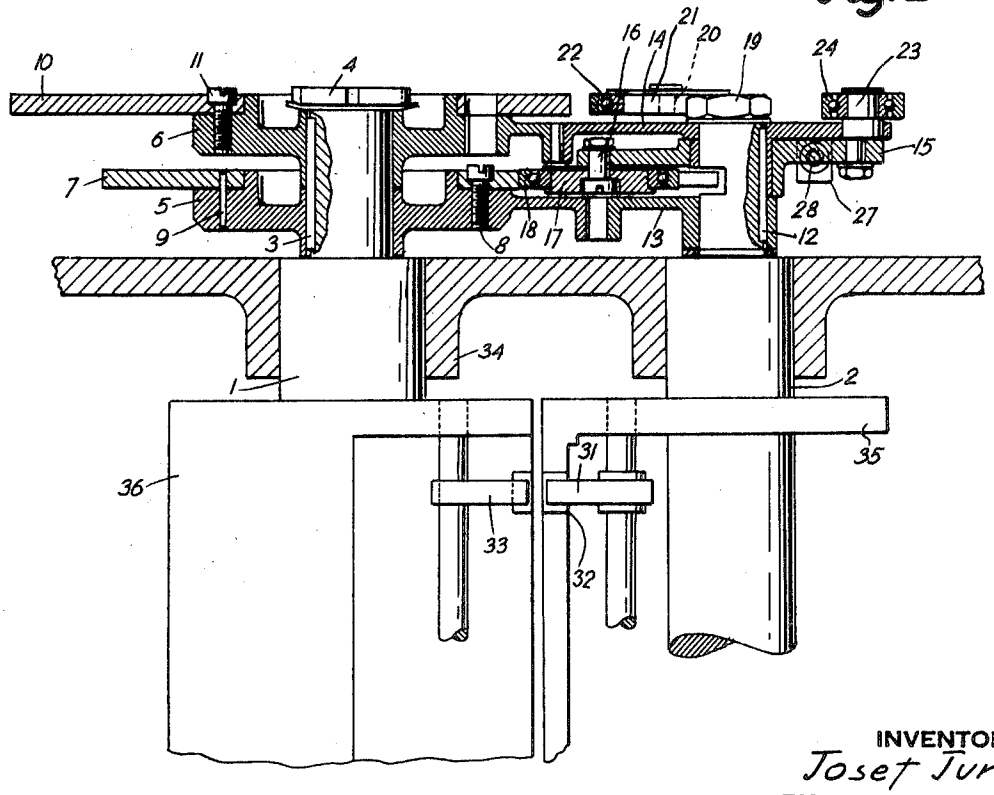


Fig. 2



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Fig. 3

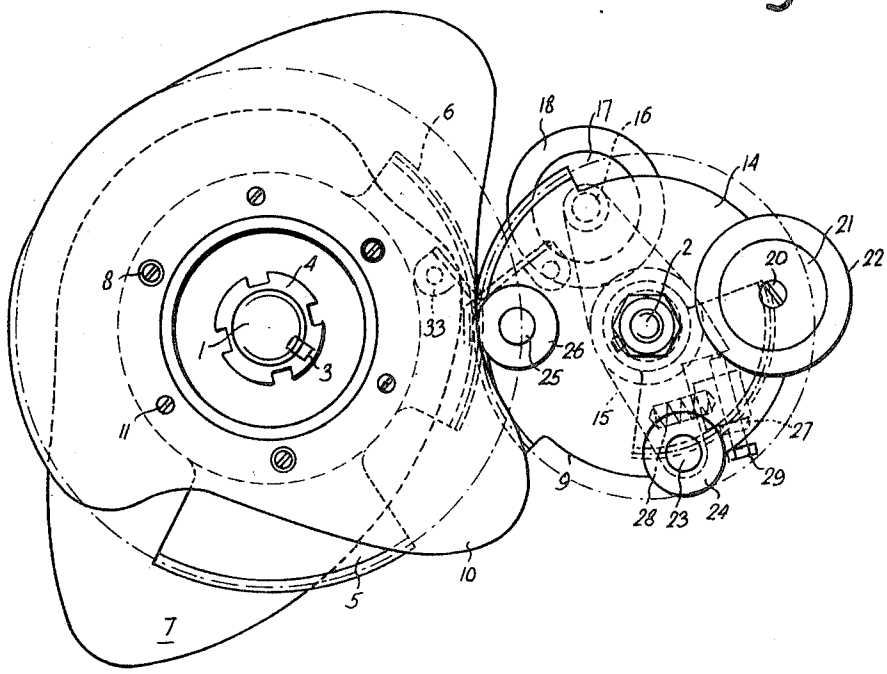
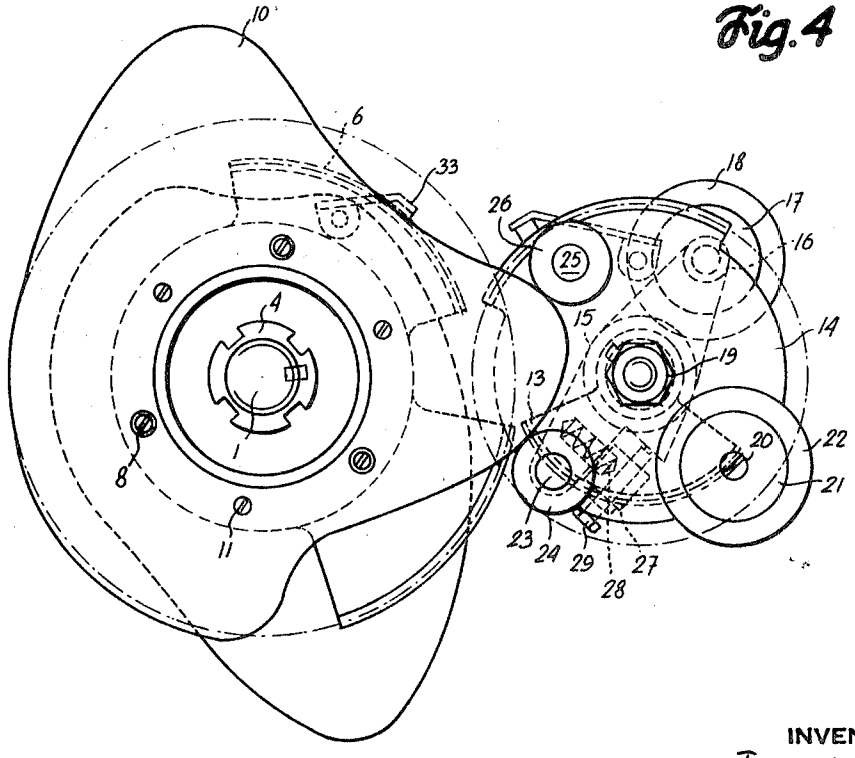


Fig. 4



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Fig. 5

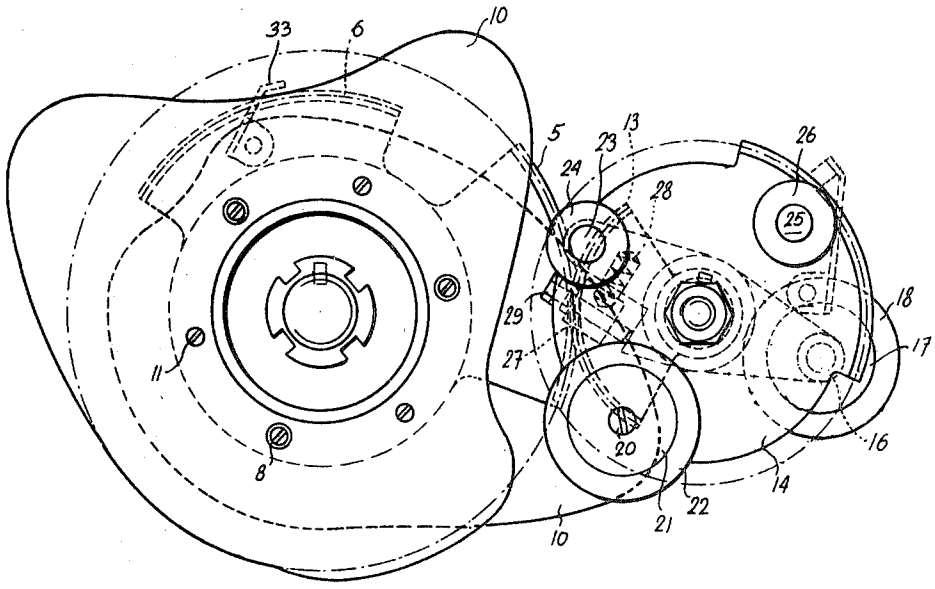
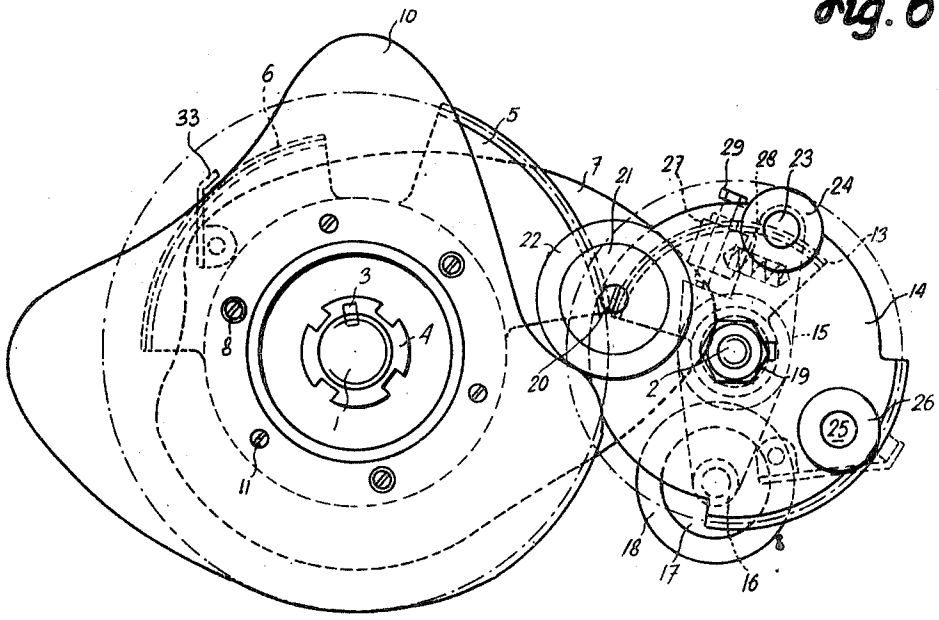


Fig. 6



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Fig. 7

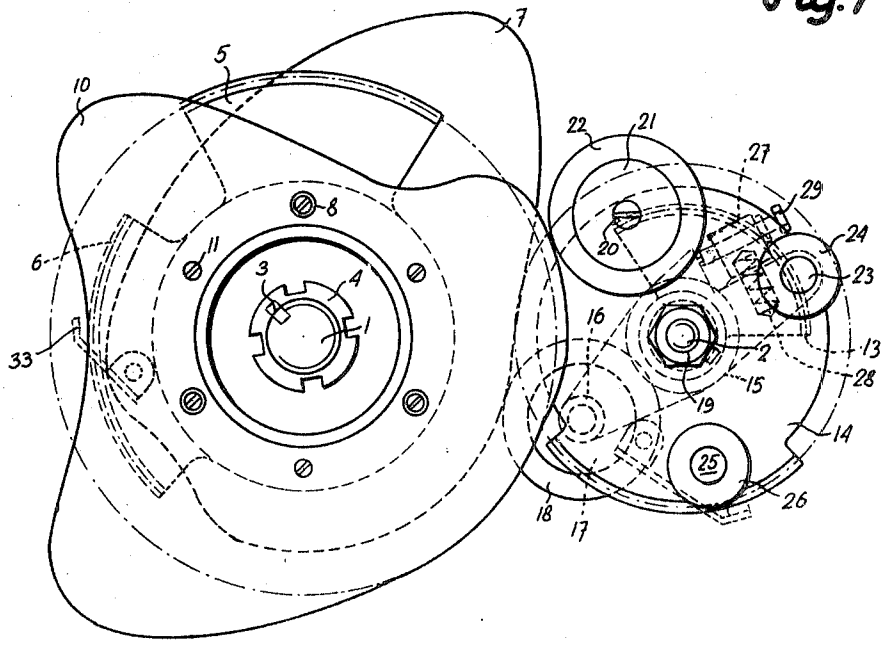
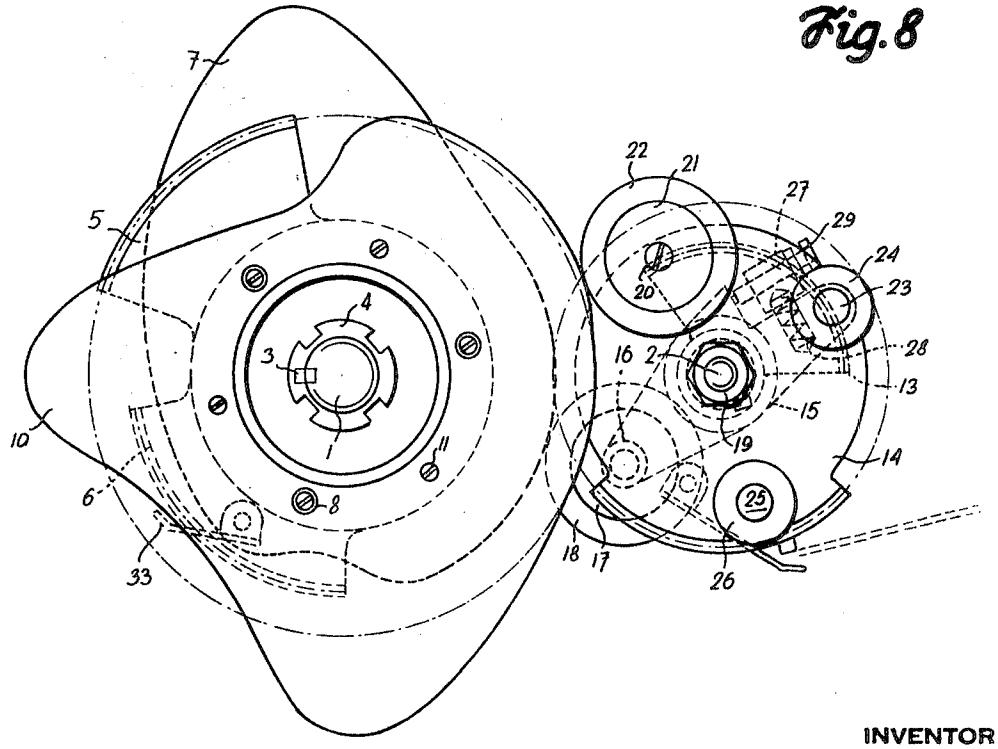


Fig. 8



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ARRANGEMENT FOR GENERATING A NOT UNIFORM MOTION OF PRIMARY GRIPPING DEVICES PARTICULARLY FOR PRINTING MACHINES

The present invention relates to printing machines and in particular to a mechanism for generating the nonuniform motion of the primary feed gripping device therefore.

It is necessary for the primary gripping device to be rotated in the nonuniform manner according to a predetermined cycle during which it introduces an oriented paper sheet to the impression or printing cylinder. The motion starts from the rest position where the grippers clamp the oriented sheet and is followed by a period in which a rapid accelerating movement carries the sheet until it reaches a speed coincident with the circumferential speed of the printing cylinder, at which time the sheet is transferred to the impression cylinder or printing cylinder. The primary gripping device thereafter rotates for a substantial part of its circumference, subsequently slowing down to a full stop so as to be ready for the gripping of a new paper sheet.

Most of the known mechanisms for generating such motion employ complex gears and drive means such as a Geneva cross or a plurality of rollers fixed on uniformly rotating disc, the rollers cooperating with forked shaped cams fixed on a shaft of the primary gripping device.

A drawback of the known mechanism is that Geneva cross does not allow optimum acceleration to higher speeds. A further drawback is the necessity for such devices to cooperate with stop means in order to define the required movement. Such stop means require adjustment since they wear after prolonged operation. Still another drawback arises from the fact that the large mass of the cam acting on the relatively large arm of the shaft of the gripping devices has an unfavorable effect on the operation and the life of the mechanism. Another drawback of this mechanism resides in the fact that the diameter of the primary gripping device becomes too small when lengthy operating cycles are required. This is particularly disadvantageous for printing machines using more than one color, where the angle of paper is supplied might even exceed 90° , or in the transfer of heavy paper or cartons.

It is an object of the present invention to provide a mechanism for driving a gripping device of a printing machine at intermittent and nonuniform speeds, overcoming the prior art disadvantages.

It is an object of this invention to provide a mechanism permitting the diameter of the drum of the gripping device to be substantially increased so as to enable the feeding of paper of higher weight of thickness.

Another object of this invention is to simplify the means for accelerating and decelerating the motion of the gripper device.

Still another object is to eliminate the use of stop means.

In accordance with the present invention, feed means for a printing machine and the like, having a rotating cylinder and a rotating primary grip feed means arranged in a parallel axis thereto, is provided. The feed means comprises a drive shaft extending from the rotary cylinder and a mounting shaft extending from the rotary gripper feed means. Mounted on the drive shaft is a contoured cam and a pair of axially aligned segmented gears. Mounted on the mounting shaft is a corresponding pair of segmented gears adapted to engage with the gears on the drive shaft. One of the segmented gears on the mounting shaft contains a pair of cam follower rollers adapted to engage the edge of the cam mounted on the drive shaft. A lever pivoted about its center is mounted on the mounting shaft and it too contains a pair of cam follower rollers at each of its ends. The lever is spring biased with respect to the segmented gear containing the other rollers. A control cam is fixed to the driving gear. One of the cam follower rollers of the lever and the two cam follower rollers mounted on the segmented gear are adapted to engage the first mentioned contoured cam which is shaped to provide intermittent nonuniform motion in the rotary gripper feed device during rotation of the drive shaft while the remaining roller mounted on the lever is adapted to follow the contours of the control cam to regulate the engagement thereof and duration of engagement of the three earlier mentioned cams.

Full details of the present invention are disclosed in the following description.

In accordance with the present invention, feed means for a printing machine and the like, having a rotating cylinder and a rotating primary grip feed means arranged in a parallel axis thereto, is provided. The feed means comprises a drive shaft extending from the rotary cylinder and a mounting shaft extending from the rotary gripper feed means. Mounted on the drive shaft is a contoured cam and a pair of axially aligned segmented gears. Mounted on the mounting shaft is a corresponding pair of segmented gears adapted to engage with the gears on the drive shaft. One of the segmented gears on the mounting shaft contains a pair of cam follower rollers adapted to engage the edge of the cam mounted on the drive shaft. A lever pivoted about its center is mounted on the mounting shaft and it too contains a pair of cam follower rollers at each of its ends. The lever is spring biased with respect to the segmented gear containing the other rollers. A control cam is fixed to the driving gear. One of the cam follower rollers of the lever and the two cam follower rollers mounted on the segmented gear are adapted to engage the first mentioned contoured cam which is shaped to provide intermittent nonuniform motion in the rotary gripper feed device during rotation of the drive shaft while the remaining roller mounted on the lever is adapted to follow the contours of the control cam to regulate the engagement thereof and duration of engagement of the three earlier mentioned cams.

Full details of the present invention are disclosed in the following description.

The invention is illustrated in the accompanying drawings, in which

FIG. 1 is an elevation of a mechanism according to the present invention,

FIG. 2 a cross section along the line 2–2 as indicated in FIG. 1,

FIGS. 3 to 8 are elevations of the mechanism as shown in FIG. 1 showing its different position during its operation.

Reference to FIGS. 1 and 2, there will be seen a driving shaft 1 of a conventional compression cylinder 36. Fixed to the end of the shaft 1 by means of a key way 3 is an indented gear segment 5 by which accelerated speed is to be obtained. A contoured control cam 7 is fixed to the segmented gear 5 by means of screws 8 and bolts 9. A second indented gear segment 6 by which normal speed is obtained is also fixed to the shaft 1 by means of the same key way 3. Segments 5 and 6 are secured by a nut 4. A contoured guiding cam 10 is fixed to the segmented gear 6 by means of screws 11. The cams 7 and 10 and the gears 6 by means of screws 11. The cams 7 and 10 and the gears 5 and 6 define paths about the axis of the shaft 1.

The gripping device is mounted on a shaft 2 and includes paper sheet guiding plates 35 which are fixed by means of a key way 12 to the shaft. To the end of the shaft 2 if fixed an indented gear segment 13 cooperating with the segment 5 for accelerated speed and an indented gear segment 14 cooperating with the gear segment 6 for normal speed. The gear segments 13 and 14 are secured axially on the end of the shaft by a nut 19. The driving shaft 1 and the mounting shaft 2 for the gripping device are both supported by the sidewalls 34 of he frame of the printing machine. A two arm lever 15 is pivotally mounted on the hub of the indented segment 14, and has a supporting roller 24 arranged on one of its ends. The roller 24 is radially adjustable by being fixed on an eccentric bolt 23. A disclike insert 17 supporting a roller bearing 18 is fixed on the opposite end of the lever 15 by means of a bolt 16. The two arm lever 15 has a recess, housing a pressure spring 28 which bears with one end against a stop 27 fixed on the indented segment 14. The stop 27 is provided with a set screw 29 bearing against a shoulder extending from the hub of the two arm lever

15. In this manner the lever 15 is adjustable positioned to have the roller 18 bear against the edge of the cam 8 with a predetermined bias. The indented segment 14 is provided adjacent to its periphery with a bolt 25 supporting a guiding roller 26 and with a bolt 20, on which a disk-shaped insert 21 is fixed and which supports a second guide roller bearing 22. The driving shaft 1 receives its motion as seen by the arrow from the main drive of the machine in a conventional manner. The rotating primary gripping device is mounted on the shaft 2, the guide plates 35 support grippers 31 and stops 32 for clamping the paper sheet (see FIG. 2). The cams 7 and 10 are, of course, contoured in the known manner to produce the movement prescribed to them and to effect intermittent nonuniform motion of the gripper feed.

The described structure operates synchronously and sequentially as follows.

The operating cycle is initiated when the grippers 31 of the primary gripping device clamp a paper sheet 30. In the course of such clamping, the grippers 31 of the primary gripping device are of course at rest, being placed in this condition by so selecting the peripheral edge of the guiding cam 10 so that the guiding roller bearing follower 22 abuts against it. (See FIG. 1). A constant contact pressure between the guiding roller 22 and the guiding cam 10 is obtained by the spring loaded roller 18 which itself is urged against the edge of the bearing cam 7 by the pressure spring 28. In the rest position the grippers are in a very stable and fixed condition. The stable position of the primary gripping device ends after the grippers 31 effectively clamp the sheet. Immediately thereafter its accelerating motion starts. FIG. 1 illustrates the end of the rest position and the start of the movement of the primary gripping device. The rapid accelerated movement of the primary gripping device is caused by the contact of the segments 5 and 13 and their rotation in response to the shape of the guiding cam 10. The rapid accelerated movement ends as the indented segments 6 and 14 come into engagement. The spring loaded cam follower 18 rolls along the edge of the bearing cam 7 generating in the course of this movement a force which causes the guiding roller 22 to disengage from the guiding cam 10. During the further movement of the segments 6 and 14, the paper sheet 30 is grasped by the grippers 33 of the impression cylinder as shown in FIG. 3 preparatory for complete transfer to the impression cylinder. During the subsequent movement and prior to the time the indented gear segments 6 and 15 come out of engagement, the guiding roller 26 and the control roller 24 come in to contact with the rotated circumference of the guiding cam 10. The guiding cam 10 then causes the indented segments 6 and 14 to move smoothly out of engagement and produces a further rapid acceleration of the primary gripping device by a smooth reengagement of the indented segments 5 and 13 (FIG. 4). The yielding pressure of the control roller 24 may be adjusted by means of the eccentric bolt 23.

FIG. 5 shows the position of the indented segments 5 and 13 during the second accelerated synchronous movement of the primary gripping device. Before the indented segments 5 and 13 move out of engagement, the guiding roller 22 again contacts the guiding cam 10 and the control roller 18 contacts the control cam 7. The shape of the control cam 7 and of the guiding cam 10 causes a smooth disengagement of the indented segments 5 and 13 and a deceleration of the primary gripping device to a rest as indicated in FIG. 6 and 7. After the rest position during which the grippers 31 are opened, the primary gripping device are moved rearwardly to the position required for clamping a new paper sheet 30. The rear movement is indicated in FIG. 8. During the remainder of rest position a succeeding paper sheet 30 is clamped by the grippers 31 of the primary gripping device and the whole cycle is again repeated.

I claim:

1. A feed mechanism for printing machines and the like having a rotating cylinder and rotating primary gripping feed arranged along a parallel axis thereto, comprising in combination:

a drive shaft extending from said rotating cylinder having mounted thereon a first contoured cam and a pair of axially aligned first and second segmented gears,

a mounting shaft extending from said rotating gripper feed having mounted thereon a pair of axially aligned third and fourth segmented gears respectively arranged for engagement with the said first and second gears,

a first and second cam follower roller fixed to said third segmented gear mounted on said mounting shaft,

a lever pivoted about is center and mounted on said mounting shaft having a third and fourth cam roller resiliently biasing said lever with respect to said third segmented gear,

a second cam fixed to said driving shaft,

the rotation of said drive shaft causing said first, second and third roller to follow the contours of said first cam to effect intermittent nonuniform motion in said rotary gripper feed and said fourth cam roller following the contour of said second cam to control the engagement of said first, second and third cams.

2. The combination of claim 1, wherein said third roller is supported on an eccentrically formed bolt and is adapted to be radially adjustable with respect to the mounting shaft.