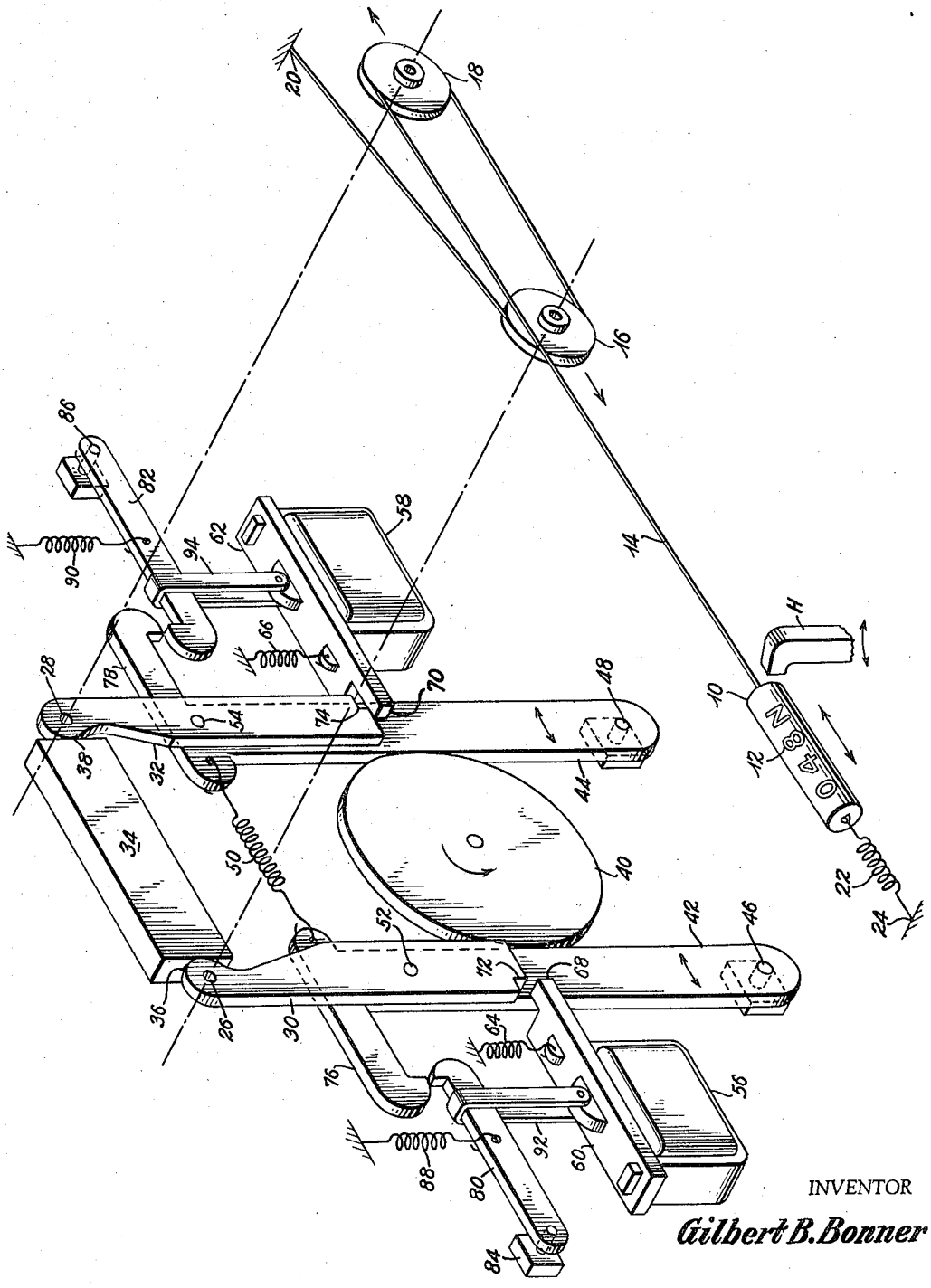
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CAM OPERATED CODE SETUP MECHANISM

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CAM OPERATED CODE SETUP MECHANISM

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This invention relates to a cam operated code setup mechanism adapted for use in a printing apparatus of the type wherein a printing member is movable to various positions relative to a printing hammer.

Although this invention is particularly adapted for positioning a printing member and is described in this environment, it is not limited thereto but may be used in any apparatus where it is desired to rapidly position an element by utilizing a continuously rotating cam operator with code actuation.

In a class of printing apparatus sometimes called "stick printers" a movable print member, called a print stick, has characters on the periphery thereof and this member is axially and rotatably moveable to position any selected character thereon at the striking position of a printing hammer. The printing hammer is reciprocated to provide the printing stroke and the print stick is moveable relative thereto. Patents relating to this class of printing apparatus are Howard—2,727,944, Hickerson—2,757,775, and Howard—2,769,029. In printers of the type mentioned above, the print stick is movable by a flexible cable which in turn is trained over positioning pulleys. Movement of these pulleys by suitable means will cause a corresponding movement of the cable and thereby move the print stick. Movement of the pulleys in the known apparatus is conventionally accomplished by a solenoid acting upon the pulley, either directly or through a mechanical linkage. It is the object of this invention to provide an improved rotary cam operated device for positioning a print stick bar in the type of apparatus described above.

It is an additional object of this invention to provide a cam operated, interposer-type code setup mechanism for a printing apparatus of the class described in which the cam is continuously in motion. Since the motion of the operating cam is rotary the device may be operated to provide an extremely high type moving speed, for example, the potential speed of the mechanism of this invention is in the neighborhood of four thousand characters per minute.

It is a further object of this invention to provide a cam operated positioning mechanism for a movable type bar in a printing apparatus which has fewer parts than known devices, is less expensive to produce, is smaller, and in which all motion is rotary or oscillating and is continuous.

Other objects of this invention will be pointed out in the following detailed description and claims and illustrated in the accompanying drawing which discloses, by way of example, the principle of this invention and the best mode which has been contemplated of applying that principle.

The single figure on the accompanying drawing is a perspective view, portions of which are schematic, showing the cam operated code setup mechanism of this invention utilized for positioning a type bar of a printing apparatus.

In general, the apparatus of this invention includes a

pair of positioning pulleys around which is trained a cable connected to a print stick. The positioning pulleys are attached to arms and a continuously rotating cam operates cam followers to which the arms are freely pivotally attached. The end of the arms carrying the positioning pulleys are normally biased against a fixed abutment such that motion of the cam follower by means of the rotating cam will only cause the arm to oscillate about the contact point with the fixed abutment and the pulley will stay in substantially the same position. An interposer member is operable by a spring biased electromagnet armature to contact the lower end of the arm to change the point about which the arm will oscillate upon movement of the cam follower. A latch member is operable to latch the cam follower in the position it assumes at the high point of the cam thereby holding the pulley attached to the arm in a stationary position away from the fixed abutment. The amount of movement of the pulley will be dependent upon the relation of the distances between the point of interposer contact at one end of the arm, the pulley attachment point at the other end of the arm, and the pivot point intermediate the ends of the arm and will also depend on the amount of motion imparted to the pivot point where the arm is attached to the cam follower. Thus by attaching the arm to the cam follower at varying pivot points and providing more than one arm, the device can be provided with a plurality of adjustable positions. The setup illustrated is adapted to control the print stick in axial translation although another similar device could be utilized to control the print stick in rotational translation in a manner well known in the art as taught by the aforesaid patents.

Referring to the drawing, a print stick **10** is provided with a plurality of characters **12** thereon. This stick is axially movable in the described embodiment to position one of the characters **12** adjacent a printing hammer H for printing in a manner well known in the art. The print stick is attached at one end to a flexible cable or cord **14** trained around a pair of pulleys **16** and **18** and fixed to a stationary support **20**. The other end of the print stick **10** is biased to the left as shown in the drawing by spring **22** attached to the stationary support **24**. Thus, spring **22** in effect biases the pulleys **16** and **18** toward each other.

Pulleys **16** and **18** are rotatably attached at points **26** and **28** to movable arms **30** and **32**. The ends of the arms carrying the pulleys are biased by spring **22** against fixed abutment **34** at surfaces **36** and **38**.

A continuously rotatable cam **40** has a cam surface which cooperates with cam followers **42** and **44**, pivotally mounted about fixed pivots **46** and **48**. A spring **50** interconnecting arms **42** and **44** biases these arms to cam engaging position. The arms **30** and **32** are freely pivoted on pivot studs **52** and **54** to their respective cam followers **42** and **44**.

Electromagnets **56** and **58** have pivotally mounted armatures **60** and **62**. These armatures are normally biased away from the energized position by springs **64** and **66**. Armatures **60** and **62** have projections **68** and **70** which function as interposers when they engage in notches **72** and **74** in the ends of arms **30** and **32**. Projections **76** and **78**, integral with cam followers **42** and **44**, extend outwardly therefrom for engagement with a pair of latch fingers **80** and **82**. The latch fingers **80** and **82** are pivoted at stationary pivots **84** and **86** and are biased to latching position by springs **88** and **90**. The latching fingers **80** and **82** are connected with the armatures **60** and **62** by U-shaped connecting straps **92** and **94**.

The operation of the mechanism will now be described. With the electromagnet **58** energized the armature **62** and the latching finger **82** will be pulled downwardly such that projection **70** on armature **62** clears the bottom

of arm 32. The action of the armature and the latching finger is against the bias of springs 66 and 90. As cam 40 rotates cam follower 44 oscillates about pivot point 48. The pivot stud 54 in arm 32 will also oscillate, following the movement of arm 44, but the pulley center 28 which is spring biased by spring 22 to position surface 38 against stop 34 remains in the position against this stop. At this time the instantaneous center of rotation or oscillation of arm 32 is the point of contact of surface 38 with abutment 34. Since the motion of the pivot stud 54 is quite small, i.e., .070 inch, the motion of the surface 38 along stop 34 is negligible. Therefore, as long as magnet 58 is energized the arm 32 will remain against stop 34 and the pulley 18 will remain in this position also.

When magnet 58 is de-energized the armature 62 is moved by the spring 66 to interpose the projection 70 into the notch 74 of arm 32. At the same time spring 90 will move latching finger 82 into position to engage and latch projection 78 on cam follower 44. As the cam 40 rotates the instantaneous center of rotation of arm 32 is the point where projection 70 engages notch 74 and as the cam follower 44 drives the arm 32 through pivot stud 54, the pulley center 28 and pulley 18 will be moved away from the abutment 34. The amount of motion away from this surface will depend on the ratio of the distance between pulley center 28 and the point of engagement of projection 70 with notch 74 to the distance between pivot stud 54 and the point of engagement of projection 70 with notch 74, as well as the amount of displacement of pivot stud 54. As cam follower 44 continues to rise on the high point of cam 40 the projection 78 will clear the end of latching finger 82 and spring 90 will move latch finger 82 into latching engagement therewith. In this condition as long as the magnet 58 is de-energized the pulley center 28 will remain in the displaced position and the arm 44 will not follow the cam 40. Upon energization of the electromagnet 58 the follower arm 44 and arm 32 will be released and the pulley 18 will return to the position defined by surface 38 resting against abutment 34.

The action of the arm 30, cam follower 42, and associated parts is identical with the action of the similar parts on the other side of cam 40. It will be apparent, however, that pivot stud 52 is positioned considerably closer to the point where projection 68 engages notch 72. Therefore, the displacement of pulley center 26 on arm 30 will be greater than the displacement of pulley center 28 on arm 32. Hence, de-energization of electromagnet 56 will position pulley 16 and therefore print stick 10 substantially more than de-energization of electromagnet 58. By this arrangement of two pulleys 16 and 18 and differential positioning of the pivot studs 52 and 54, the four positions of the characters 12 beneath a printing hammer can be obtained. More specifically, when both pulleys 16 and 18 are resting against abutment 34 the "N" character will be in position adjacent print hammer H. Upon de-energization of magnet 58 only, arm 32 moves pulley 18 to the character "8" into print position; upon de-energization of magnet 56, only arm 30 moves the character "4" into print position; and upon de-energization of both electromagnets 56 and 58, both arms 30 and 32 move pulleys 16 and 18 away from each other moving the print stick 10 to place character "O" in print position. The electromagnets 56 and 58 may be selectively energized and de-energized to position any desired character in print position.

In order to simplify the illustrated preferred embodiment of applicant's invention, the print stick 10 is shown with only four characters thereon. However, if it is desired to utilize more than four characters in each row of a print stick, additional pulleys and setup mechanisms may be added to that shown in the drawing. Furthermore, if additional rows of characters around a periphery of the print stick are desired, additional setup mechanisms similar to the one illustrated and described above may be utilized to rotatably translate the print stick 10 to the various rows of characters thereon.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A positioning mechanism comprising, a continuously oscillating driving member, an arm freely pivotally attached intermediate its ends to said driving member, a positioning device connected to one end of said arm, an abutment, means biasing the end of said arm connected to said positioning device against said abutment whereby movement of the driving member will not normally move the end of said arm connected to said positioning device away from said abutment, and interposer means adapted to be interposed into the path of the end of said arm opposite said positioning device whereby the end of said arm with said positioning device will be moved away from said abutment.

2. A device as defined in claim 1 further comprising, latching means operable to effectively prevent the end of said arm with said positioning device from moving while in its position away from said abutment.

3. A cam operated positioning apparatus comprising: a continuously rotating cam, at least one cam follower normally biased into cam engaging position, an arm pivotally attached intermediate its ends to said cam follower, an abutment, means normally biasing said arm against said abutment such that motion of the cam follower will not normally cause the arm to move away from the abutment, and latching means selectively operable to latch the pivotable arm such that it will move away from said abutment with the movement of the cam follower, said latching means also operable to latch the cam follower away from cam following position whereby the arm will be positioned away from the abutment.

4. A device as defined in claim 3 wherein said latching means further comprises an electromagnet operable to place a latching member in the path of said pivotable arm and to latch said cam follower at the position it assumes when moved by the high point of the cam.

5. A device as defined in claim 4 wherein said pivotable arm is latched by a spring biased armature of said electromagnet and said cam follower is latched by a spring biased latching finger attached to said armature of said electromagnet.

6. A device as defined in claim 3 wherein there are a plurality of cam followers and associated parts for said rotating cam.

7. A cam operated setup mechanism adapted for positioning a movable printing member in a printing apparatus, said printing member being movable to various positions in response to a positioning member, said apparatus comprising; a continuously rotatable cam, at least one cam follower biased against said cam and movable by said cam about a pivot adjacent one end thereof, an arm carrying said positioning member, said arm being pivotally mounted intermediate the ends thereof on said cam follower, said arm also carrying said positioning member adjacent one end thereof, a fixed abutment adjacent the end of said arm carrying said positioning member, means biasing said arm against said fixed abutment whereby normal movement of said cam follower in response to said cam will merely cause said arm to move about the pivotal connection to said cam follower and said positioning member will be in the position determined by said fixed abutment, a member adapted to be interposed into the path of the free end of said

arm thereby causing said arm to pivot away from said fixed abutment when said cam follower moves in response to said cam, and latching means for holding said cam follower in the position wherein said positioning member is away from said abutment.

8. A device as defined in claim 7 wherein there are two positioning members, two cam followers, two arms pivotally attached to said cam followers, and said cam followers are positioned on opposite sides of said cam to operate against fixed abutments, the point of pivotable attachment of said arm to said cam follower being different for each of said arms whereby variable positioning may be accomplished by selectively moving either of said arms to move either of said positioning mechanisms.

9. An apparatus for selectively positioning a printing member in a printing apparatus wherein said printing member is movable in response to a positioning member, said apparatus comprising; a continuously rotatable cam, a pivotable cam follower normally biased into engagement with said cam, an arm carrying said positioning member, said arm being freely pivotable intermediate its ends on said cam follower, a fixed abutment, means normally biasing one end of said pivotable arm against said fixed abutment, and means for selectively latching the other end of said pivotable arm, whereby said arm will pivot about the point of said latching means in response to movement of said cam follower thereby allowing said positioning mechanism to be moved.

10. A mechanism for positioning a printing stick carried by flexible member trained over at least one movable positioning pulley, said mechanism comprising; a rotatable cam, a cam follower cooperating with said cam, an arm pivotally connected to said cam follower, said arm carrying said positioning pulley adjacent one end thereof, means biasing said arm and positioning pulley against a fixed abutment whereby motion of said cam follower will cause said arm to pivot while retaining the positioning pulley at the position determined by the fixed abutment, and a latching member for changing the instantaneous center of rotation of said arm to another position whereby movement of said cam follower will drive said arm about said new instantaneous center to position the positioning pulley away from said fixed abutment, and means for retaining said positioning pulley in said position away from said fixed abutment.

11. A device as defined in claim 10 wherein said retaining means for said pulley after it has been positioned and said latching member for changing the instantaneous center of rotation of said arm have a common actuator.

12. A device as defined in claim 11 wherein said common actuator is an electromagnet.

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