United States Patent [19]

Paul

[11] **3,820,459**

[45] **June 28, 1974**

[54] **OFFSET PRESS FOUNTAIN KEYS**

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[22] Filed: **June 15, 1972**

[21] Appl. No.: **263,300**

[52] **U.S. Cl.** **101/365**
[51] **Int. Cl.** **B41f 31/04**
[58] **Field of Search** 101/365, 207, 208, 210, 101/350, 363

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[57] **ABSTRACT**

Fountain keys for adjusting the amount of ink discharged from an offset printing press ink fountain to the fountain roller which includes an elongate rod carrying a hardened steel ball in contact with the fountain blade. The rod serves as a follower in conjunction with a cammed surface to precisely position each steel ball with respect to the fountain blade. The rods are slidable within aligned bushings and are spring biased towards the cammed surface in a manner to completely eliminate the need for threaded components to function the rods relative to the fountain blade. A vernier scale is disposed upon the fountain key operator to facilitate subsequent adjustment of the key positions.

6 Claims, 9 Drawing Figures

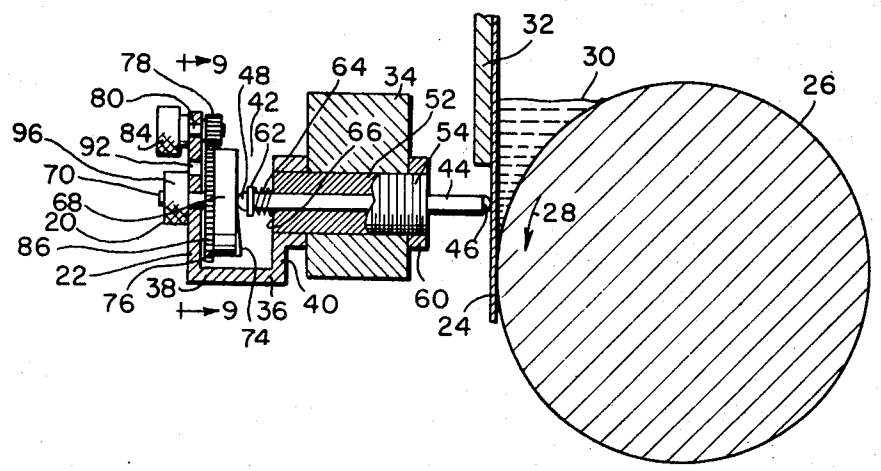
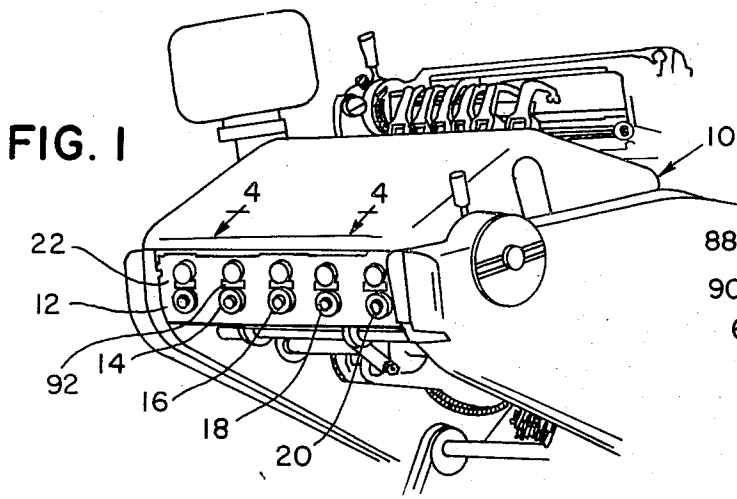


FIG. 1



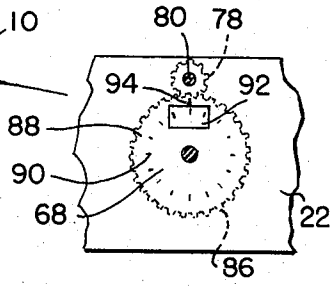


FIG. 9

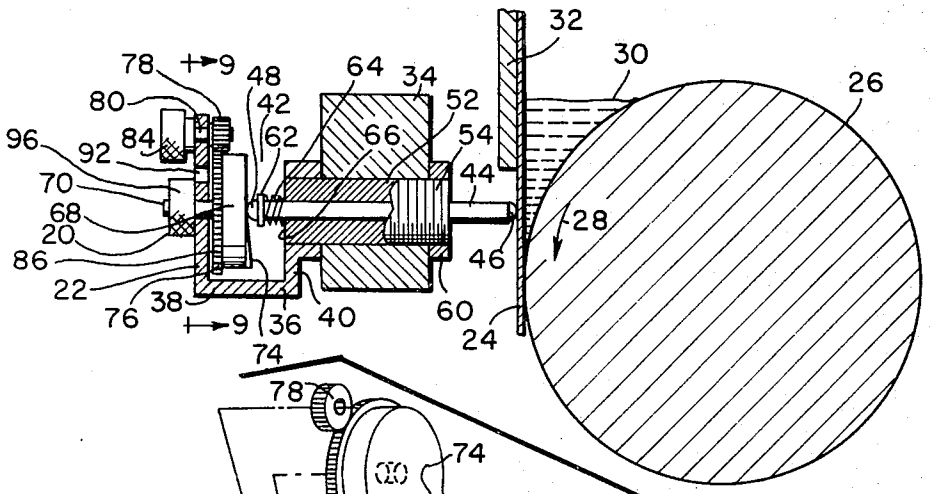


FIG. 2

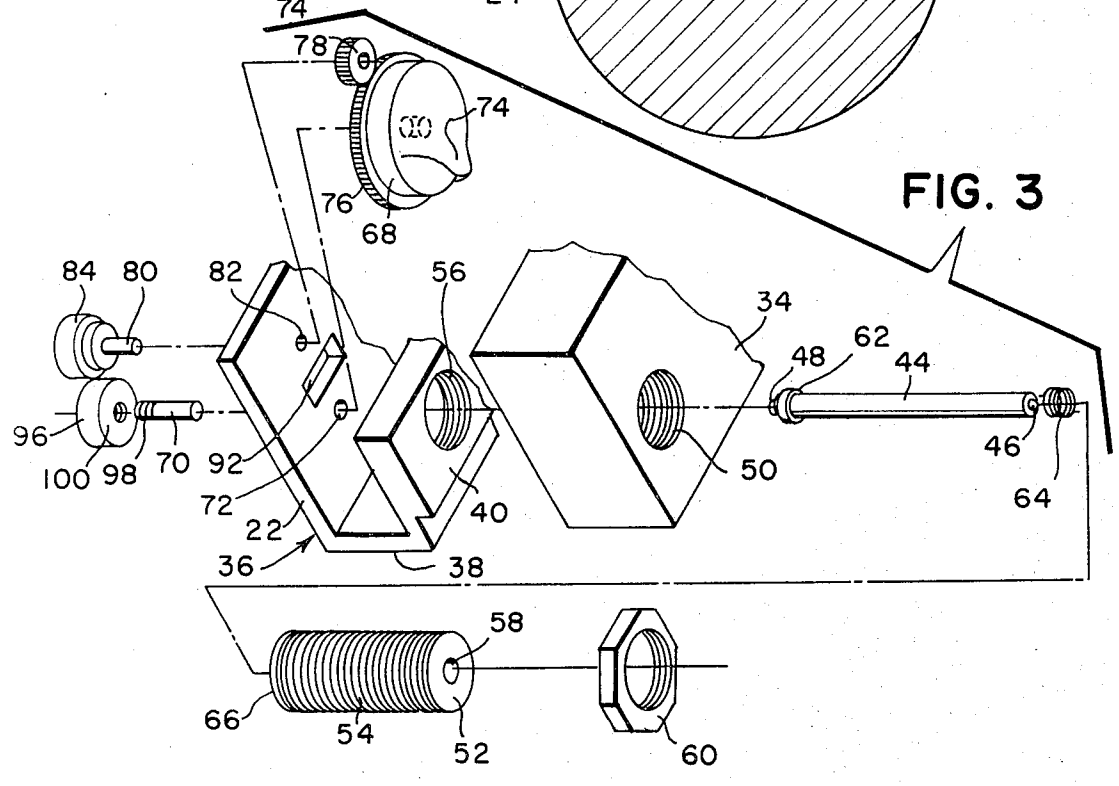


FIG. 3

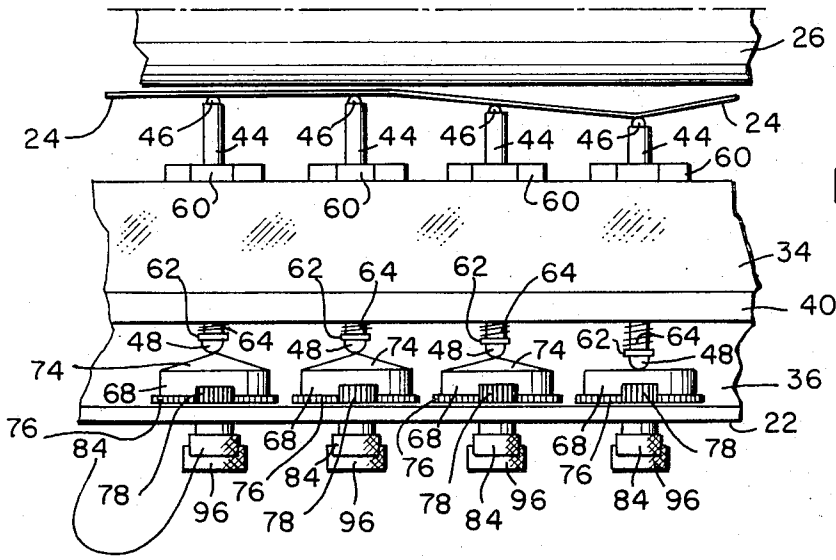


FIG. 4

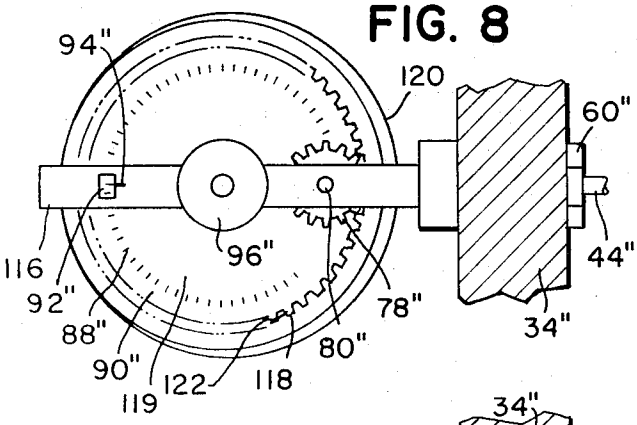


FIG. 8

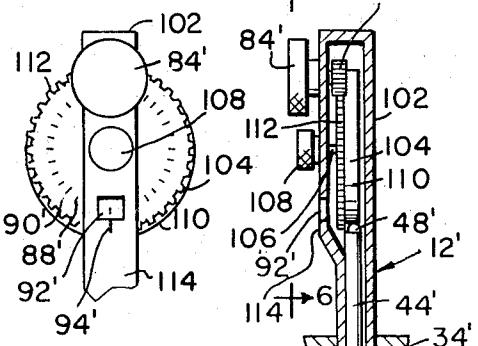


FIG. 6

FIG. 5

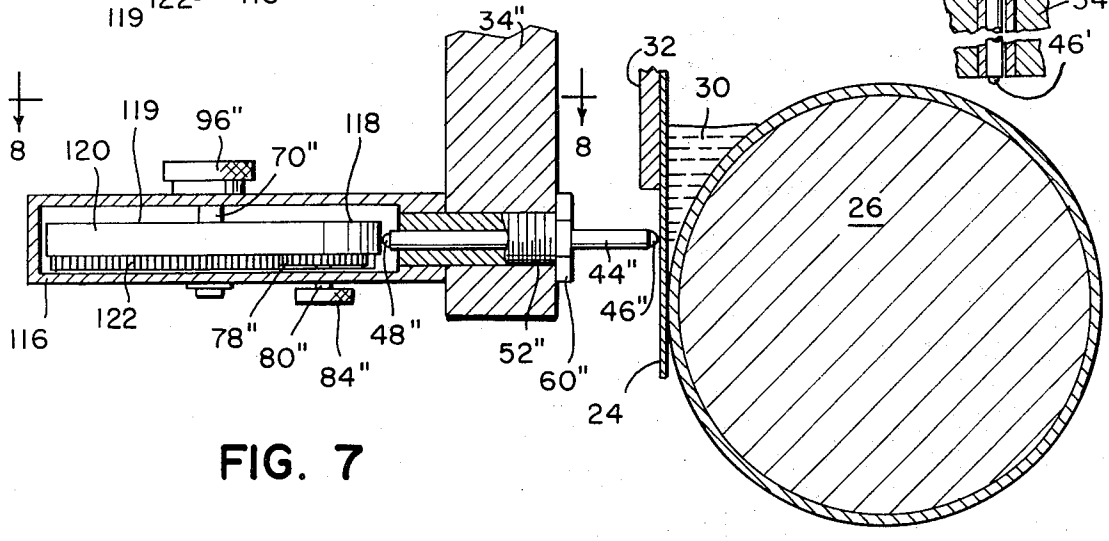


FIG. 7

OFFSET PRESS FOUNTAIN KEYS

BACKGROUND OF THE INVENTION

This invention relates generally to the field of offset printing presses, and more particularly, to improvements in fountain keys to control the position of the fountain blade with respect to the fountain roller.

Prior workers in the art have previously developed the technique of offset printing wherein the lithographic principle that grease in the form of ink and water in the form of the fountain solution do not mix readily and so most offset duplicators include two separate systems, one for inking and one for dampening. In the inking system, a series of thumbscrews, called fountain keys, push against a thin blade which positions beneath the ink fountain to control the volume of ink to the fountain roller. Each thumbscrew allows more or less ink to be deposited on a specific area of the fountain roller by varying the spacing between portions of the fountain blade and the fountain roller. As the spacing increases, a greater quantity of ink will be deposited upon the fountain roller and subsequently transferred to the plate cylinder where it will be printed as a relatively darker color. Conversely, relatively lighter colors will be printed on the final copy at the plate cylinder by reducing the spacing between the fountain plate and fountain cylinder by manipulating the fountain keys.

Presently available fountain keys are all of the thumbscrew type, that is, all are threaded and threadedly turn into or away from the fountain plate. Additionally, the keys terminate forwardly in a bearing end which is continuously in contact with the fountain blade to forwardly or rearwardly urge the blade with respect to the surface of the fountain cylinder. In view of the fact that the threaded section and forward bearing ends of the fountain keys are continuously stressed under the bias of normal operation, these areas are subject to rapid wear and deterioration. Additionally, the existing fountain keys are pointed, and accordingly, after periods of use, have a tendency to pit or otherwise damage the fountain blade surface.

In accordance with the usual operations in the trade, considerable time and effort is spent by a pressman in order to properly set up a press prior to running a printing order. The individual fountain keys must each be carefully adjusted to assure that the fountain blade is properly positioned relative to the surface of the fountain cylinder for optimum printing results. Each fountain key must be individually adjusted on a trial and error basis until the desired settings are obtained. Because of the multitude of precise adjustments required, the set up procedure by nature is a tedious, time consuming and costly operation.

Once the proper settings of the fountain keys have been obtained, the prior art devices of which I am familiar offered no easy method of marking the exact rotative location of each fountain key. Accordingly, then, should it become necessary to move the fountain blade for any reason during a run, the entire trial and error process had to be duplicated in order to complete the run.

SUMMARY OF THE INVENTION

The present invention relates generally to the art of printing machinery, and more particularly, is directed to improvements in fountain keys to control the flow of ink from the ink fountain to the fountain roller.

The fountain keys constructed in accordance with the teachings of this invention each include an elongate, unthreaded rod which has motion normal to the surface of a fountain blade and which is in sliding engagement within a properly aligned, stationary bushing. The rod terminates at either end in a conventional socket, within which is retained a hardened steel ball. The forward ball bears against the surface of the fountain blade and is fabricated of harder material so as to assure extended periods of use without undue wear. The rearward ball bears against a cam surface and serves as a cam follower to transmit axial forces to the rod for fountain blade adjusting purposes.

The cam surface is turned by a peripherally positioned gear which may be precisely positioned in any desired rotative location by means of a meshed pinion gear. Preferably, the cam surface includes structure which is scored or otherwise marked to provide a vernier scale to visually indicate the precise key position at any given time. Accordingly, a predetermined fountain key position may be readily duplicated by employing the associated vernier scale and turning the pinion gear until the cam surface reaches the precise desired rotative location.

It is therefore an object of the present invention to provide improved offset press fountain keys of the type set forth.

It is another object of the present invention to provide novel fountain keys to overcome the deficiencies of presently available offset press fountain keys.

It is another object of the present invention to provide novel offset press fountain keys which are provided with gear actuated movement designed to completely eleminate threaded engagements.

It is another object of the present invention to provide novel, offset press fountain keys which include an elongate rod and a hardened steel ball at each end of the rod.

It is another object of the present invention to provide novel offset press fountain keys which function by means of a cam to vary the spacing of a fountain blade from its associated fountain roller.

It is a further object of the present invention to provide novel offset press fountain keys which are cam operated and which have a vernier scale associated therewith to accurately set forth the rotative location of the cam.

It is a further object of the present invention to provide novel offset press fountain keys which have elongate rods in contact with a fountain blade, cam means to axially bias the rods and lock means to securely restrain the cam means in the desired rotative location to position the fountain blade in the desired position relative to the associated fountain roller.

It is another object of the present invention to provide novel offset press fountain keys which are rugged in construction, highly accurate in use and trouble-free when in operation.

Other objects and a fuller understanding of the invention will be had by referring to the following description and claims thereof taken in conjunction with the

accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial perspective view of a portion of an offset printing press, showing a portion of the fountain keys.

FIG. 2 is an enlarged, side elevational view of a fountain key of FIG. 1, partially broken away to expose details of interior construction.

FIG. 3 is an exploded, perspective view of the construction components of a fountain key.

FIG. 4 is a cross sectional view, taken along Line 4—4 of FIG. 1. looking in the direction of the arrows.

FIG. 5 is a partial, side elevational view similar to FIG. 2, showing a modified cam arrangement.

FIG. 6 is an elevational view of the modified cam arrangement taken along Line 6—6 of FIG. 5, looking in the direction of the arrows.

FIG. 7 is a partial, side elevational view similar to FIG. 2, showing a second modified cam arrangement.

FIG. 8 is an elevational view of the second modified cam arrangement taken along Line 8—8 of FIG. 7, looking in the direction of the arrows.

FIG. 9 is a cross sectional view taken along Line 9—9 of FIG. 2, looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Although specific terms are used in the following description for the sake of clarity, these terms are intended to refer only to the particular structure of my invention selected for illustration, and are not intended to define or limit the scope of the invention.

Referring now to the drawings, I show in FIG. 1 a conventional offset printing press **10** which incorporates a plurality of fountain keys **12, 14, 16, 18, 20.** The fountain keys mount through the front housing **22** and have axial movement relative to the fountain blade **24.** (FIG. 2) as hereinafter more fully set forth.

As best seen in FIG. 2, a conventional fountain roller **26** of the offset press **10** rotates in the direction indicated by the arrow **28** to receive a coating of ink from the ink reservoir **30** in the usual manner. The fountain blade **24** mounts upon the support **32** in well known manner and is substantially tangentially positioned with respect to the fountain roller **26** to spread a film of ink upon the surface of the roller upon function of the fountain keys **12, 14, 16, 18, 20** in the manner hereinafter more fully set forth. A relatively heavy base bar **34** is carried by the machine frame (not shown) in spaced relation from the fountain roller **26** in stationary manner so that there is no relative movement between the roller **26** and the base bar **34.** An elongate, generally U-shaped channel **36** forwardly secures to the base bar **34** to mount the plurality of fountain keys **12, 14, 16, 18, 20** in position to function the fountain blade **24.** The U-shaped channel member **36** incorporates the front housing **22,** a bottom web **38** and the connecting leg **40** which define the interior channel space **42** to receive the fountain key cams and gears as hereinafter more fully described.

As best seen in FIGS. 2 and 3, each fountain key **12, 14, 16, 18, 20** comprises an elongate rod **44** which terminates at the fountain plate end in a hardened steel ball **46** which is positioned to bear against the fountain blade **24.** The rod terminates forwardly in a second steel ball **48** which serves as a cam follower to move the rod **44** normally to the surface of the fountain blade **24.**

The base bar **34** is drilled and tapped to provide a threaded opening **50** for each fountain key **12, 14, 16, 18, 20.** A bushing **52** having external threads **54,** threadedly engages the opening **50** and projects through the aligned threaded opening **56** which is provided in the connecting leg **40** of the U-shaped channel member **36.** In this manner, the plurality of threaded bushings **52** can be employed to secure the channel member **36** to the base bar **34.** Each bushing **52** is provided with an axially aligned cylindrical bearing **58** which is sized to receive the elongate rod **44** therein in sliding engagement. The bushing **52** serves to position the elongate rod **44** for functional operation of the fountain blade **24** in the manner hereinafter more fully set forth. If desired, a lock nut **60** may be employed to threadedly engage the external threads **54** of the bushing **52** rearwardly of the base bar **34** to firmly lock the bushing **52** in the desired location.

The elongate rod **44** is provided with a collar **62** near the forwardly positioned steel ball **48** to serve as a stop for the coil spring **64.** The spring **64** biases between the rearward face of the collar **62** and the forward end **66** of the bushing **52** to continuously bias the elongate rod **44** and the rearward steel ball **46** forwardly away from the fountain blade **24.** Of course, in accordance with well known principles of fountain key construction, the rearward steel ball **46** is never actually pulled out of contact with the fountain blade **24.**

A circular cam **68** mounts upon the front housing **22** and may be rotative about the pin **70** which positions in the lower housing opening **72.** The rearward face **74** of the cam **68** serves as the cam surface and is configured as necessary to provide a gradual transition between the high point and the low point to axially function the elongate rod **44** through its necessary full range of operation. The forward steel ball **48** bears against the rearward face **74** of the circular cam **68** to impart axial movement to the rod **44** as the cam is circularly turned.

In the embodiment illustrated, the cam **68** is provided with external gear teeth **76** which mesh with the teeth of the pinion gear **78** for fountain key adjustment purposes. The pinion gear **78** is pinned or otherwise affixed to the pinion shaft **80** which is turnable through the upper opening **82** which is provided in the front housing **22.** An adjusting knob **84,** which may be knurled, affixes to the forward end of the pinion shaft **80** and serves to provide a positive finger grasp for adjusting the position of the pinion gear **78.** Thus, by turning the adjusting knob **84,** the affixed pinion gear **78** may be readily turned to any desired rotative position. Simultaneously, the circular cam **68** is also turned through action of the meshed external gear teeth **76.** It will be noted that in accordance with well known principles of gear design, the ratio of diameters between the pinion gear **78** and the circular cam **68** is so designed that rotative movement of the pinion gear through a greater arc of rotation will result in correspondingly smaller arcuate movement of the circular cam **68** itself. In this manner, extremely fine adjustment of the circular cam and accordingly, the relative axial location of the steel

ball **46** can be precisely located for control of the fountain plate **24.**

The forward face **86** of each circular cam is preferably provided with a plurality of position marks **88** in the form of a circular dial **90.** The position marks **88** are equidistantly located to provide a plurality of calibrations so that the relative rotative position of each key may be readily apparent by the location of any given position mark **88.** The circular dial **90** may be divided circularly into any predetermined number of increments, for example 100 increments, for ease in decimal calibration. As best seen in FIGS. **3** and **9,** the front housing **22** of the channel member **36** is provided with an opening **92** which registers in front of the circular dial **90.** Preferably, an index mark **94** is scribed or otherwise marked above the center of each opening **92** to coact with the circular dial **90** which is provided on the face of the cam **68.** Thus, as the cam **68** is rotated by function of the adjusting knob **84,** the rotative position of the cam may be readily read through the opening **92** by aligning a position mark **88** with the index mark **94.** It is contemplated that the fountain keys would be normally calibrated by having their zero position on the dial **90** coincide with the index mark **94** when the fountain blade **24** contacts the fountain roller **26.**

In operation, the adjusting knob **84** would be turned by the fingers of the operator (not shown) to rotate the pinion gear **78.** This in turn rotates the circular cam **68** by the action of the pinion gear teeth upon the external gear teeth **76** to rotate the rearward cam face **74.** The rotation of the cam **68** in turn causes axial movement of the elongate rod **44** toward the fountain blade **24** through interaction of the forward steel ball **48** which serves as a cam follower. After the desired position of the fountain blade **24** has been set, the circular cam **68** can then be locked in position by turning the lock knob **96** on the threaded end **98** of the cam pin **70.** By turning the lock knob **96** fully until its rearward face **100** bottoms against the front housing **22,** the circular cam **68** can be readily locked in the desired position. In this position, the position marks **88** of the circular dial **90** are visible through the opening **92.** Accordingly, the precise axial position of the elongate rod **44** can be marked by noting which position mark **88** aligns with the index mark **94** when the cam **68** is locked in the desired position.

Referring now to FIGS. **5** and **6,** I show a modified type of fountain key **12'** which employs an elongate rod **44'** which is equipped with steel balls **46'** and **48'** in the manner hereinbefore described. The elongate rod **44'** operates in the same manner as the elongate rod **44** and so need not be further described at this time. A generally U-shaped housing **102** affixes to the base bar **34'** to carry the circular cam **104** in operative edge contact with the forward steel ball **48'.** The circular cam **104** turns within the housing **102** about the pin **106** which extends through the housing to threadedly receive the lock knob **108.** The circular cam **104** is provided with an eccentric surface **110** which is in contact with the steel ball **48'** for axially functioning the elongate rod **44'.** The circular cam **104** is provided with peripheral external gear teeth **112** which mesh with the teeth of the pinion gear **78'** for cam position adjustment purposes. An adjusting knob **84'** extends forwardly of the housing **102** to provide a convenient means for turning the pinion gear **78'.** Thus, turning the pinion gear **78'** in turn rotates the circular cam **104** to move the eccentric surface **110** relative to the forward steel ball **48.** In the manner hereinbefore set forth, a circular dial **90'** may be imprinted or otherwise affixed to the forward surface of the circular cam **104** for cam positioning purposes. An opening **92'** is provided through the forward wall **114** of the housing **102** in registry above the circular dial **90** so that the individual position marks **88'** of the dial are visible therethrough. An index mark **94'** is provided on the forward wall **114** to accurately mark the relative circular position of the circular cam **104.**

In the embodiment illustrated in FIGS. **7** and **8,** a similar elongate rod **44''** is employed to function the fountain blade **24** relative to the fountain roller **26.** The rod **44''** terminates at each end in hardened steel balls **46'',** **48''** and is a sliding fit within the threaded bushing **52''** which is threadedly engaged within the base bar **34''.** A lock nut **60''** secures the threaded bushing and elongate rod in the desired operating position. A generally U-shaped housing **116** forwardly secures to the base bar **34''** in well known manner such as by means of the threaded bushings **52''** and mounts the circular cam **118** in position to rotate its cam edge **120** relative to the forward steel ball **48'',** which serves as a cam follower in the manner hereinbefore described. In this embodiment, an adjusting knob **84''** turns a pinion gear **78''** by means of a shaft **80''** which journals through the housing **116.** The circular cam **118** is machined or otherwise fabricated to provide an interior, peripheral gear **122** which meshes with the teeth of the pinion gear **78''.** Thus, when the adjusting knob **84''** is turned, the pinion gear **78''** will cause rotation of the circular cam **118** to thereby circularly move the cam edge **120** relative to the forward steel ball **48''.**

In the manner hereinbefore described regarding the embodiments set forth in FIGS. **5** and **6,** the top surface **119** of the circular cam **118** may be inscribed or otherwise provided with a circular dial **90''** comprising a plurality of individual position marks **88''** which indicate various increments of rotative travel of the cam **118.** An opening **92''** and an index mark **94''** may be provided in the housing **116** in position to register over the circular dial **90''** to visually indicate the circular position of the cam **118** in any rotative location. A lock knob **96''** threadedly turns on the pin **70''** in well known manner to lock the circular cam **118** in any desired rotative position.

It should be noted that the fountain key and cam operation disclosed herein may be used and installed both on new equipment and on existing type offset presses. Also, after the equipment has been used and the pressman gains experience, it is contemplated that it will be possible to rapidly set the fountain keys in predetermined desired position since it will be possible to plot fountain key locations associated with desired ink characteristics by means of the dial **88, 88'** or **88''.**

Although I have described the present invention with reference to the particular embodiments therein set forth, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction may be resorted to without departing from the spirit and scope of the invention. Thus, the scope of the invention should not be limited by the foregoing specification, but rather only by the scope of the claims appended hereto.

I claim:

1. In an apparatus including fountain keys for positioning the fountain blade of an ink fountain at a predetermined setting for ink releasing purposes of the type wherein a fountain roller rotates relative to the ink fountain, wherein the fountain blade has a forward surface facing away from a fountain roller and a rearward surface facing toward the fountain roller, the combination of

A. a base bar mounted forwardly of the fountain roller and in spaced relationship therefrom,
   1. said base bar being stationary and having no movement relative to the fountain roller,
   2. said base bar being provided with a plurality of openings, said openings facing the fountain blade;

B. a channel member mounted forwardly upon the base bar,
   1. said channel member including a bottom web and a front housing,
   2. said bottom web, front housing and base bar defining an interior channel space;

C. a bushing secured within each said opening,

(1) each said bushing being drilled to provide an axial, cylindrical bearing;

D. a smooth, elongate rod having a forward end and a rearward end and being slidably arranged within each said bearing,
   1. said rod terminating at each end in a hardened ball,
   2. said rearward ball being in continuous contact with the forward surface of the fountain blade;

E. a cam rotatively mounted on the front housing and having a cam surface and an index surface,
   1. said cam positioning in the interior channel space with its index surface adjacent the front housing,
   2. said forward ball being in continuous contact with the cam surface whereby rotation of the cam causes axial movement of the rod for fountain blade adjusting purposes,
   3. said cam being furnished with gear teeth for cam rotative purposes; and

F. a pinion gear rotatively mounted on the front housing and being in mesh with the cam gear teeth,
   1. said pinion gear being rotated by an adjusting knob which mounts forwardly of the front housing,
   2. a relatively large rotation of the pinion gear causing a relatively small rotation of the cam.

2. The invention of claim 1 wherein the rod is provided with a collar near the forwardly positioned ball, and a spring associated with the rod and biasing between the collar and the bushing to continuously bias the rearward ball forwardly in a direction away from the fountain blade.

3. The invention of claim 2 wherein the cam rotates about a pin, a portion of the said pin projecting through the front housing.

4. The invention of claim 3 wherein the pin terminates forwardly in a threaded end which forwardly projects from the front housing and wherein a lock knob threadedly engages the threaded end, the lock knob locking the cam in a desired rotative position by turning upon the threaded end until it is tight against the front housing.

5. The invention of claim 4 wherein the index surface of each cam faces the front housing and is provided with a dial comprising a plurality of circularly spaced position marks.

6. The invention of claim 5 wherein the front housing is provided with an opening in alignment with a portion of each dial wherein the position marks may be viewed therethrough.

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