Sept. 6, 1966 A. C. GOLDSMITH ETAL 3,270,851

TYPEWRITER

Filed Aug. 8, 1963 2 Sheets-Sheet 1

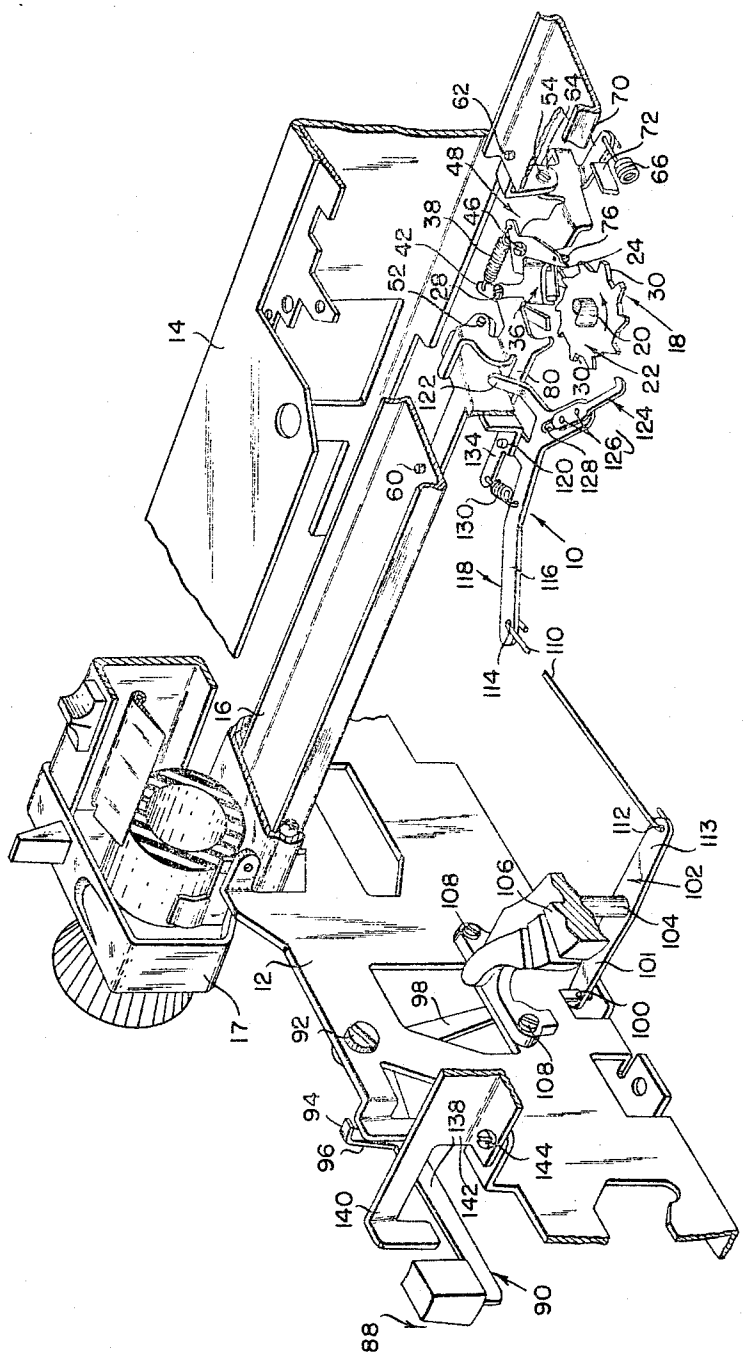


FIG. 1

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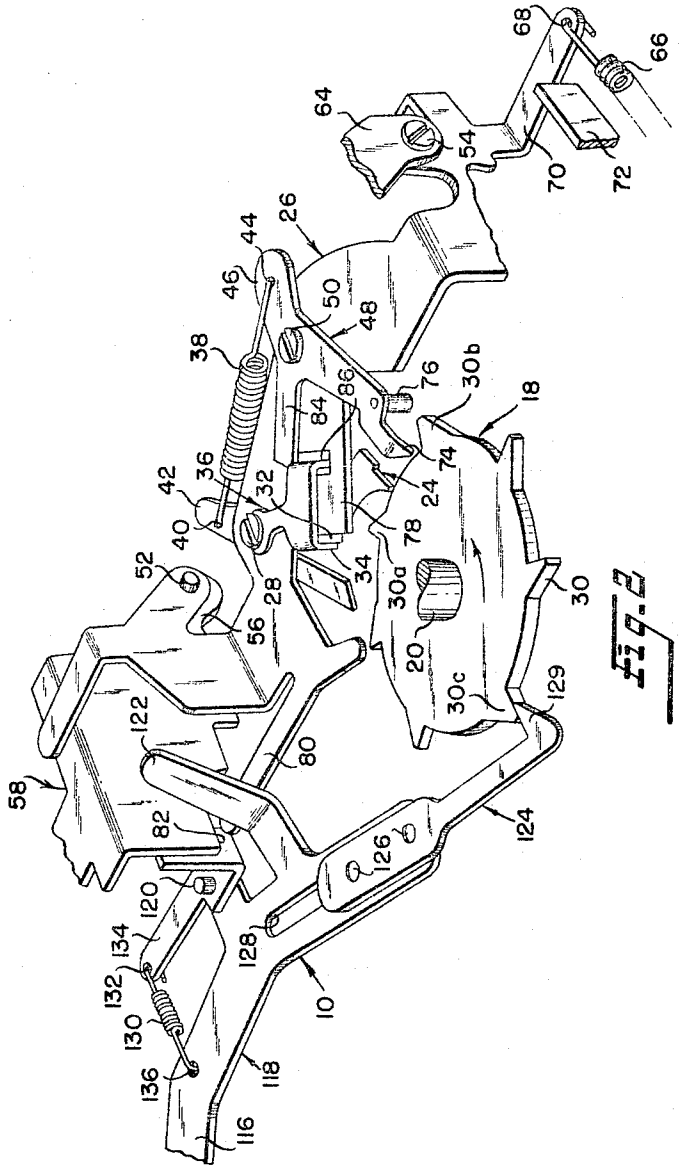


Fig. 2

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United States Patent Office

3,270,851

Patented Sept. 6, 1966

3,270,851

TYPEWRITER

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Filed Aug. 8, 1963, Ser. No. 300,823

2 Claims. (Cl. 197—84)

This invention relates to carriage spacing mechanisms for typewriters and like machines and, more particularly, to novel mechanisms for spacing the carriages of such machines a fraction of a normal letter space. (Such mechanisms will hereinafter be referred to collectively as half space mechanisms for the sake of convenience. It is to be understood, however, that the novel spacing mechanisms of the present invention are not limited to this particular fractional spacing.)

The novel half space mechanisms of the present invention may be advantageously employed to facilitate the correction of typing errors and to justify (i.e., produce even) right-hand margins. Occasionally, a typist will err by omitting a letter from a word. In the absence of a half or other fractional space mechanism, this generally necessitates the retyping of the page as, even if a portion or all of the word is erased, there will not be room to insert the missing letter and retype the word.

If, however, typewriters are provided with the novel half space mechanisms of the present invention, such errors present no problem. By using these mechanisms, the misspelled word can be erased and correctly retyped wtih a half space between the corrected word and the preceding and following words instead of the normal full space. The correction will be barely noticeable and will eliminate retyping the page. This may be of particular importance in cutting stencils and the like since stencils and similar materials are relatively expensive.

Similar corrections can be made when the typist errs by inserting an extra letter in a word. In this case the novel half space mechanisms of the present invention may be employed to increase the space between the letters of the retyped word or the spaces between the corrected and adjacent words, minimizing the obviousness of the correction and making it unnecessary to retype the page.

Other errors of this type can also be corrected by erasing appropriate letters or words and retyping them in respaced relationship by use of the novel half space mechanisms of the present invention.

The typed page produced by the conventional typewriter has a ragged right-hand margin because words cannot be arbitrarily broken at the margin and because typed characters occupy an invariable space and a typed line therefore cannot be expanded or compressed to produce an even margin as can the lines of print in various printing processes. However, by employing the novel half space mechanisms of the present invention, the spaces between words can be decreased and the spaces between words and the letters of words expanded as necessary to produce an even or justified right-hand margin.

The broad concept of a half space mechanism is, in itself, not new. Half space mechanisms were proposed as early as 1914 as shown by United States Patent No. 1,100,669 issued to C. B. Corcoran June 16, 1914, for Type Writing Machine. More recently, United States Patent No. 2,645,324 issued July 14, 1953, to F. J. Kavanaugh for Adjustable Escapement Mechanism for Typewriters disclosed another form of half spaced mechanisms.

A serious disadvantage of the Corcoran half space mechanism is that the typist must exert a heavy force on the half space key as, in Corcoran's mechanism, the

carriage is half spaced by moving it in the back space direction against the bias of the conventional spring motor employed in both manual and electric typweriters to move the carriage in the letter space direction. In typewriters equipped with our novel half space mechanisms, in contrast, only a light pressure need be exerted on the half space key since the spring motor moves the carriage, and the half space mechanism performs only an arresting function which does not require the exertion of force by the typist.

The most serious drawback of the Kavanaugh half space mechanism is that it can only be used with a carriage provided with a half drop escapement. A half drop escapement permits the carriage to move one half of a space before the letter prints (or when the space bar is depressed) and the remaining half space after the letter prints or the space bar is released.

Such escapements have been widely used, but, to a substantial extent, have been superseded by full drop escapements in which the carriage moves the full letter space distance before the letter is printed. The Kavanaugh type half space mechanism is not usable with a full drop escapement and, consequently, cannot be incorporated in many present day typewriters. In contrast, the novel half space mechanisms of the present invention may be employed with both half and full drop escapements and with escapements having other fractional drops.

Another disadvantage of both the Corcoran and Kavanaugh half space mechanisms is that they are incorporated to a substantial extent in the carriage escapement and, therefore, could not be used with an existing escapement without extensive modification of the escapement or the half space mechanisms or both. The novel half space mechanisms of the present invention, in contrast, are compatible with existing escapements. For example, they may be used with the full drop escapements disclosed in United States Patent No. 2,649,179 issued to J. P. Barkdoll August 18, 1953, for Carriage Feeding Escapement Mechanism with, at most, only a minor modification in the shape of the dog rocker of Barkdoll's escapement.

The novel half space mechanisms of the present invention should be carefully distinguished from the proportional movement type escapements employed in variable spacing typewriters. This class of typewriter has type bars on which the narrow and wide letters are different widths and employs a type key acutated escapement which permits the carriage to move in the letter space direction a distance proportional to the width of the letter to be printed when a type key is struck. These typewriters therefore resemble the present invention insofar as they provide for different increments of carriage movement in the letter space direction. Typical devices of this type are shown in United States Patent No. 2,202,565 issued May 28, 1940, to R. S. Reid for Typewriter and in United States Patent No. 2,385,035 issued September 18, 1945, to J. F. Smathers for Typewriting Machine.

These devices are structurally different from the present invention and, except for the single point of similarity noted above, function in an entirely different manner. These devices are essentially full drop escapements with the addition of mechanism for varying the drop depending upon the width of the character to be printed. In contrast to the present invention, there is no provision for advancing the carriage a predetermined fraction of the normal increment by a mechanism operating independently of the type and space bar actions. Indeed, it would probably be impossible to satisfactorily combine half spacing and variable spacing in a single machine since there would be no single letter space increment on which the half space could be based, and a different half space

would therefore have to be provided for each of the variable spacings, resulting in an extremely complex machine.

From the foregoing, it will be apparent that one object of the present invention resides in the provision of novel improved half space mechanisms.

Among the additional objects of this invention are the following:

(1) The provision of novel half space mechanisms which may be used with both fractional drop and full drop escapements;

(2) The provision of novel half space mechanisms which are compatible with existing escapements and may readily be incorporated in existing typewriters and like machines;

(3) The provision of novel half space mechanisms which do not require the typist to exert a heavy carriage moving force on the half space key as was required in some earlier half space mechanisms;

(4) The provision of novel typewriter mechanisms for producing justified margins which are much simpler than those conventionally employed in typewriting and like machines for this purpose; and

(5) The provision of novel half space mechanisms which are extremely simple and rugged and are, therefore, reliable and inexpensive to manufacture and maintain.

Additional objects and further novel features of the present invention will become more fully apparent from the appended claims and as the ensuing detailed description and discussion proceeds in conjunction with the accompanying drawing, in which:

FIGURE 1 is a partial perspective view of a typewriter equipped with the novel half space mechanism provided by the present invention together with its actuating mechanism, a portion of the typewriter carriage and carriage bed, the carriage escapement, and enough of the typewriter side and back frames to orient the half space mechanism;

FIGURE 2 is a perspective view of the half space mechanism shown in FIGURE 1, and is drawn to a larger scale than the latter figure.

As was mentioned above, the novel half space mechanism of the present invention may be employed in conjunction with typewriters equipped with full drop carriage escapements; and, in the ensuing detailed description, our invention will be explained in conjunction with such an escapement. It will be apparent from this description, however, that our novel half space mechanism may equally well be employed with half drop and other proportional drop carriage escapements; and it is to be understood, therefore, that the present invention has utility with fractional drop as well as full drop escapements.

Turning now to FIGURE 1, the novel half space mechanism **10** of the present invention may be employed with the conventional typewriter having a side frame **12**, a back frame **14** and a transversely extending, horizontally oriented, frame supported carriage bed **16** on which the typewriter carriage **17** is supported as by ball bearings for rectilinear movement transversely of the typewriter. In the conventional typewriter, the typewriter carriage is constantly urged toward the left, as viewed in FIGURE 1, by a spring motor (not shown) connected to the carriage by a flexible tape. Normally, a restraining force is exerted on the carriage by an escapement which may be of the half drop or other proportional drop type or of the full drop type identified in FIGURE 1 by reference character **18**. When a type key or the space bar is operated, the escapement temporarily releases its restraining influence on the carriage, permitting the latter to move to the left one letter space. Substantially the same result is produced by actuating the half space mechanism **10** of the present invention, except that the carriage is only permitted to move one half of the normal letter space distance.

Referring now to both FIGURES 1 and 2, the illustrated exemplary full drop escapement **18** is of the type disclosed in United States Patent No. 2,649,179 issued to J. P. Barkdoll August 18, 1953, for Carriage Feeding Escapement Mechanism, and a detailed description of the escapement is therefore not deemed necessary to an understanding of the present invention. In general, however, escapement mechanism **18** includes a pinion meshed with a toothed rack (not shown) on the typewriter carriage. The carriage rack engaging pinion is fixed to the upper end of a vertically extending shaft **20** which has a starwheel **22** fastened to its lower end. Therefore, movement of the typewriter carriage will effect rotation of starwheel **22** and vice versa.

Starwheel **22** is normally prevented from rotating by a holding dog **24** pivotably mounted on the underside of a dog rocker **26** by a screw **28**. Holding dog **24** is normally engaged by one of the teeth **30** on starwheel **22** which, through its connection to the typewriter carriage, is urged in a counterclockwise direction by the spring motor. The starwheel tooth **30**, therefore, pivots holding dog **24** in a clockwise direction about screw **28** until the holding dog abuts a strip of silencing material **32** fixed to a depending leg **34** of a U-shaped stop **36** also fixed to dog rocker **26** by the screw **28**. Depending stop leg **34** limits the movement of holding dog **24** which, in turn, limits the rotation of starwheel **22** and, consequently, the letter space movement of the typewriter carriage.

Holding dog **24** is biased in a clockwise direction by a spring **38** hooked at one end into an aperture **40** formed in a rearwardly extending arm **42** of holding dog **24**. The other end of spring **38** is hooked into an aperture **44** formed in the rearwardly extending arm **46** of a stepping dog **48**. Stepping dog **48** is pivotally mounted on the upper side of dog rocker **26** by a screw **50**.

Dog rocker **26** is a formed, sheet metal member extending transversely of the typewriter and is pivotally mounted on axially aligned pivot pins **52** and **54**. As is best shown in FIGURE 1, pin **52** is fixed to a downwardly and rearwardly inclined extension **56** of a bracket **58** rigidly assembled to the underside of carriage bed **16** with screws **60** and **62**. Pivot pin **54** is fixed to a depending arm **64** formed on the right-hand end of bracket **58**.

Dog rocker **26** is normally biased in a clockwise direction to position holding dog **24** in the same plane as starwheel **22** by a spring **66** (see FIGURE 2) hooked at one end into an aperture **68** formed in a horizontally and transversely extending finger **70** of the dog rocker. The opposite end of spring **66** (not shown) may be attached to any convenient portion of the typewriter frame.

Operation of the typewriter space bar or of a type key causes an arm **72** to move toward the rear of the typewriter, engage dog rocker finger **70**, and rotate the dog rocker in a counterclockwise direction about pivot pins **52** and **54**. As dog rocker **26** rotates, holding dog **24** is driven off the starwheel tooth **30***a* with which it is engaged and a downwardly inclined extension **74** of stepping dog **48** is lowered into the path of the succeeding starwheel tooth **30***b*. As holding dog **24** moves out of engagement with starwheel tooth **30***a*, it frees starwheel **22** for rotation. As a result, the typewriter's spring motor pulls typewriter carriage **17** in the letter space direction; i.e., to the left as shown in FIGURES 1 and 2, rotating starwheel **22** in a counterclockwise direction.

As the starwheel rotates and the succeeding starwheel tooth **30***b* advances, the tooth engages extension **74** of stepping dog **48** and rotates the stepping dog in a clockwise direction about screw **50** until a depending pin **76** adjacent the free end of the stepping dog engages the edge of a step portion **78** on the free end of holding dog **24**. At this point holding dog **24** prevents further pivotal movement of stepping dog **48** and starwheel **22** and, consequently, stops the typewriter carriage.

The distance through which starwheel **22** rotates is so adjusted that, when a type key or the space bar is operated, the typewriter carriage will be allowed to move one letter

space in the letter space direction. This operation is typical of a full drop escapement.

When the type key or space bar is released, arm **72** returns toward the front of the machine to its normal inoperative position, and spring **66** rotates dog rocker **26** in a clockwise direction about pivot pins **52** and **54** until a transversely extending, integral finger **80** formed adjacent the left-hand end of the dog rocker engages the lower edge **82** of the bracket **58** on which pivot pins **52** and **54** are mounted. As dog rocker **26** pivots, stepping dog extension **74** slides off the tooth **30***b* with which it is engaged and holding dog **24** is moved upwardly into the path of tooth **30***b*, disengaging stepping dog **48** and engaging holding dog **24**, preferably with a minimum amount of starwheel movement.

As stepping dog **48** is disengaged from starwheel tooth **30***b*, spring **38** pivots the dog in a counterclockwise direction about screw **50** to its inoperative position in which an integral stepping dog extension **84** engages a depending leg **86** of the U-shaped stop **36**. This completes the movement of escapement **18** to its inoperative position.

It is the function of the novel half space mechanism **10** of the present invention to operate the escapement mechanism when the half space key is depressed to permit carriage movement in the letter space direction through an increment equal to one half the normal letter space distance. Referring now to FIGURE 1, half space mechanism **10** includes a half space key **88** mounted on the forward end of a keystem **90** pivotally fixed to the outside of typewriter side frame **12** by a screw **92**. Depression of half space key **88** pivots keystem **90** in a counterclockwise direction about screw **92** until a stop **94** formed on the upper end of an integral keystem extension **96** engages the upper edge of typewriter side frame **12**.

Counterclockwise movement of keystem **90** moves a depending keystem arm **98** toward the rear of the typewriter. Arm **98** extends, at its lower end, through an aperture **100** in one arm **101** of a bell crank **102**. Bell crank **102** is pivotally fixed on the lower end of a post **104** by a E-ring retainer (not shown) fitted into a groove in the post on the lower side of the bell crank. Post **104** is mounted on the lower side of frame member **106** which extends transversely across the typewriter and is attached to side frame **12** by screws **108**. Frame member **106** is similarly fixed to the typewriter frame at the right-hand side of the typewriter.

A wire link **110** is hooked through an aperture **112** in the opposite arm **113** to bell crank **102**. The opposite, rear end of link **110** extends through an aperture **114** in a transversely extending arm **116** of half space mechanism actuator **118**. Therefore, as depending keystem arm **98** moves toward the rear of the typewriter, bell crank **102** is rotated in a clockwise direction about post **104**. This pulls link **110** toward the front of the typewriter and pivots half space mechanism actuator **118** counterclockwise about a screw **120** pivotally fixing the half space mechanism actuator to bracket **58**.

As half space mechanism actuator **118** rotates, an upwardly and rearwardly inclined camming extension **122** of the actuator engages and depresses the horizontally extending finger **80** on dog rocker **26**, pivoting the dog rocker in a counterclockwise direction about pivot pins **52** and **54** and releasing holding dog **24** in the manner described above in conjunction with the operation of full drop escapement **18**.

As actuator **118** rotates, it also positions a half space dog **124** in the path of the teeth **30** on starwheel **22**. Half space dog **124** is adjustably fixed to actuator **118** by screws **126** which extend through an elongated slot **128** in the actuator into threaded engagement with the dog.

As discussed above in conjunction with the operation of escapement **18** counterclockwise movement of dog rocker **26** and the movement of holding dog **24** out of engagement with the teeth **30** of starwheel **22** frees the carriage, which moves in a letter space direction, rotating starwheel **22** counterclockwise. As starwheel **22** rotates, one of its teeth **30**, in this case, tooth **30***c*, will engage the laterally extending projection or step portion **129** at the free end of half space dog **124**. This stops starwheel **22** and, consequently, prevents further movement of the typewriter carriage in the letter space direction.

Screws **126** and elongated slot **128** permit half space dog **124** to be adjusted to limit the movement of the typewriter carriage to exactly one-half of its normal letter space movement. Therefore, by maintaining the half space key **88** depressed, the typewriter carriage will be so positioned that a letter may be printed in a position offset one-half space from the space in which it would normally be printed.

When half space key **88** is released, a spring **130**, hooked in an aperture **132** in the laterally projecting finger **134** of bracket **58** and in an aperture **136** in half space mechanism actuator **118**, rotates the actuator in a clockwise direction about screw **120**. This causes step portion **129** of half space dog **124** to slide off starwheel tooth **30***c* and free starwheel **22** for movement in a counterclockwise direction under the influence of the typewriter's spring motor.

Simultaneously, actuator camming extension **122** moves forwardly, permitting spring **66** to rotate dog rocker **26** in a clockwise direction about pivot pins **52** and **54** to its inoperative position. This, as explained above, moves holding dog **24** upwardly into the path of the teeth **30** on starwheel **22**. The typewriter carriage is therefore stopped in its normal letter spacing position when the succeeding tooth **30** on starwheel **22** engages holding dog **24**.

The timing of the starwheel's release by half space dog **124** and the simultaneous pivotal movement of dog rocker **26** to its inoperative position (which is so timed that the first succeeding starwheel tooth **30** will engage holding dog **24**) is determined by the angle of actuator camming extension **122**. This angle is preferably so adjusted that dog rocker **26** will be returned very nearly to its inoperative position by spring **66** before half space dog **124** moves out of engagement with the tooth **30***c* of starwheel **22**.

Referring next to FIGURE 1, as actuator **118** rotates clockwise when half space key **88** is released, it pulls link **110** toward the rear of the machine, rotating bell crank **102** in a counterclockwise direction about post **104**. This moves keystem arm **98** toward the front of the machine, rotating keystem **90** in a clockwise direction about screw **92** and moving half space key **88** upwardly to its inoperative position. In this position the horizontal leg **138** of keystem **90** abuts the under edge of a transverse extension **140** of a stop **142** rigidly assembled to the left-hand typewriter side frame **12** by a screw **144**.

The invention may be embodied in other specific forms without departing from the spirit of essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. In combination in a typewriter or like machine: a carriage; a starwheel movable concomitantly with said carriage; an escapement operable to free the carriage for incremental movement in the letter space direction including a pivotally mounted dog rocker, a holding dog mounted on said rocker normally engaged by a tooth of and restraining the starwheel against movement; type key operated means for pivoting said dog rocker to disengage the holding dog from the starwheel tooth and free the

starwheel for rotation; and independent key operated means operable to pivot said dog rocker and disengage the holding dog and simultaneously position in the path of the starwheel restraining means effective to limit the movement of the carriage to a predetermined fraction of its normal letter space increment, comprising a pivotally mounted actuator including dog rocker pivoting cam means, a starwheel tooth engageable dog fixed to said actuator, spring means biasing said actuator in a direction effective to hold said dog out of engagement with the teeth of the starwheel, and a key operated motion transmitting linkage effective to pivot the actuator against the bias of said spring and move said dog into the path of said starwheel.

2. The combination as defined in claim 1, wherein the dog is adjustable along said actuator.

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