United States Patent [19]

Decker

[11] **3,838,764**

[45] **Oct. 1, 1974**

[54] **FINAL POSITIONING MECHANISM FOR SINGLE ELEMENT TYPE CARRIER**

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[73] Assignee: **Triumph Werke Nuernberg A.G.,** Nuernberg, Germany

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[21] Appl. No.: **309,062**

Related U.S. Application Data

[63] Continuation of Ser. No. 97,833, Dec. 14, 1970, abandoned.

[52] **U.S. Cl.** **197/52,** 197/55

[51] **Int. Cl.** **B41j 1/60**

[58] **Field of Search** 197/16, 18, 49, 52, 55, 197/48; 178/34

[56] **References Cited**

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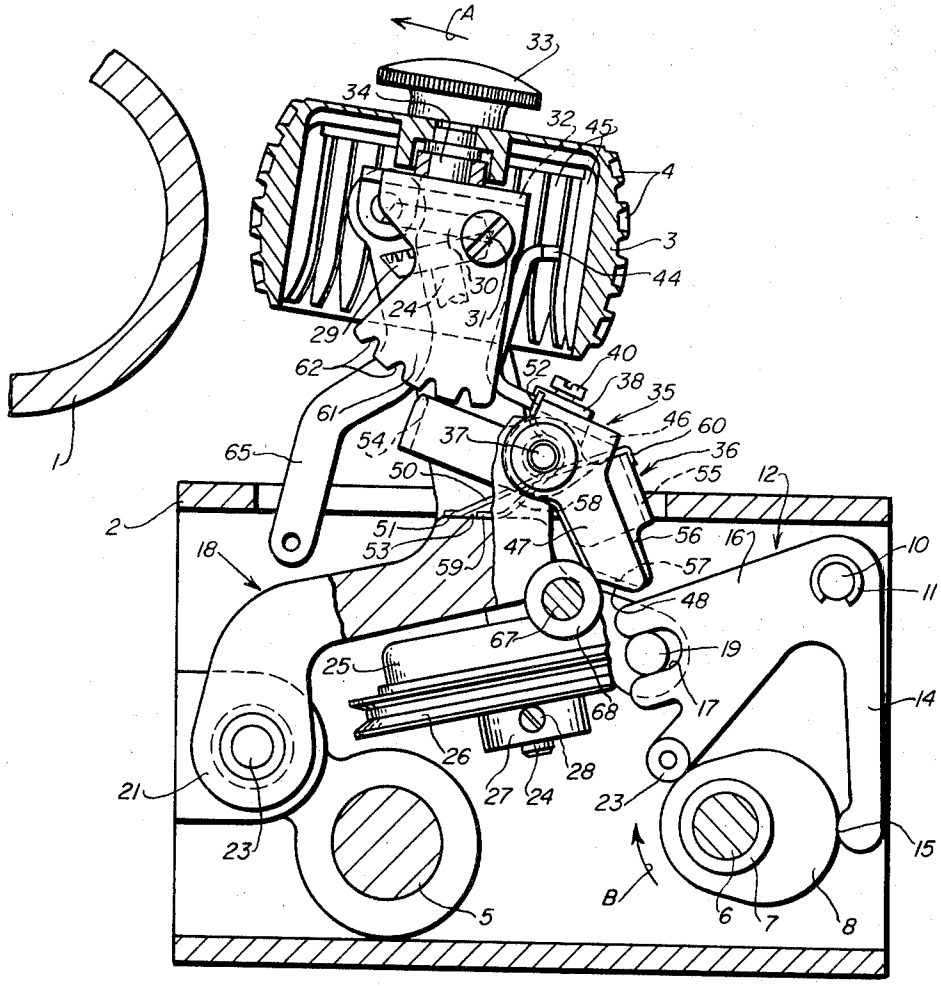
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[57] **ABSTRACT**

A rotatably and tiltably positionable type carrier is mounted on a swingable support to move the type carrier from a normal to a printing position and is detentably finally accurately positioned for printing by detenting teeth which are rotatably mounted on the swingable support and resiliently biased to move into detenting engagement with complimentary rotate and tilt teeth on the type carrier but held out of engagement by a stationary member positioned to withdraw said teeth from engagement as the support moves from a printing to normal position and to allow movement of said detenting teeth toward engagement as the support moves from normal to printing position.

17 Claims, 6 Drawing Figures



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SHEET 1 OF 4

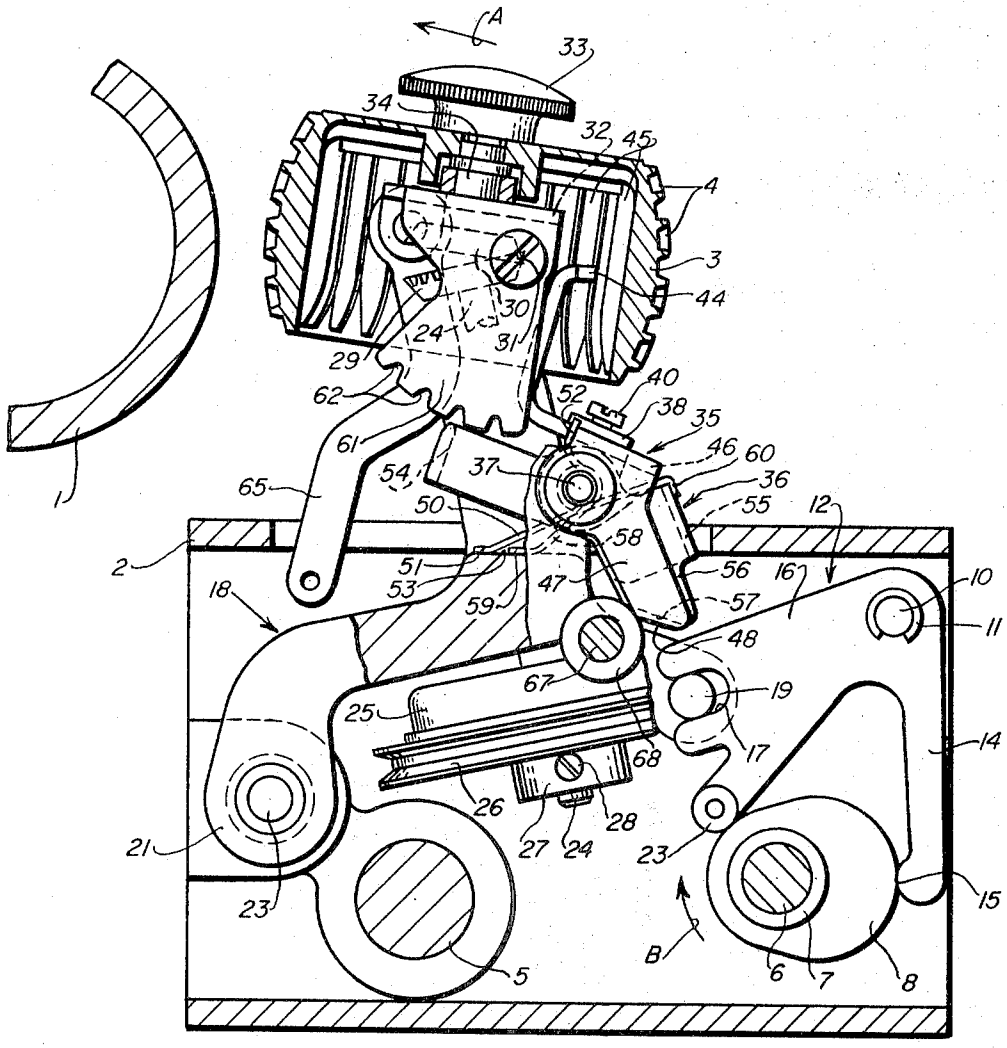


Fig_1

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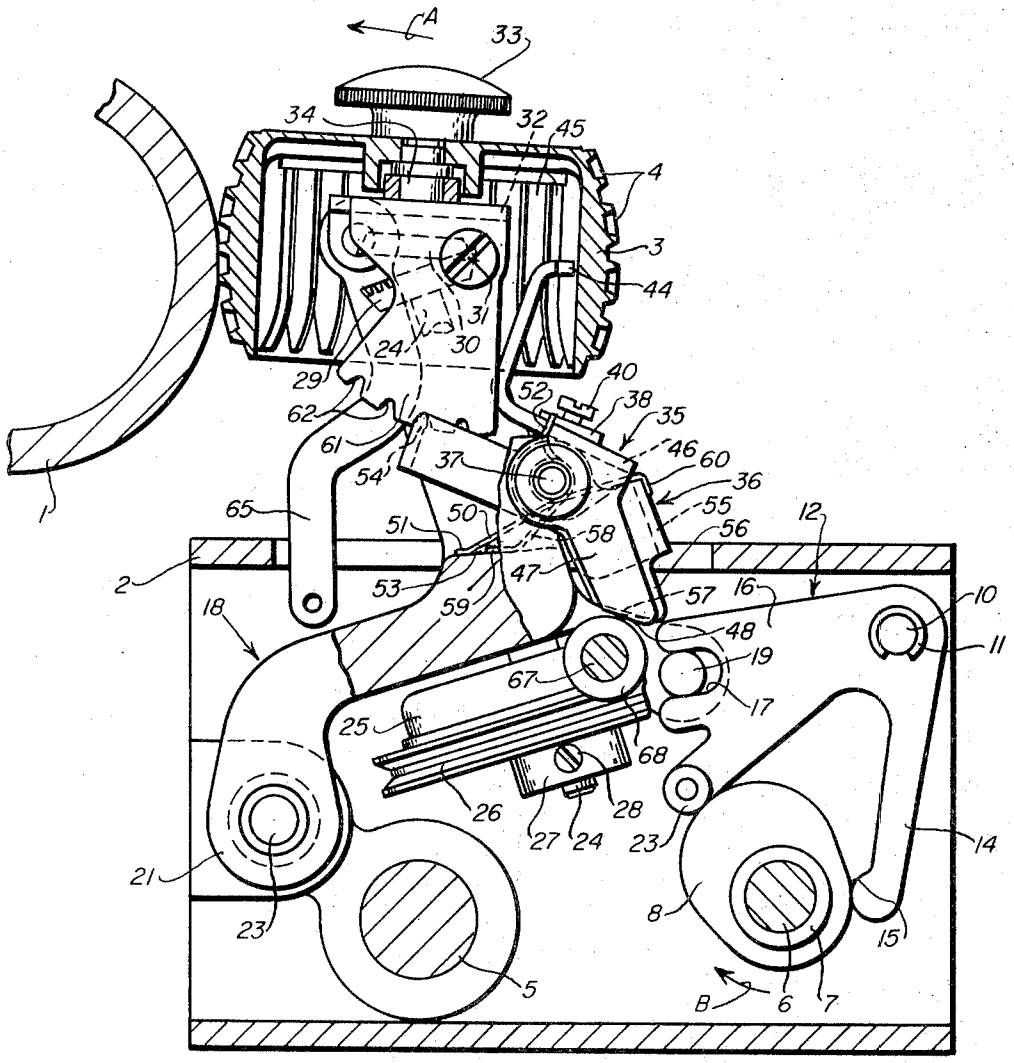


Fig_2

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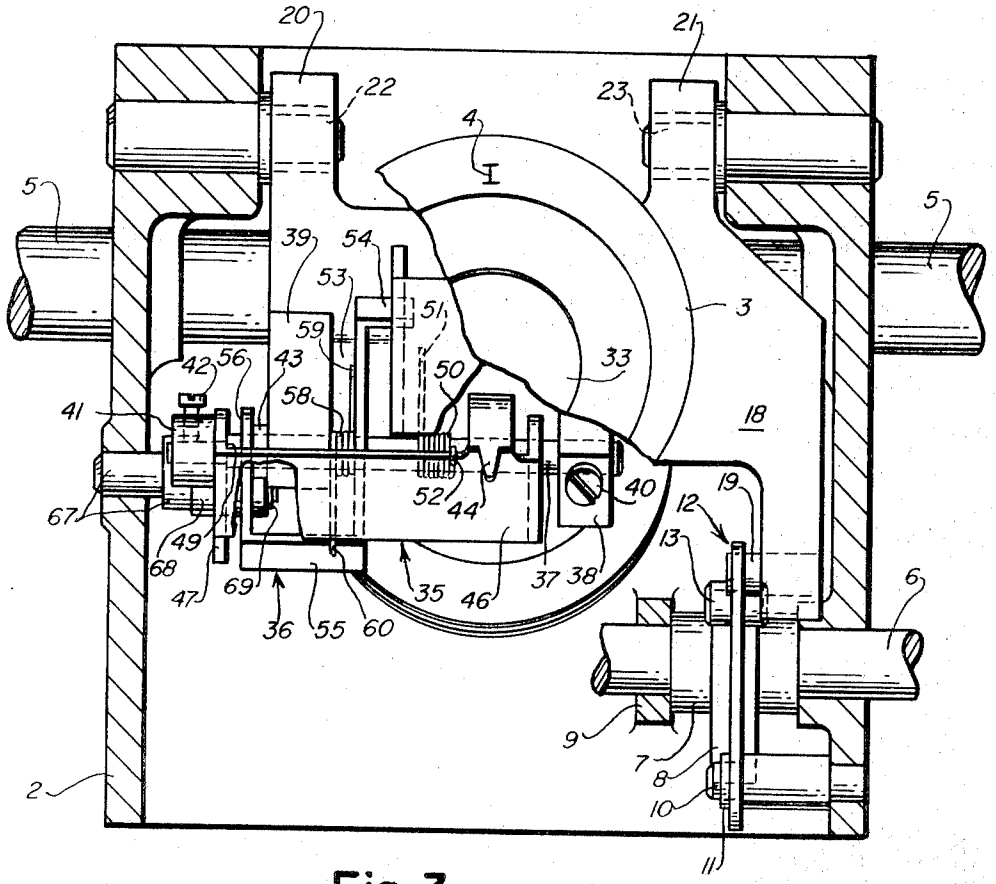


Fig_3

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Fig_4

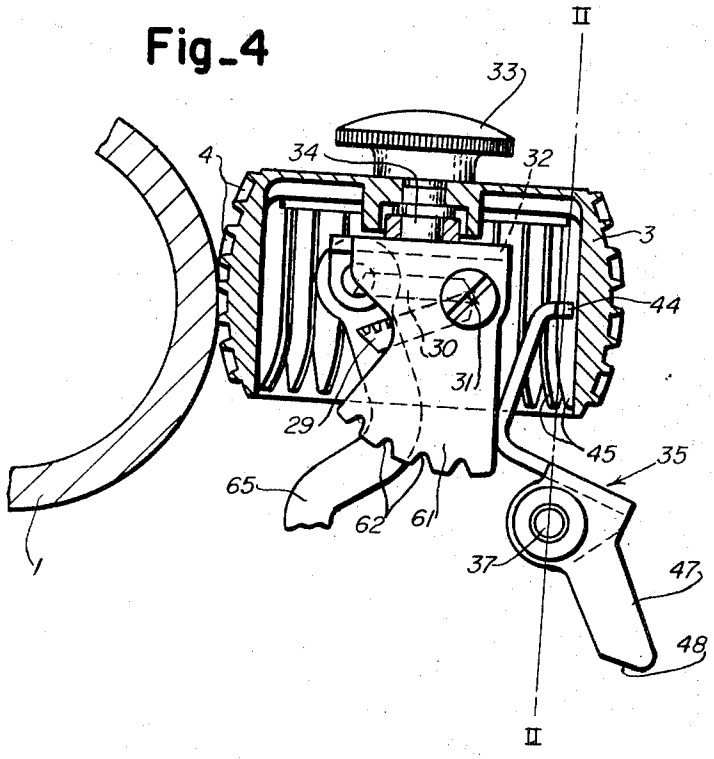


Fig_5

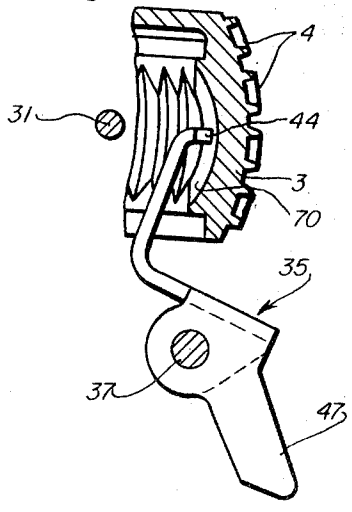
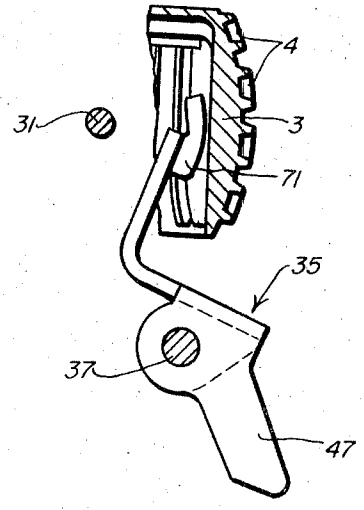


Fig_6



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FINAL POSITIONING MECHANISM FOR SINGLE ELEMENT TYPE CARRIER

This is a continuation of copending U.S. application Ser. No. 97,833, filed Dec. 14, 1970, now abandoned.

BACKGROUND OF THE INVENTION

The invention relates to structure for accurately detentably finally positioning single element type bodies which for type selective control are mounted to be rotated and also tilted and which to print are swingable against a printing surface.

In typewriters which have a type carrier or body which embodies on its exterior the various characters required for printing, it is necessary to accurately locate and detent the type carrier after it has been located approximately in any type selective position and shortly before the type positioned to print moves into printing contact. In connection with type carriers which are in the form of a rotatable body and of sphere or barrel shape, a dual detent system is required in order to accurately finally position or orient the desired character in the aspects of horizontal row and vertical column selection. For this purpose, devices are provided which are instrumental on one hand to accurately position the type carrier at the selected rotary position and on the other hand are instrumental to accurately position the type carrier at the selected tilt position. In order to bring the type carrier at a high rate of speed into any type-selective position, it is necessary to keep to a minimum those parts which selectively position the type carrier. The parts which are employed to orient and detent the type carrier should, as much as is feasible, be required to effect only minimal corrective rotative or tilting motion of the type carrier.

It is old and known to provide for these purposes a power operated cam drive which controls a spring loaded multi-armed lever pivoted below the type carrier which has a detent arm and which at the conclusion of tilting motion of the type carrier cooperates resiliently with teeth definitive of tilt positions, and which further controls a spring loaded detent lever which is cooperative with teeth definitive of different rotative positions. In order to effect corrective orientation of the type carrier it has been necessary to provide a power operated cam drive which acts by way of several intermediate members on a detent lever for correctively orienting the tilt of the type carrier, and which lever in turn acts on another detent lever to correctively orient the type carrier rotatively. In connection with each swinging motion of the type carrier therefore both detent levers are moved. Furthermore, in connection with each selective positioning operation of the type carrier the cam drive has to act through a number of levers to orient the type carrier.

SUMMARY OF THE INVENTION

A type carrier which has characters arranged in horizontal rows and vertical columns is accurately oriented and detented, without use of a power drive cam, just before the type carrier reaches the printing position with a minimum of elements by providing on the swingable type carrier support member a rod on which two spring loaded detenting levers are pivotally mounted. Each detent lever has an arm normally bearing, under spring influence, against a stationary stud, so that the detenting teeth of such levers are normally held released from detenting surfaces on the type carrier.

The detent arm is pivotally carried on said support rod between a shoulder and a collar, and axial adjustment of the detent arm is effected by axial adjustment of its support rod.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional side elevation of a type carrier, a swingable support structure therefor, and orienting elements for the type carrier in normal released positions;

FIG. **2** is a sectional side elevation similar to FIG. **1**, but with the type carrier actuated to printing position and the orienting elements in operated positions;

FIG. **3** is a plan view of the type carrier support structure and shows the orienting elements in their normal positions;

FIG. **4** is a fragmentary sectional side elevation of the type carrier moved to its print position and the element for rotative orientation in active position;

FIG. **5** is a fragmentary sectional side elevation showing a modified type carrier having curved rotative orientation defining formations; and

FIG. **6** is a view similar to FIG. **5** wherein an orientation element includes an active end of curved form.

DESCRIPTION OF EMBODIMENT OF THE INVENTION

In front of a platen **1** for travel parallel thereto is mounted a carriage in the form of a housing **2** which bears a type carrier or head **3** having type characters **4** thereon. The housing **2** is mounted on a rail **5** and a shaft **6** for travel in the direction of the writing line. Turnable with the shaft **6** is a sleeve **7** which is slidable lengthwise thereon and has a cam **8** formed thereon. The sleeve **7** is in an axial direction confined by the housing **2** in conjunction with a bearing lug **9**, see FIG. **3**, so that it will move with the carriage **2** while the shaft **6** is lengthwise stationary.

A multi-armed cam follower **12** is pivotally mounted on a stud **10** and is retained thereon by a retainer washer **11**. The middle arm of this follower **12** has a roll **13** which contacts the cam surface of the cam **8**. Further contacting the cam surface is a rounded gliding surface **15** provided on a second arm **14**. A third arm **16** of the cam follower lever **12** has a slot **17** in which is engaged a stud **19** carried on swingable support member **18** (FIG. **3**) for the type carrier **3**.

The support member **18** has extension, **20, 21** at two spaced locations provided with coaxial bearing holes by which it is mounted pivotally in the carriage or housing **2** through studs **22** and **23** on the latter. The support member **18** serves to rotatably carry a rotate shaft **24** which at its lower end carries a spring barrel **25**, a guide pulley **26**, and a collar **27** fastened by a set screw **28**. On the upper end of the rotatable shaft **24** there is mounted a crown gear **29** which is in engagement with another crown gear **30**. Coincidental with the engagement point of these crown gears **29, 30** is a tilt axle **31** which is carried on the support **18** and serves to pivotally carry a tilt bridge **32**. The type carrier **3** is mounted to an axle **34** extending from the crown gear **30** and turnably carried in the tilt bridge **32** by this axle is a knurled nut **33** which secures the type carrier to the axle.

The stated crown gear arrangement facilitates the tilting of the bridge **32** and is the subject of applicant's copending U.S. application Serial No. 308,622, filed November 21, 1972, as a continuation of U.S. Serial No. 76,733 filed on Sept. 30, 1970.

Orienting or detenting devices for the type carrier **3** consist of lever members generally designated by **35** and **36** which both are mounted on a rod **37.** The rod **37** extends through bearing holes in spaced lugs **38, 39** (FIG. **3**) and is held adjustably lengthwise thereon in position by a screw **40** in the lug **38,** whereby the effective position of the lever member **35** is adjustable, it being noted that lever member **35** is situated on the rod **37** between a shoulder **49** on the rod and a collar **41** which is secured on the rod by a screw **42.** In order to give the lever member **36** its appropriate axial position, a spacing washer **43** is provided between the lever member **36** and the lug **39.** The lever member **35** terminates in an orienting tooth **44** which is constituted to cooperate with teeth **45** which on the inner side of the type carrier **2** afford locating teeth or formations. The lever member **35** includes a connecting bridge portion **46** intermediate two pivotal locations.

As can be seen in FIG. **1,** there is on the lever member **35** at the end opposite to the orienting tooth **44** an engagement face **48.** A torsion spring **50** is borne on the rod **37** and has two opposite ends **51, 52** of which the end **51** bears against a surface **53** of the support member **18** and the end **52** bears against the edge of the said connecting bridge portion **46** of the lever member **35.** As can also be seen in FIG. **1** the lever member **36** has an offset tooth **54** which through a bridge portion **55** is connected with a follower arm **56** which at its lower end has an engagement face **57.** In association with the lever member **36** there is provided a torsion spring **58** on the rod **37** and such spring by one end **59** contacts the surface **53** of the support **18** and by its other end **60** bears resiliently against the edge of the bridge **55.** As a counterpart to the offset tooth **54** there is provided on the tilt bridge **32** a toothed segment **61** providing four notches or formations **62** definitive of type selective positions of the four rows of types. In order to transmit tilting motions to the type carrier **3** the tilt bridge **32** has an ear **63** to which an operating link **65** is connected by a stud **64.** A drive part (not shown) transmits tilting motion to the tilt bridge via a hole **66** in the link **65.** In order to keep the lever members **35** and **36** normally ineffectively located, a stud **67** is fast on the carriage housing **2** which carries a roller **68** retained thereon by a washer **69.**

In order to effect a transitory printing operation of the type carrier **3** against the platen **1** in the direction A, see FIGS. **1** and **2,** the shaft **6** is rotated one revolution by a clutch (not shown) in the direction of the arrow B. The cam follower **12** through the cam **8** acting on the follower arm **16** thereof, turns clockwise, causing the support **18** to be operated on the studs **22, 23,** counterclockwise by the slot **17** of the follower acting on the stud **19.** The lever members **35** and **36** being carried on the support **18** by the rod **37** move along with the support **18** in the direction of the arrow A. However, the stud **67** and the roller **68** remain stationarily located since they are on the carriage housing **2.** A relative motion occurs thus between the rod **37** and the roller **68** in which the distance therebetween increases. As the rod **37** swings in a circle about said studs **22, 23,** there follow quickly after the start of the print motion, clockwise spring urged motions of both the levers **35, 36** on the rod **37.** These motions of the levers **35, 36** take place because the pivotal rod **37** therefor moves with the support **18** during the printing movement of the latter toward the platen **1** away from the adjustable roller **68,** and in view of which the surfaces **48, 57** and said levers will be allowed to move clockwise by their related springs **50** and **58.** Furthermore, in view of this the detent tooth **44** of the lever **35** moves clockwise resiliently between the internal teeth **45** on the type carrier **3,** and detent therewith with corrective final positio defining effect on the type carrier with the detent tooth **44** engaging the internal teeth **45** at a location substantially aligned with the tilt axis **31** and the type character to be printed. Similarly, the detent arm **36** is moved resiliently clockwise so that its tooth **54** slides resiliently and correctively into one of the tilt position defining tooth gaps or formation **62** in the sector **61,** the approximate tilt position having been established by the operation of the tilt bridge **32** through the link **65.** In the printing position of the type carrier **3,** the arms **47** and **56** of the levers **35** and **36** stand clear off the stationary roller **68,** so that the detent teeth **44** and **54** are exclusively under the influences of their respective springs **50, 58** and have corrective final position defining effect.

The shapes of the teeth **45** and **62** which define formations or indents, and the shapes of the teeth **44** and **54** effect by their engagement exactly defined positions for the types **4** in reference to the platen **1** and the type carrier support **18.**

As can be seen from FIG. **4,** the distance which the detent lever **35** is able to move varies somewhat for different tilt positions of the type carrier **3.** Namely, it differs somewhat depending on the horizontal row to which the character to be printed belongs. However, in view of the location which the tilt axis **31** has, this difference of possible movement of the lever **35** is so minor that as a practical matter it can be ignored. The location of the pivot axis **37** of the detent lever **35** is on a line II–II, indicated in FIG. **4** which is substantially perpendicular to the alignment of the tilt axis **31,** the type character to be printed, and the location of the detenting engagement of detent tooth **44** with the internal teeth **45.** If it were substantially out of agreement with such line then the relative motion between the type carrier **3** and the lever **35** would be much greater for the differing row positioning movements, whereby in the extreme tilt positions the engagement area between the tooth notches **45** and the location defining teeth **44** would be smaller and would entail more localized operating pressures and wear.

In a modification illustrated in FIG. **5,** any tooth notch **70** which is in active position conforms to the tilt path of the type carrier **3** at the location of the operated tooth **44.** Any tooth notch **70** in its inactive position is thus curved in a radius which is centered in the tilt axis **31.**

FIG. **6** illustrates another modification wherein an orienting tooth **71,** for improved engaging conditions, is arcuate and is so formed that in each tilt position of the type body **3** a contact area of equal magnitude is in effect.

The invention achieves in an advantageous manner the detenting of a variously positionable type carrier in an exactly defined position as the type carrier nears the printing position, and does so in a most direct manner and without necessitating an extra power drive for the locating levers **35, 36.** Advantage is taken of the printing motion which the support **18** of the type carrier has to execute toward the platen thereby to allow these lo-

cating levers to become spring operated. Resultant to this, there is no necessity for a cam drive specifically to effect corrective type carrier locating operation, nor a train of motion transmitting means for operation thereby. The provision of the location correcting levers **35, 36** of the invention are simple two-armed levers supported on a rod on the swinging support **18** and produce reliably the essential movement for correctively locating the type carrier. To give the lever member **35** a basically correct position to determine the correct type selective position for the type carrier **3,** the rod **37** on which such lever is carried is axially adjustable on the support **18.**

With the modified configurations of the locating member and the location defining teeth on the type carrier, shown in FIGS. **5** and **6,** it is feasible to effect corrective tilt positioning always under equally advantageous conditions. The contact areas which come into effect are of the same magnitude for every tilt position.

The invention claimed is:

1. In a printing machine, the combination comprising:

a type head having type characters formed thereon for impacting against a recording medium,

said type head being movable to position a selected type character for printing,

moving means for moving said type head to effect approximate positioning of the type character selected for printing,

a support member for supporting said type head and said moving means,

said support member being movably supported for moving said type head in a printing movement from a normal position to a printing position to impact the selected type character against a recording medium,

drive means for driving said movable support member to effect the printing movement of said type head to impact a selected type character against a recording medium at a printing position,

detent formations associated with said type head for defining the correct impacting position of the selected type character on said type head,

detenting means for engagement with said detent formations to correctly position the selected type character prior to impacting against a recording medium,

acting means acting on said detenting means independently of said drive means and in response to the printing movement of said support member to move said type head to the printing position for moving said detenting means into engagement with said detent formation to correctly position the selected type character for impacting against a recording medium at the printing poisition, and

disengaging means separate from said support member and stationary relative to the printing movement of said support member for acting on said detenting means independently of said drive means and in response to the movement of said support member to move said type head to the normal position for removing said detenting means from engagement with said detent formations.

2. In a printing machine according to claim **1,** said acting means being in the form of a spring urging said detenting means into engagement with said detent formations.

3. In a printing machine according to claim **1,** said disengaging means being in the form of a stationary member being engaged by said detenting means in response to the movement of said support member to move said type head to the normal position.

4. In a printing machine according to claim **1:**

said type head being rotatable and tiltable for rotationally and elevationally positioning a selected type character for printing,

said detent formations associated with said type head serving to correctly define both the rotational and elevational position of a particular type character for impact, and

said detenting means being cooperable with said detent formations associated with said type head for correctly positioning said type head both rotationally and elevationally to impact a particular type character against a recording medium.

5. In a printing machine, the combination comprising:

a type head having type characters formed thereon for impacting against a recording medium,

said type head being movable to position a selected type character for printing,

moving means for moving said type head to effect approximate positioning of the type character selected for printing,

a support member for supporting said type head and said moving means,

said support member being movably supported for moving said type head in a printing movement from a normal position to a printing position to impact the selected type character against a recording medium,

drive means for driving said movable support member to effect the printing movement of said type head to impact a selected type character against a recording medium at a printing position,

detent formations associated with said type head for defining the correct impacting position of the selected type character on said type head,

detenting means for engagement with said detent formations to correctly position the selected type character prior to impacting against a recording medium,

said detenting means being carried by said support member for movement therewith, and

acting means acting on said detenting means independently of said drive means and in response to the printing movement of said support member to move said type head to the printing position for moving said detenting means into engagement with said detent formation to correctly position the selected type character for impacting against a recording medium at the printing position.

6. In a printing machine according to claim **5,** said acting means being in the form of a spring carried by said support member and urging said detenting means into engagement with said detent formations associated with said type head.

7. In a printing machine according to claim **6,** the combination further comprising a stationary member separate from said support member and stationary relative to the printing movement of said support member and acting on said detenting means independently of said drive means and in response to the movement of said support member to move said type head to the normal position for removing said detenting means from engagement with said detent formations.

8. In a printing machine according to claim **5:**

said support member being pivotally supported for pivotally moving said type head between a normal position and a printing position,

said detenting means being pivotally supported on said support member for pivotal movement into engagement with said detent formations, and

said acting means being in the form of a spring carried by said support member for pivotally urging said detenting means into engagement with said detent formations.

9. In a printing machine according to claim **8**, the combination further comprising disengaging means acting on said detenting means independently of said drive means and in response to the movement of said support member to move said type head to the normal position for removing said detenting means from engagement with said detent formations.

10. In a printing machine according to claim **9**, said disengaging means being in the form of a member stationary relative to said support member and engaged by said detenting means in response to the movement of said support member to move said type head to the normal position.

11. In a printing machine, the combination comprising:

a type head having type characters formed thereon for impacting against a recording medium,

said type head being movable to position a selected type character for printing,

moving means for moving said type head to effect approximate positioning of the type character selected for printing,

a support member for supporting said type head and said moving means,

said support member being movably supported for moving said type head in a printing movement from a normal position to a printing position to impact the selected type character against a recording medium,

drive means for driving said movable support member to effect the printing movement of said type head to impact a selected type character against a recording medium at a printing position,

detent formations associated with said type head for defining the correct impacting position of the selected type character on said type head,

detenting means for engagement with said detent formations to correctly position the selected type character prior to impacting against a recording medium,

said type head having a cavity formed therein which opens towards the exterior surface,

one of said detent formations being located in said cavity for defining the correct rotational impacting position of the selected type character,

said detenting means including an arm extending into said cavity formed in said type head for engaging the detent formation located therein, and

acting means acting on said detenting means independently of said drive means and in response to the printing movement of said support member to move said type head to the printing position for moving said detenting means into engagement with said detent formation to correctly position the selected type character for impacting against a recording medium at the printing position.

12. In a printing machine according to claim **11**:

said type head being tiltable about an axis in said cavity formed in said type head for elevationally positioning a selected type character for printing,

said rotational detent formation for correctly rotationally positioning the selected type character on said type head being in the form of teeth spaced circumferentially about said cavity,

said teeth having a configuration extending substantially parallel to the axis of rotation of said type head, and

said arm of said detenting means extending into said cavity of said type head having a tooth formed thereon for engaging said circumferentially spaced teeth at a location substantially aligned with the tilt axis and the type character selected for printing.

13. In a printing machine according to claim **11**:

said type head being tiltable about an axis in said cavity formed in said type head for elevationally positioning the selected type character for printing,

said rotational detent formation for correctly rotationally positioning the selected type character on said type head being in the form of teeth spaced circumferentially about said cavity,

said teeth having a configuration extending substantially parallel to the axis of rotation of said type head,

said arm of said detenting means extending into said cavity of said type head having a tooth formed thereon for engaging said circumferentially spaced teeth at a location substantially aligned with the tilt axis and the type character selected for printing, and

said tooth formed on said arm of said detenting means having an arcuately curved configuration conforming substantially with the radius of movement of said type head about the tilt axis at the location of engagement with said circumferentially spaced teeth.

14. In a printing machine according to claim **11**:

said type head being tiltable about an axis in said cavity formed in said type head for elevationally positioning a selected type character for printing,

said rotational detent formation for correctly rotationally positioning a selected type character on said type head being in the form of teeth spaced circumferentially about said cavity,

said teeth having a configuration extending substantially parallel to the axis of rotation of said type head,

said arm of said detenting means extending into said cavity of said type head having a tooth formed thereon for engaging said circumferentially spaced teeth at a location substantially aligned with the tilt axis and the type character selected for printing, and

said circumferentially spaced teeth having a curvature substantially conforming to the radius of movement of said type head about the tilt axis at the location of engagement with said tooth of said detenting means.

15. In a printing machine according to claim **11**:

another of said detent formations associated with said type head being tiltable therewith for defining the correct elevational impacting position of the selected type character, and

said detenting means further including another arm for engaging said other detent formation defining the elevational positions of said type head.

16. In a printing machine according to claim **11**:

said cavity formed in said type head opening externally toward said support member,

said type head being tiltable about an axis in said cavity for elevationally positioning a selected type character for printing,

said rotational detent formation for correctly rotationally positioning the selected type character on said type head being in the form of teeth spaced circumferentially about said cavity,

said arm of said detenting means extending into said cavity of said type head and having a tooth formed thereon for engaging said circumferentially spaced teeth at a location substantially aligned with the tilt axis and the type character selected for printing, and

said arm of said detenting means being pivotally supported on said support member at a location substantially perpendicular to the alignment of the tilt axis and the location of engagement of said tooth with said circumferentially spaced teeth.

17. In a printing machine, the combination comprising:

a type head having type characters formed thereon for impacting against a recording medium,

said type head being rotatable and tiltable for rotationally and elevationally positioning a selected type character for printing,

moving means for rotating and tilting said type head to effect approximate positioning of the type character selected for printing,

a support member for supporting said type head and said moving means and being pivotally movable in a printing movement between a normal position and a printing position to impact the selected type character against the recording medium,

drive means for driving said movable support member to effect the printing movement of said type head to impact a selected type character against a recording medium at a printing position,

detent formations associated with said type head for correctly defining the rotational and elevational position of the selected type character on said type head,

detenting means associated with said support member for engagement with said detent formations of said type head for correctly positioning said type head both rotationally and elevationally to impact the selected type character against the recording medium,

said detenting means being in the form of levers pivotally supported on said support member for movement into engagement with said detent formations associated with said type head,

resilient biasing means for urging said detenting levers into engagement with said detent formations,

stationary means for engaging said resiliently biased levers upon movement of said type head to the normal position for preventing said detenting levers from engaging said detent formations associated with said type head, and

said detenting levers being operable independently of said drive means and movable under the urging of said resilient biasing means in response to the printing movement of said type head to the printing position for engaging said detenting formations associated with said type head to correctly position the selected type character for printing.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,838,764

DATED : October 1, 1974

INVENTOR(S) : Herbert Decker

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In The Heading:

After item [21], insert --Foreign Application Priority Data
December 23, 1969 Germany....1964486.1--.

Signed and sealed this 20th day of May 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks