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Guerrini et al.

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[54] **REMOVABLE TYPEHEAD FOR A PRINTING MECHANISM**

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[52] **U.S. Cl.** **197/18,** 197/48, 101/109

[51] **Int. Cl.** **B41j 1/32**

[58] **Field of Search** 197/18, 48, 52, 145; 101/109, 110

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Primary Examiner—Edgar S. Burr

[57] **ABSTRACT**

A removable typehead for a printing device in which the typehead is rotated to align a particular type for printing. The typehead is mounted on a shaft supported by a pair of spaced opposed arms. One of the arms has a bearing completely encircling the shaft and the other arm has a bearing having a radial slot of width less than the diameter of the shaft. The shaft is axially shiftable between a printing position and a release position by means of a knob attached to one end. The shaft has a reduced diameter portion that is aligned with the slot in the release position so that the shaft can be moved laterally out of the slotted bearing and pivoted out of the other bearing to remove the typehead from the printing device. The typehead has a recess that engages a drive gear mounted on the arms to rotate the typehead. The arms are mounted for rotation about an axis perpendicular to the shaft and provides the necessary compound rotational movement for the typehead. The typehead and support arms are further provided with interengaging elements for facilitating alignment of the type during insertion, and with means for supporting the typehead when the shaft is in the release position disengaged from the bearings.

14 Claims, 4 Drawing Figures

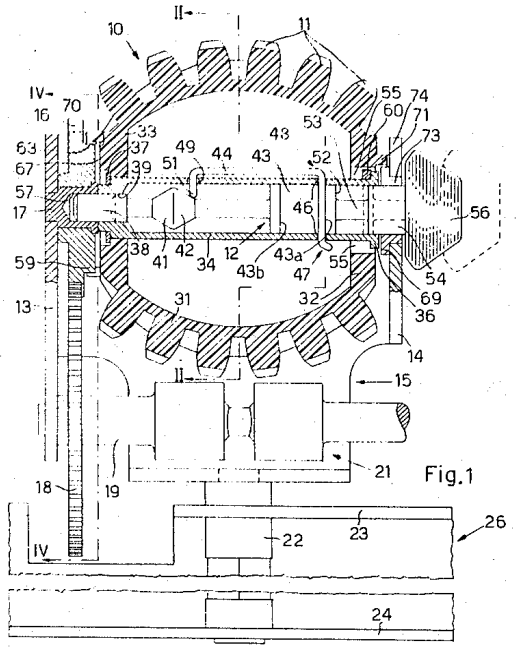

Fig.1

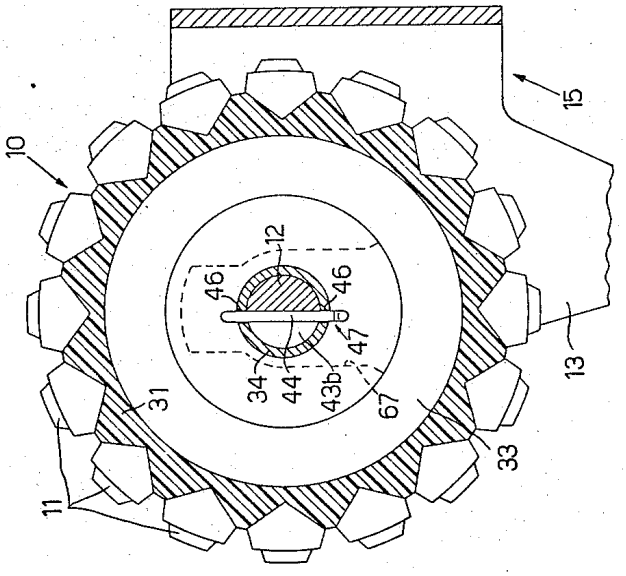

Fig. 2

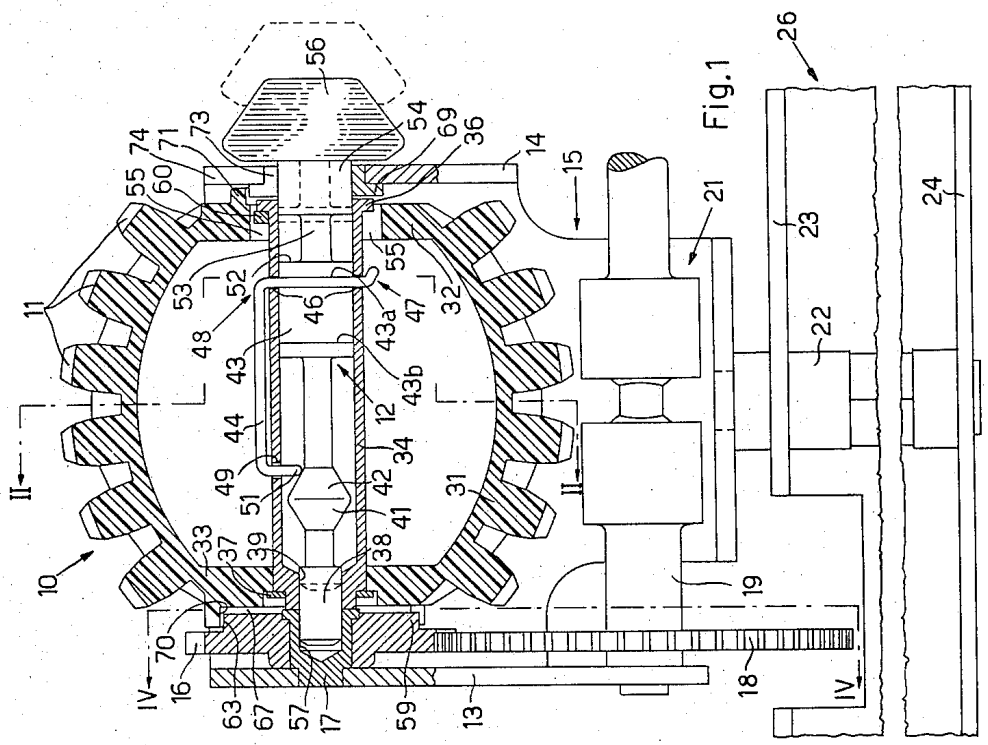

Fig. 1

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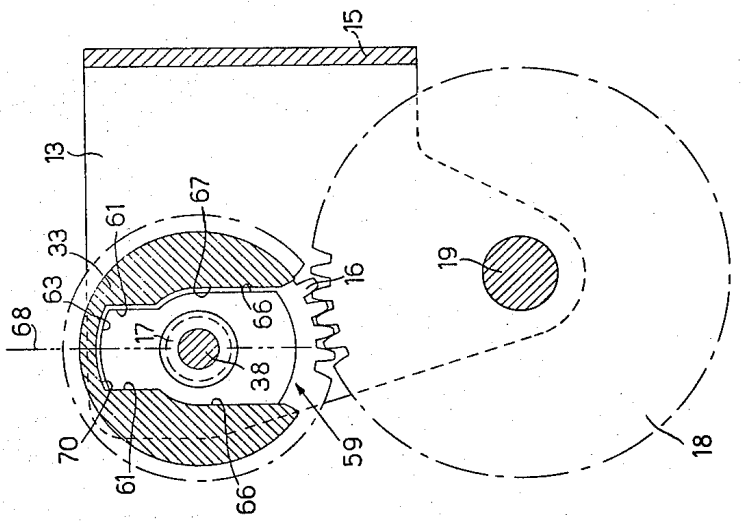

Fig. 4

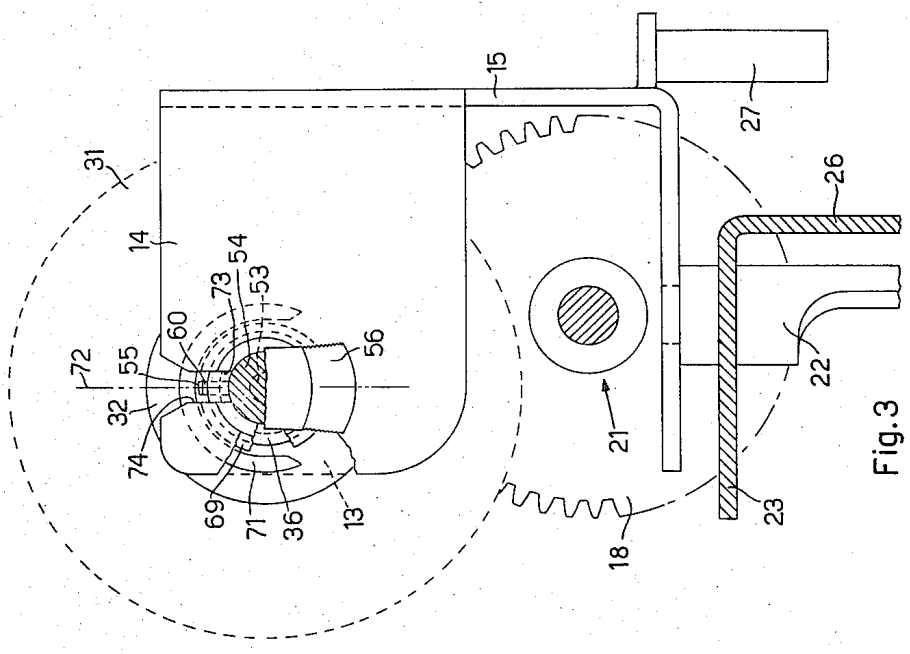

Fig.3

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REMOVABLE TYPEHEAD FOR A PRINTING MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to a removable typehead for a printing mechanism comprising a forked support, in the two arms of which the head is rotatable selectively by means of at least one shaft on which it is mounted.

In typewriters and other office machines equipped with a type head it is frequently necessary to be able to replace the head with another, the type of characters of which are of different form or are differently arranged. The replacement of the head should not, however, require the use of auxiliary tools and should be very simple and such that it can be carried out rapidly by the same person operating the machine.

Various printing mechanisms with a removable type head are known. In one of these mechanisms the type of characters of the head are arranged in rows and columns on a spherical shell fixed at the end of a vertical selector shaft. This shell is open at the bottom and is defined at the top by a plane surface on which a fixing element is disposed. This is fixed to the selector shaft by snap or spring action or by means of a screw, the shaft being rotatable and inclinable for selecting the character to be printed. These heads are therefore easily removable. They have the disadvantage, however, that the types belonging to the various rows are arranged at different distances with respect to the fixing point of the shell, so that on the striking action the types in the rows that are more distant are less rigid than the types in the rows that are close. Moreover, with wear of the fixing means, the types more distant from the fixing shaft may give rise to blurring and indistinctness in the character when the striking action takes place.

Also known are type heads constituted, for example, by two semi-spherical shells, each of which is fixed at the end of a shaft by means of screws. The shaft is rotatable in a forked support inside the two shells and is orientable with respect to the platen or paper-bearing cylinder. This head has greater rigidity due to the smaller distance of the vertical lines or columns of types from the fixing point, but the replacement thereof is complex.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a type head which is rotatable selectively in a forked support and can be replaced manually with the maximum accuracy and simplicity without the aid of any tool.

According to the present invention, there is provided a removable type head device for a printing mechanism comprising a forked support in the two arms of which the head is rotatable selectively upon at least one shaft on which it is mounted, the shaft being provided with a knob for shifting the shaft axially with respect to the head so as to disengage the head from the arms.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a front view, partly in section, of a removable type head for a printing mechanism embodying the invention;

FIG. 2 is a section on the line II—II of FIG. 1;

FIG. 3 is a side view from the right, partly in section, of the printing mechanism;

FIG. 4 is a section of the mechanism on the line IV—IV of FIG. 1.

DESCRIPTION OF A PREFERRED EMBODIMENT

The printing mechanism of the invention can be used in office machines employing type heads in the form of a solid of revolution, such as drums, spheres, etc., rotatable in forked supports. The mechanism comprises a barrel **10** (FIG. 1) of spheroidal form which bears a set of types **11** distributed in rows disposed in meridian planes (FIG. 2) and in vertical lines or columns disposed in parallel planes (FIG. 1). The barrel **10** is carried by a substantially horizontal shaft **12**, which is rotatable in two arms **13** and **14** of a forked support **15**. The barrel **10** is positioned angularly in the support **15** through the medium of a gear **16** rotatable on a pivot **17** fixed to the arm **13** of the support **15**. The gear **16** is retained axially between the arm **13** and a terminal flange of the pivot **17** and meshes with a gear **18**, fixed on a shaft **19** and rotatable in the arm **13**. The gear **18**, in turn, is rotated by the shaft **19** through the medium of an articulated joint **21**, in the manner described in our copending British Pat. application Ser. No. 21188/71 to select in front of the striking point the row of the character to be printed.

The fork **15** is fixed on a substantially vertical shaft **22** which is rotatable between two bent portions **23** and **24** of a bail **26**. The fork **15** (FIG. 3) is moreover equipped with a pin **27** which is shiftable angularly to select in front of the striking point the vertical row or column of the character to be printed. The bail **26** moreover provides for the striking of the selected type against a platen or printing cylinder not shown in the drawing.

The type barrel **10** comprises an outer shell **31** (FIG. 1) of thermoplastic or other suitable material provided with two plane side portions **32** and **33**. A hollow shaft **34** is forced between these side portions in such manner as to be angularly fast with the shell. The axial fixing of the hollow shaft **34** to the side portions **32** and **33** is obtained on the one hand by means of a terminal flange **36** of the hollow shaft **34** and on the other hand by means of a ring **37** forced on to the free end thereof. Slidably mounted inside the hollow shaft **34** is inner coaxial shaft **12**, which has a terminal portion **38** of reduced diameter rotatable in a portion **39** of the hollow shaft **34**. About one third along its length the inner shaft **12** has two substantially conical zones **41** and **42** which are joined at the larger base and are connected to two other portions of reduced diameter.

About two thirds the distance along its length from the terminal portion **38** the shaft **12** has, over a depth of about half its diameter, a transverse notch **43** defined by two straight lateral faces **43*a*** and **43*b***. Against the base of the notch there bears a wire of high elasticity **44** (FIG. 2), for example a wire as used for springs, which extends through two holes **46** in the shaft **34**, as a result of which it is fixed transversely to the shaft **34**. The wire acts as a connecting key between the two shafts **12** and **34**. On emerging from the holes **46**, the

wire 44 has a first bend 47, which prevents the disengagement of one end, and a second bend 48 (FIG. 1) which arranges the wire 44 parallel to the shaft 34. The terminal portion of this part of the wire 44 is bent again once at right angles and is freely slidable in a hole 49 in the shaft 34. The end of this slidable portion, indicated by the reference 51, is rounded and is adapted to co-operate resiliently with one of the two conical surfaces 41 and 42 of the shaft 12, acting on the latter as a spring locating device.

Near the notch 43, on the opposite side with respect to the shaft portion 38, the shaft 12 has another transverse reduction, for example a groove 52 defining a core 53 with a diameter smaller than that of a last terminal portion indicated by the reference 54. A knob 56 with a knurled gripping surface is attached to the terminal portion 54 of shaft 12. A pair of slots 55 parallel to the knob 56 in the side portion 32 permit the fitting of the hollow shaft 34 together with the bent wire 44. A key 60 of the shaft 34 finally fixes the axial position of the latter with respect to the barrel 10.

Under the working conditions indicated in FIG. 1, the terminal portion 38 projects from the side portion 33 and is rotatable in an axial hole 57 of the pivot 17. The gear 16 is provided with a front projection 59 (FIG. 4) which is constituted by two flanks 61 which are parallel and symmetrical with respect to an axis perpendicular to the axis of the pivot 17. The two flanks 61 are united by a curved portion 63 and are connected by means of two curved portions to another two flanks 66 disposed at a greater interval compared with the flanks 61. The projection 59 normally engages in a corresponding recess 67 in the form of an inverted U arranged in the side portion 33 and provided with a curved connection 70. This recess is symmetrical with respect to a radial axis 68 parallel to the two slots 55 (FIG. 3) and copies in negative form the front projection of the gear 16 (FIG. 4).

The terminal portion 54 (FIG. 1) of the shaft 12 is normally rotatable in a bushing 69 which is fixed to the arm 14 of the forked support 15. In addition to the pivot 17 and the bushing 69 supporting the shaft 12, they bear against the shaft 34 axially, ensuring the axial location of the barrel 10 between the two arms 13 and 14 of the support 15. The bushing 69 moreover projects inwardly from the arm 14 and is adapted to co-operate with a substantially semi-circular hood 71 (FIG. 3) disposed on the side portion 32 of the shell 31 and the axis of symmetry of which, indicated by the reference 72, is parallel to the axis 68 (FIG. 4) of the recess 67. The bushing 69 (FIG. 3) and the arm 14 moreover have a radial slot 73 and 74 of a width greater than the diameter of the core 53, but smaller than the diameter of the terminal portion 54. The inclination of the slots 73 and 74 is moreover such that, in correspondence with the selection of a predetermined row of types, the recess 67 (FIG. 4) and the hood 71 (FIG. 3) are adapted to orient themselves with their respective axes of symmetry parallel to the slots 73 and 74.

Under normal working conditions, for selection of the row of the type or character, the barrel 10 (FIG. 1) is rotated together with the shaft 12 between the arms 13 and 14 of the fork 15 by means of the gear 16. The gear 16 rotates the shell 31 through the medium of the projection or driving element 59 and the corresponding recess or driven element 67 of the side portion 33. The terminal portion 54 of the shaft 12 rotates in particular in the bushing 69 without any sliding action between the bushing and the hood 71, while the terminal portion 38 rotates in the hole 57 of the pivot 17. The end 51 of the wire 44 exerts a resilient force on the conical surface 42 of the shaft 12, the axial component of which force locates the shaft to the left with the face 43*a* of the notch 43 abutting against the part of the wire 44 which is fixed between the holes 46, as a result of which the core 53 remains inside the hollow shaft 34.

For removal of the barrel 10 from the fork 15, the row of types which renders the axis of the recess 67 (FIG. 4) parallel to the slots 73 and 74 (FIG. 3) is selected in a known manner, for example through the medium of a predetermined printing key or a suitable command element on the keyboard. By means of the knob 56 (FIG. 1), the shaft 12 is drawn out manually in opposition to the action of the wire 44 on the conical surface 42. Having passed the base of this surface, the same spring, acting on the other surface 41, causes the shaft 12 to shift completely to the right until the face 43*b* of the notch 43 strikes against the length of wire fixed between the two holes 46.

In this position of the shaft 12, the terminal portion 38 is withdrawn from the hole 57 of the pivot 17 and is inside the tube 34, as indicated by dashes in FIG. 1. The core 53 is located similarly shifted to the right and in correspondence with the slots 73 and 74, so that the shaft 12 is no longer supported by the fork 15. The barrel 10, however, remains centered on its support owing to the stop action exerted by the corresponding support stops and counterstops comprising the curved portion 70 of the recess 67 and the hood 71 on the curved portion 63 of the projection 59 and on the projecting portion of the bushing 69, respectively. The barrel 10 can now be raised vertically by means of the knob 56 by causing the core 53 to slide along the slot 74 until said barrel 10 is completely removed from the forked support 15. This operation can therefore be performed with only two fingers and in a very short time, without touching the barrel 10 with the fingers and without exerting any strain on the selector mechanisms.

To fit a new type head, after the shaft 12 has been withdrawn from the shell 31, the barrel 10 is arranged parallel to the axis of the pivot 17 and of the bushing 69 by means of the knob 56 with the knob 56 on the same side as the slot 74. Still through the medium of the knob 56, the barrel 10 is then rotated until the axis 68 (FIG. 4) of the recess 67 is rendered approximately parallel to the axis of the projection 59, after the gear 16 has been arranged before in the dismantling position in the manner already stated. The barrel 10 (FIG. 1) can now be introduced between the arms of the fork 15 by causing the core 53 to slide into the slot 74 of the arm 14 until the axis of the shaft 12 is arranged in coincidence with the axis of the pivot 17 and of the bushing 69. This operation is also normally performed with two fingers of one hand and is facilitated by the widened shape of the recess 67 (FIG. 4), which automatically centers the barrel by acting first on the flanks 61 and then on the flanks 66 of the projection 59. The curved connection 70 (FIG. 1) of the recess 67 and the hood 71 are respectively arrested against the corresponding curved portion 63 of the projection 59 and against the projecting edge of the bushing 69, centering the barrel axially between the pivot 17 and the bushing 69. With the barrel fitted and centered, the shaft 12 is shifted axially to the left by means of the knob 56 in opposition

to the action of the spring positioning or locating element **51**. The terminal portion **38** of the shaft **12** is then introduced into the hole **57** of the pivot **17**, while the other terminal portion **54** is introduced into the bushing **69**. The same spring locating element **51** then enables the shaft **12** to be maintained axially locked with respect to the barrel **10** and to the fork **15** in the manner already described.

It is clear that various modifications can be made in the mechanism described. For example, a bevel gear or a toothed pulley mechanism could be used for the rotation of the barrel **10**. Moreover, the two arms **13** and **14** of the support **15** may both be slotted together with the gear **16**. Furthermore, the barrel **10** may rotate on one or two shafts or sleeves which are slidable in the barrel and are positioned by an axial spiral spring. In the case of two sleeves, these are not removable, but are in turn provided with one or two slots to permit withdrawal of the barrel from the slots of the arms of the fork. Finally, the shaft **12** may be connected to the barrel **10** either by means of a screw and female thread or by means of a bayonet joint.

We claim:

1. A removable type head device for a printing mechanism comprising,

a rotatable type head;

shaft means supporting said type head, said shaft means being axially movable with respect to said type head between a first position wherein portions of said shaft means extend outwardly on both sides of said type head and a second position axially offset from said first position, said shaft means further including a portion of reduced diameter,

a type head support having a pair of spaced opposed arms closely confining said type head therebetween, each of said arms being provided with a shaft support engagable with said outwardly extending portions of said shaft means when said shaft means is in said first position, one of said shaft supports comprising a radial slot having a width greater than the diameter of said reduced portion of said shaft means but less than the diameter of the remainder of said shaft means, said reduced portion of said shaft means registering with said slot when said shaft means is in said second position,

a knob attached to one of said extended portions of said shaft means for shifting said shaft means between said positions and for moving said shaft means laterally when said shaft means is in said second position to facilitate removal of said shaft means from said supports, and

selecting means for selectively rotating said type head including gear means rotatable on said head support, a driving element rotatable synchronously with said gear means and a driven element rotatable synchronously with said type head, said driving element and said driven element being mutually engageable under the control of said knob for particularly positioning said type head with said gear means on assembling said type head on said support.

2. A type head device according to claim **1** wherein said driving element is integral with said gear means and said driven element is integral with said type head, and the other said shaft support rotatably supports said gear means and comprises an opening receiving the other of said extended portions when said shaft means is in said first position, said other extended portion being disengaged from said opening when said shaft means is in said second position.

3. The type head device of claim **1** further comprising stop means supported by said type head limiting the extent of axial movement of said shaft means to define said positions, and spring means also supported by said type head urging said shaft means toward each of said positions during at least the final stages of movement toward said positions.

4. The type head device of claim **3** wherein said spring means engages a cam means carried by said shaft means.

5. A type head device according to claim **1** further comprising support stops carried by the sides of said type head, and counterstops carried by said opposed arms and positioned to engage said support stops when said shaft means is moved to said second position, whereby said stops and counterstops support said type head when said shaft means is moved to said second position.

6. The device of claim **5** wherein said counterstops comprise said projection of said gear and a second projection fixed on said support arm opposite said gear, and second projection being also slotted in a position corresponding to said radial slot, whereby said shaft may be moved laterally past said second projection when said shaft is in said second position.

7. The type head device of claim **1** further comprising a radial recess in said type head and a driven gear rotatably mounted on one of said arms and having a projection engaging said recess to drive said type head in rotation, said projection and said recess being correspondingly outwardly tapered to facilitate alignment for engagement when said type head is being installed.

8. The type head device of claim **1** wherein said type head comprises an axial passage therethrough and said shaft means is mounted in said passage, and wherein when said shaft means is in said second position the other one end portion of said shaft means is substantially fully withdrawn into said passage.

9. A type head device according to claim **1** wherein said gear means is rotatable on one of said arms, and said driving element is integral with said gear means, said driven element being angularly fast to said type head and said shaft means being coaxial to said gear means.

10. A type head device according to claim **1** wherein said driving element is integral with a side of said gear means and said driven element is integral with a side of said type head, said driving element and said driven element comprising mutually engageable shoulder surfaces parallel to said slot for a predetermined position of said gear means.

11. A removable type head device for a printing mechanism comprising,

a rotatable type head;

shaft means supporting said type head, said shaft means being axially movable with respect to said type head between a first position wherein portions of said shaft means extend outwardly on both sides of said type head and a second position axially offset from said first position, said shaft means further including a portion of reduced diameter,

a type head support having a pair of spaced opposed arms closely confining said type head therebetween, each of said arms being provided with a

shaft support engageable with said outwardly extending portions of said shaft means when said shaft means is in said first position, one of said shaft supports comprising a radial slot having a width greater than the diameter of said reduced portion of said shaft means but less than the diameter of the remainder of said shaft means, said reduced portion of said shaft means registering with said slot when said shaft means is in said second position,

a knob attached to one of said extended portions of said shaft means for shifting said shaft means between said positions and for moving said shaft means laterally when said shaft means is in said second position to facilitate removal of said shaft means from said supports,

a radial recess in said type head and a driven gear rotatably mounted on one of said arms and having a projection engaging said recess to drive said type head in rotation, said projection and said recess being correspondingly outwardly tapered to facilitate alignment for engagement when said type head is being installed.

12. A removable type head device for a printing mechanism comprising:

a rotatable type head,

shaft means supporting said type head, said shaft means being axially movable with respect to said type head between a first position wherein portions of said shaft means extend outwardly on both sides of said type head and a second position axially offset from said first position, said shaft means comprising a hollow shaft fixed to and extending through said type head coaxially and coextensively therewith and an inner shaft coaxial with said hollow shaft and extending slidably therethrough, said inner shaft carrying said extended portions and being slidable between said first and second positions while said type head remains fixed in position, said shaft means further comprising a reduced diameter portion carried by said inner shaft and a cam means carried by said inner shaft,

wire spring means carried by said hollow shaft and extending inwardly therethrough to engage said cam means, said wire spring means urging said inner shaft toward said first and second positions during at least the final stages of movement toward each of said positions,

stop means limiting the extent of axial movement of said inner shaft to define said first and second positions,

a type head support having a pair of spaced opposed arms closely confining said type head therebetween, each of said arms being provided with a shaft support engageable with said outwardly extending portions of said shaft means when said shaft means is in said first position, one of said shaft supports comprising a radial slot having a width greater than the diameter of said reduced portion of said shaft means but less than the diameter of the remainder of said shaft means, said reduced portion of said shaft means registering with said shaft when said shaft means is in said second position, and

a knob attached to one of said extended portions of said shaft means for shifting said shaft means between said positions and for moving said shaft means laterally when said shaft means is in said second position to facilitate removal of said shaft means from said supports.

13. The type head device according to claim **12** wherein said stop means comprises a cutout portion in said inner shaft having a pair of spaced opposed walls defining said position, said wire spring means also engaging said walls when said shaft means is in one of said positions.

14. The type head device of claim **13** wherein said wire spring means comprises a single wire spring having a first portion perpendicular to said shaft means and extending through said cutout portion whereby said first portion engages one of said walls when said inner shaft is moved with respect to said hollow shaft to one of said positions, said single wire spring also having a second portion engaging said cam, and wherein said cam comprises two conical surfaces carried by said inner shaft.

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