

Nov. 22, 1966

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3,286,807

ADJUSTABLE DRIVE CAM FOR TYPEWRITERS

Filed Oct. 11, 1963

4 Sheets-Sheet 1

FIG. 1

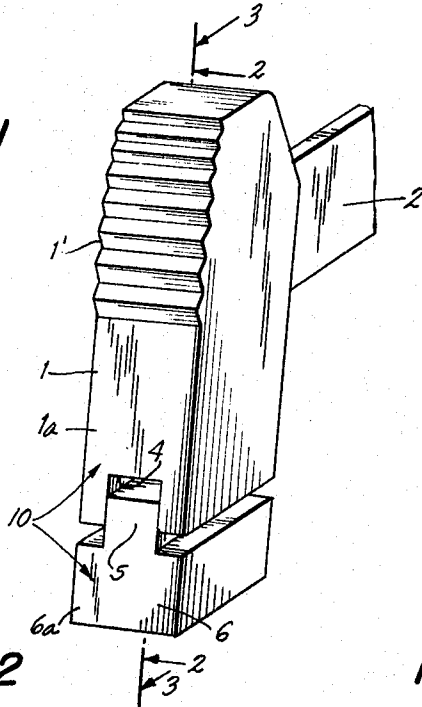


FIG. 2

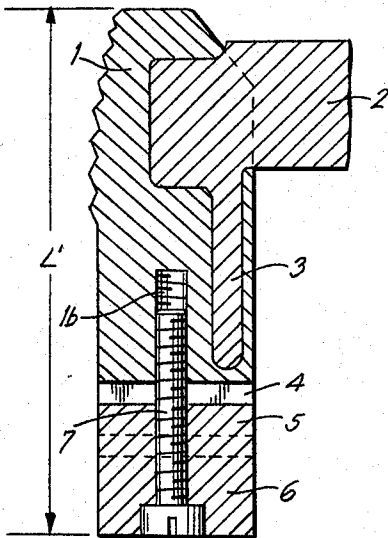
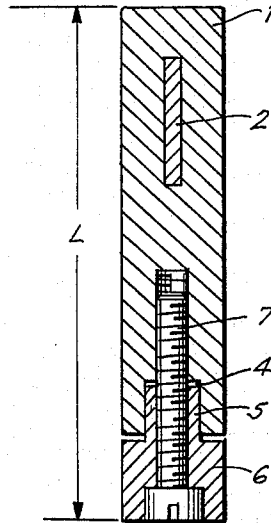


FIG. 3



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FIG. 4

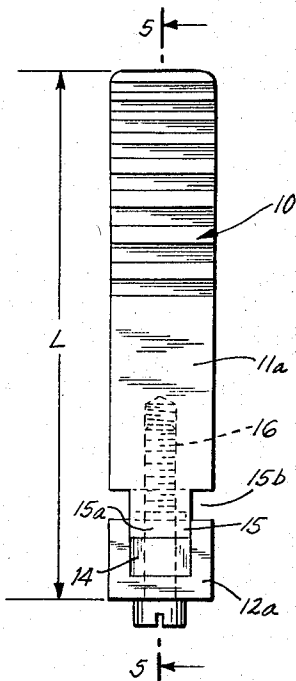


FIG. 5

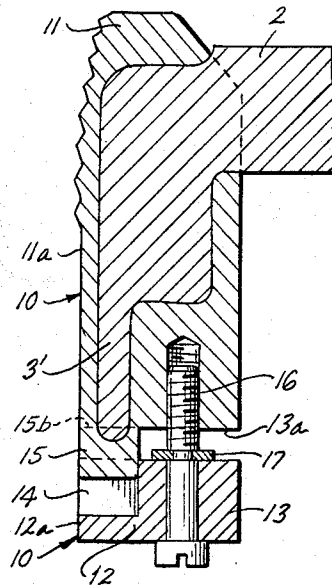


FIG. 6

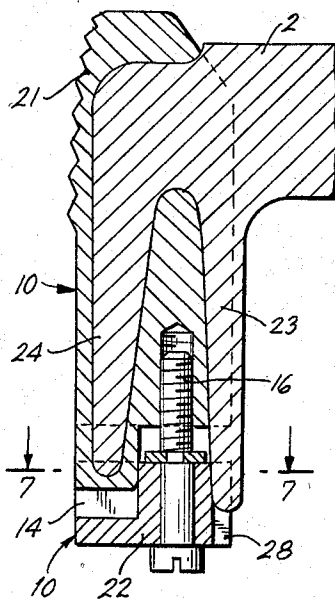
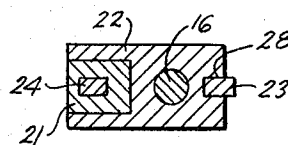


FIG. 7



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FIG. 8

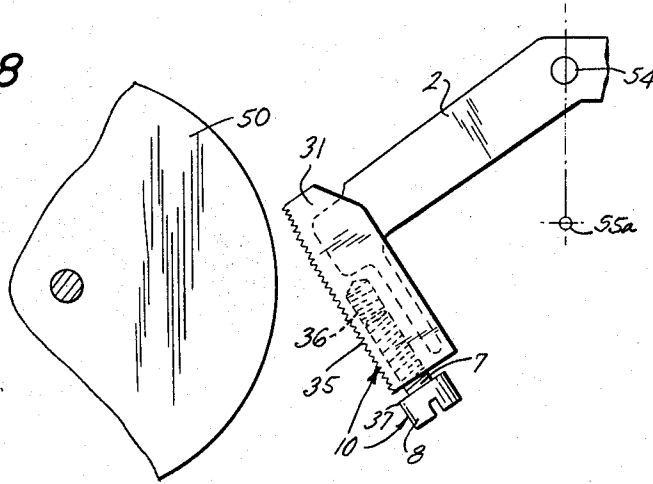


FIG. 9

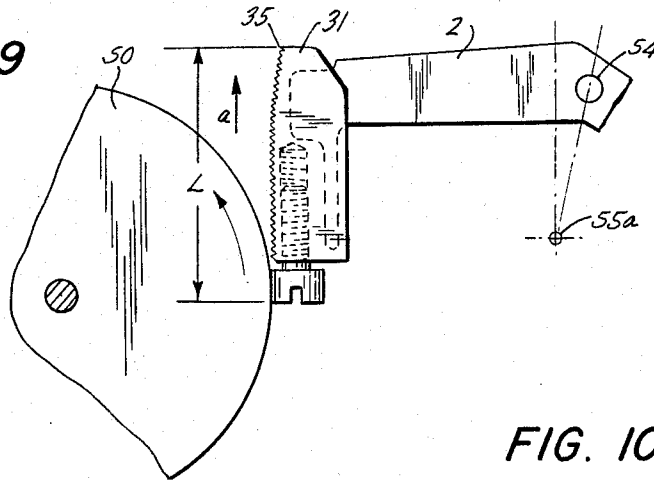


FIG. 11

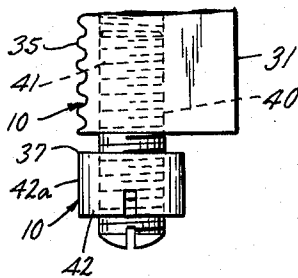
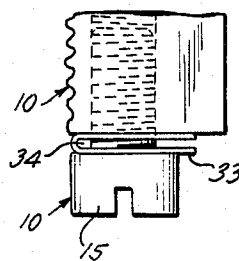


FIG. 10



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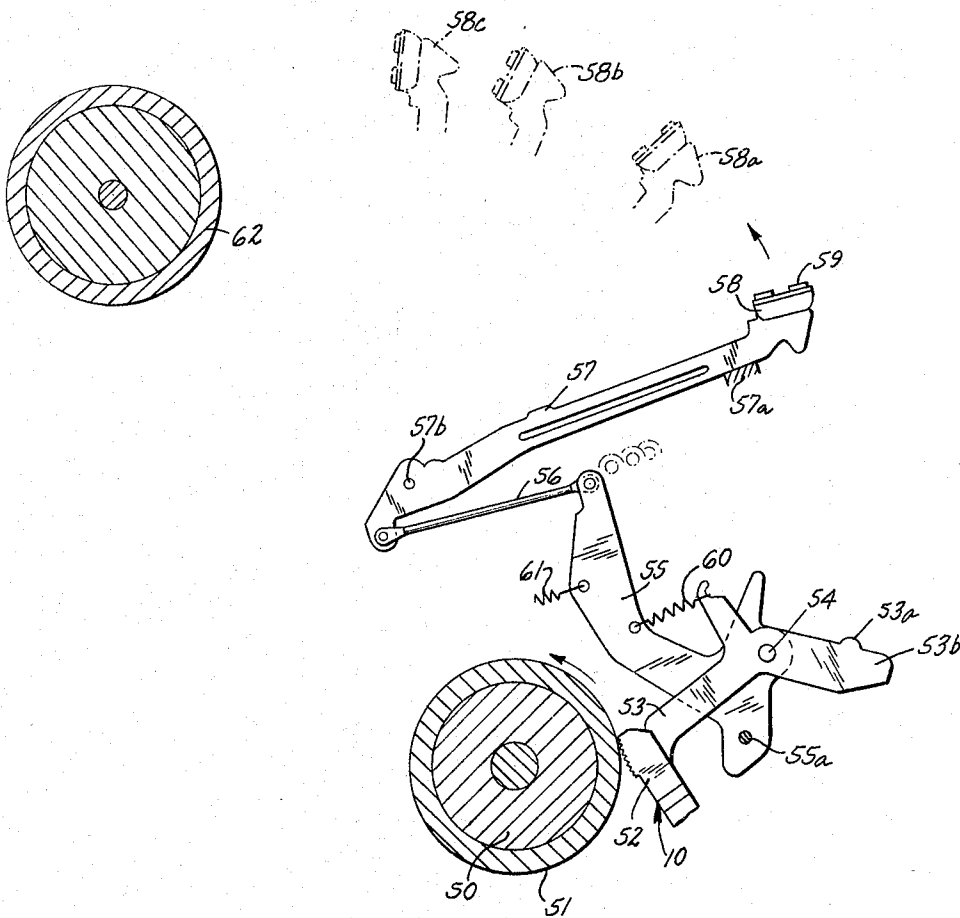
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FIG. 12



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ADJUSTABLE DRIVE CAM FOR TYPEWRITERS

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Claims priority, application Germany, Oct. 13, 1962,

G 36,134

5 Claims. (Cl. 197—17)

The present invention relates to a drive cam arrangement for typewriters, and more particularly to an improvement of drive cams which are driven by the power roll of an electric typewriter to cause actuation of the type actions.

The type actions of a typewriter are associated with type faces having different surface areas and consequently requiring different impact forces for producing uniform imprints. For example, the letter "W" will require a far greater impact force than the letter "i," and a period will require an even lesser impact force.

In accordance with the prior art constructions, substantially uniform imprints are achieved by a variation of the time during which the cam faces of the drive cams are engaged by the rotary power roll. For example, after a movement of the drive cam through a certain angle, the drive cam engages a stop which causes movement of the drive cam away from the power roll, and by adjustment of the stops of the various type actions, different impact forces are achieved.

However, the constructions according to the prior art have the disadvantage that at the moment in which the drive cam is stopped, and before the same moves away from the power roll, the surface of the power roll slides momentarily on the cam face of the stopped drive cam. This causes great wear of the surface of the power roll, and of the cam face.

It is one object of the present invention to overcome this disadvantage of prior art constructions of drive cams for type actions and to provide a drive cam arrangement in which the drive cams are not stopped so that sliding of the power roll on the drive cam cannot take place.

Another object of the present invention is to provide each drive cam with a cam face whose length is adjustable in accordance with the impact force required by the respective type action and type face, so that the power roll can be permitted to engage the entire length of each drive cam.

Another object of the invention is to provide drive cams with cam faces of different adjustable lengths respectively corresponding to the required impact forces so that the necessary separation between the power roll and the drive cam takes place when the trailing end of the drive cam passes beyond the power roll in tangential direction.

Another object of the invention is to provide a drive cam which is adjustable for varying the effective length of its cam face in accordance with the impact force required by the respective associated type face.

With these objects in view, the present invention relates to an improved drive cam for a type action. A drive cam according to one embodiment of the invention comprises a first part having a first surface, a second part having a second surface, and means for securing the first and second parts to each other in different relative positions.

The first and second surfaces formed together a composite elongated cam face, and the length of the composite cam face is different in different relative positions of the first and second parts of the drive cam.

As a result, different amounts of energy are transferred from the power roll to the drive cam when the cam

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face is made longer or shorter by adjustment of the first and second parts.

By a suitable adjustment of the distance between the first and second parts, the length of the cam face can be selected at which the amount of energy required for producing the correct impact force of the respective type face is transferred from the power roll to the drive cam and type action.

The adjusted cam faces are of different lengths, corresponding to the surface of the respective associated type face. Consequently, in accordance with the present invention, the drive cams have longer or shorter cam faces, and are respectively operatively connected with type actions having larger or smaller type faces, respectively. The drive cams and cam faces are constructed and arranged in such a manner that the power roll engaging the cam faces of different cams along the lengths thereof, transfers such different amounts of energy to different drive cams and type actions that different type faces produce uniform imprints.

The preferred embodiment of the invention provides threaded adjusting means connecting the two parts of each drive cam. Preferably, the parts of each drive cam have the same transverse width resulting in a composite cam face of uniform width.

In certain adjusted positions of the parts of the drive cam, the two parts are spaced by a gap, and in accordance with one embodiment of the invention a resilient member is placed in the gap with a surface portion thereon connecting the surfaces of the two cam parts and forming a portion of the cam face.

In another embodiment of the invention, the two parts have interengaging projections and recesses so that the composite cam face is not interrupted.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a fragmentary perspective view illustrating a drive cam according to one embodiment of the invention;

FIG. 2 is a sectional view taken on line 2—2 in FIG. 1; FIG. 3 is a sectional view taken on line 3—3 in FIG. 1 but illustrating another adjusted position of the drive cam;

FIG. 4 is a front view of another embodiment of the invention;

FIG. 5 is a longitudinal sectional view taken on line 5—5 in FIG. 4;

FIG. 6 is a longitudinal sectional view corresponding to FIG. 5, but illustrating a modified embodiment;

FIG. 7 is a cross sectional view taken on line 7—7 in FIG. 6;

FIG. 8 is a fragmentary side view of another embodiment of a drive cam according to the invention;

FIG. 9 is a side view illustrating another operative position of the drive cam of FIG. 8;

FIG. 10 is a fragmentary side view illustrating a modification of the embodiment of FIG. 8;

FIG. 11 is a fragmentary side view illustrating a further embodiment; and

FIG. 12 is a fragmentary side view illustrating a type action provided with a drive cam according to the invention.

Referring now to the drawings, and more particularly to FIG. 12, a power roll 50 has a rubber cover 51 and is continuously rotated by a motor, not shown. Power

roll 50 cooperates with a series of drive cams 52 each of which is a part of a type lever action, only one type lever action and drive cam being shown for the sake of clarity and simplicity. Each drive cam 52 includes two parts as will be explained hereinafter in greater detail, one of the parts being mounted on a support lever 53 which is mounted for turning movement on a pivot pin 54 which is provided on a lever 55. Lever 55 of each type action is mounted on a shaft 55a on the frame of the machine, while the free end of each lever 55 is connected by a link 56 to a type lever 57 carrying a type 58 with a type face 59. It will be understood that different type faces having different surface areas are provided on the types of different type actions.

A spring 60 connects levers 53 and 55, and a spring 61 is connected to the frame of the machine and to lever 55 to urge the same to move in counterclockwise direction so that the type action assumes the illustrated position in which type lever 57 abuts stop 57a.

When one of the key levers, not shown, is depressed, it engages a projection 53a of support lever 53 and turns the same in clockwise direction from the illustrated position in which drive cam 52 is slightly spaced from the power roll to a position in which the cam face 10 of drive cam 52 engages the power roll so that drive cam 52 is coupled to the power roll causing turning of support lever 53 in clockwise direction until the trailing end of cam face 10 has passed in tangential direction beyond the power roll.

This turning movement of drive cam 52 with support lever 53 is transmitted by spring 60 to lever 55 so that type lever 57 is turned about shaft 57b in counterclockwise direction toward platen 62.

As will be explained hereinafter in greater detail, each drive cam includes two adjustable parts permitting an adjustment of the total length of the cam face 10. The drive cams associated with type faces 59 having a small surface are adjusted to have a correspondingly short cam face 10, while drive cams associated with type faces having a greater surface and requiring a greater impact force are adjusted to have a longer cam face 10.

The trailing end of a drive cam having a short cam face will be released by the power roll 50 when the type 58 is in the position 58a, whereupon the type lever 57 will continue its movement toward the platen 62 due to its inertia.

If a drive cam having an adjusted cam face of intermediate length is operated by the power roll 50, the power roll will release the longer cam face 10 when the type 58 is in the position 58b, and consequently a greater amount of energy will have been transferred from the power roll to the type lever. When a drive cam 52 is adjusted to have the longest possible cam face, power roll 50 will be in engagement with the cam face 10 until the type 58 has moved to the position 58c so that an even greater amount of energy is stored in the type lever 57, resulting in a greater impact force when the type face hits the paper sheet on platen 62.

As explained above, the different impact forces thus produced by the action of the power roll on drive cams having cam faces of different lengths, are necessary for producing uniform imprints of type faces having different surface areas, for example the characters "W," "i," and ".". The greatest impact force and the longest cam face 10 will be required for broad letters, and the smallest impact force and shortest cam faces 10 will be required for small symbols.

After a drive cam 52 has moved beyond the surface of the power roll 50, support lever 53 may be stopped by a stop, not shown, engaging arm 53b. Since the pivot axis 54 of support lever 53 has moved with lever 55 along a circular path about axis 55a, spring 60 can return support lever 12 with drive cam 52 to the initial position with the cam face 10 spaced from the surface of power roll 50. Lever 14 and type lever 57 continue

the movement toward the platen due to the greater inertia of these parts.

FIGS. 1 to 11 illustrate several embodiments of drive cams 55, each of which may be used in the arrangement described with reference to FIG. 12.

Referring first to the embodiment illustrated in FIGS. 1, 2 and 3, a drive cam includes a first part 1 and a second part 6 which are connected to each other by a screw 7. The first part 1 preferably consists of a synthetic plastic material attached by a mold injection process to a support 2 which is part of support lever 53 and has an arm 3 longitudinally extending in part 1. The cam face 10 is a composite cam face including the cam surface 1a of part 1 and the cam surface 6a of part 6. Cam surface 1a includes a serrated face portion 1' which assures a good coupling connection with the surface of the rubber sleeve 51 on power roll 50.

The trailing end of part 1 is formed with a recess 4 extending through the entire thickness of part 1 and having a rectangular cross section. The second part 6 has a projection 5 having the same transverse width as recess 4 and projecting into the same. Consequently, the surface 1a is recessed, and the surface 6a has a projecting surface portion which overlaps with the surface 1a so that the composite cam face 10 is nowhere along the length thereof completely interrupted, although parts 1 and 6 are spaced from each other in the adjusted positions of the drive cam.

Adjusting screw 7 is freely turnably in a bore in part 6 and in threaded engagement with a threaded bore 1b in part 1. The total length of cam face 10 can be adjusted by turning screw 7, and it will be seen that the length L of the cam track 10 shown in FIG. 3 is shorter than the length L' of the cam track in the adjusted position shown in FIG. 2.

As explained above, the length of cam track 10 is adjusted in accordance with the impact force required by the particular type face associated with the respective drive cam, so that different relative positions of parts 1 and 6 will be necessary to adapt the drive cams for use with specific characters or type faces.

In the embodiment illustrated in FIGS. 4 and 5, the metal support 2 has a somewhat differently shaped reinforcing portion 3' on which the part 11 of the drive cam is mounted, preferably by injection molding of a synthetic plastic material.

A screw 16 passes through the thickened part 12 and has a threaded stem engaging a threaded bore in part 11. A locking nut 17 secures screw 16 so that the screw will not become loose during operation.

Part 12 has a transverse projection 13 projecting into a corresponding recess 13a in part 11. Part 11 has a projection 15 projecting into a corresponding recess 14 in part 12. The composite cam face 10 is formed by the cam surface 11a of part 11 and by the cam surface 12a of part 12. The projecting surface portion 15a overlaps with recess surface 12a so that the composite cam face 10 is not fully interrupted by the gaps 15b. It will be seen that the length L of the composite cam face 10 can be adjusted by turning screw 16 after the locking nut 17 has been loosened. The length of the composite cam face 10 is adjusted in accordance with the surface area of the respective associated character.

The embodiment of FIGS. 6 and 7 is similar to the embodiment of FIGS. 4 and 5, and corresponding parts are indicated by the same reference numerals. However, the first part 21 is shaped somewhat differently in order to receive the differently shaped arms 23 and 24 of support 2. The second part 22 is formed with a longitudinal guideway 28. Arm 23 has a portion projecting beyond the end face of part 21 and slidably engaging inner surface of recess 28. In this manner, part 22 is more firmly supported in the adjusted positions obtained by turning of screw 16.

In the embodiment of FIGS. 8 and 9, a part 31 con-

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sisting of a synthetic plastic material injection molded upon a support lever 2, has a serrated cam surface 35. A threaded bore 36 extends longitudinally into the trailing end of part 31. The second part of the drive cam is constituted by the head 8 of a screw whose stem 7 is threaded into the threaded bore 36. The head 8 is cylindrical and positioned so that a generatrix of the cylindrical surface registers with the cam surface 35 and forms a composite cam face 10 with the same. By adjustment of the screw, the length L of the composite cam track can be adjusted.

FIG. 8 shows the inoperative position of the drive cam which is moved by operation of a key lever to a position in which its leading end 35 engages the surface of the power roll 50, whereupon the power roll drives the drive cam to the position shown in FIG. 9 for actuating the type lever action. Following the position of FIG. 9, the drive cam will move in the direction of the arrow *a* until the screw head 8 separates from the surface of the power roll. However, the energy transmitted from the power roll to the drive cam will depend on the length of the combined cam face 10, and therefore on the position of the screw head 8.

The simple embodiment illustrated in FIGS. 8 and 9 has the disadvantage that a gap is formed between the two surfaces which form the composite cam track. As shown in FIG. 10, a U-shaped metal spring 33 is placed in the gap so that its curved yoke portion 34 fills the gap in the region of the composite cam face 10, permitting a smoother passage of the surface of the power roll along the composite cam track.

The embodiment illustrated in FIGS. 8, 9 and 10 may be modified by providing a square or prismatic head 8. In this event, quarter turns have to be made to adjust the length of the composite cam track. If a cylindrical screw head 8 is used, the power roll engages the head 8 only along a line, whereas a prismatic screw head will be engaged along a surface, and the head 8 may be designated to have the same transverse width as the serrated cam surface 35 of part 31.

The chain line between pivot means 54 and pivot means 55a in FIGS. 8 and 9, schematically indicates the position of lever 55, described with reference to FIG. 12, in the two illustrated positions of the drive cam.

In the modified embodiment illustrated in FIG. 11, a headless screw 40 is screwed into the threaded bore 41 of part 31, and a prismatic, preferably square nut 42 is threadedly mounted on the free end of the threaded spindle 41. The four planar surfaces 42a of nut 42 can be placed by quarter turns of nut 42 in positions forming a composite cam face 10 with the serrated cam surface 35 of part 31.

The edges 37 of screw head 8 in the embodiment of FIG. 8, and of nut 42 in the embodiment of FIG. 11, are rounded off in order to prevent any damage to the surface of the power roll 50.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of drive cam arrangements for typewriters differing from the types described above.

While the invention has been illustrated and described as embodied in a drive cam comprising two parts which can be adjusted to vary the effective length of the cam face of the drive cam in accordance with the desired impact force of the associated type action, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential

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characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

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

1. A drive cam for a type action, comprising a first part having a first surface; a second part having a second surface, said first and second surfaces together forming a composite elongated cam face having opposite free ends with said first surface leading said second surface in the longitudinal direction of said composite cam face, said surfaces having the same width, one of said parts having a recess and a central rectangular recessed surface portion and the other part having a projection projecting into said recess and having a central rectangular projecting surface portion having the same transverse width as said recessed surface portion and projecting into the same; threaded adjusting means for gradually adjusting the relative position of said first and second parts and including a screw passing through said second part and being threaded into said first part so that the same are held in different relative positions in which the distance between said opposite free ends and therewith the length of said composite cam face is different so that different amounts of energy are transferred to said drive cam from a power roll engaging said composite cam face along the length thereof; and a support having an arm having a first portion located in said first part and a second portion longitudinally projecting from said first part and slidably engaging said second part for guiding the same in longitudinal direction and for preventing transverse displacement of the same.

2. A drive cam as set forth in claim 1 wherein said second part has a longitudinal guideway on the side thereof remote from said second surface, said guideway receiving said second portion of said arm of said support.

3. A drive cam for a type action, comprising an elongated movable support and a first part having a first surface, said first part secured to said support and forming with the same a unit; a second part having a second surface, said first and second surfaces together forming a composite elongated cam face having opposite free ends with said first surface leading said second surface in the longitudinal direction of said composite cam face, said second part having a recess, a projection and a recessed surface portion and said first part having a projection projecting into said recess and a recess receiving said projection of said second part, said projection of said first part having a projecting surface portion having the same transverse width as said recessed surface portion and projecting into the same; and means for securing second part to said unit with said first and second parts in different relative positions in which the distance between said opposite free ends and therewith the length of said composite cam face is different so that different amounts of energy are transferred to said drive cam from a power roll engaging said composite cam face along the length thereof, said securing means including a screw passing through said projection of said second part and being threaded into said first part in the region of said recess of the same.

4. A drive cam for a type action, comprising a first part having a first surface; a second part having a second surface, said first and second surfaces together forming a composite elongated cam face having opposite free ends with said first surface leading said second surface in the longitudinal direction of said composite cam face; means for securing said first and second parts to each other in different relative positions in which the distance between said opposite free ends and therewith the length of said composite cam face is different so that different amounts of energy are transferred to said drive cam from a power roll engaging said composite cam face along the length thereof; and a support having an arm having a first por-

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tion located in said first part and a second portion longitudinally projecting from said first part and slidably engaging said second part for guiding the same in longitudinal direction and for preventing transverse displacement of the same.

5. A drive cam as set forth in claim 4 wherein said first and second parts consist of a synthetic plastic material, and said support consists of a metal.

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