United States Patent

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Nurnberg, Germany
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[33] **Germany**
[31] **P 17 61 226.9**

[54] **TYPE ACTION DRIVE**
10 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **197/17**
[51] **Int. Cl.** **B41j 23/06**
[50] **Field of Search** 197/17

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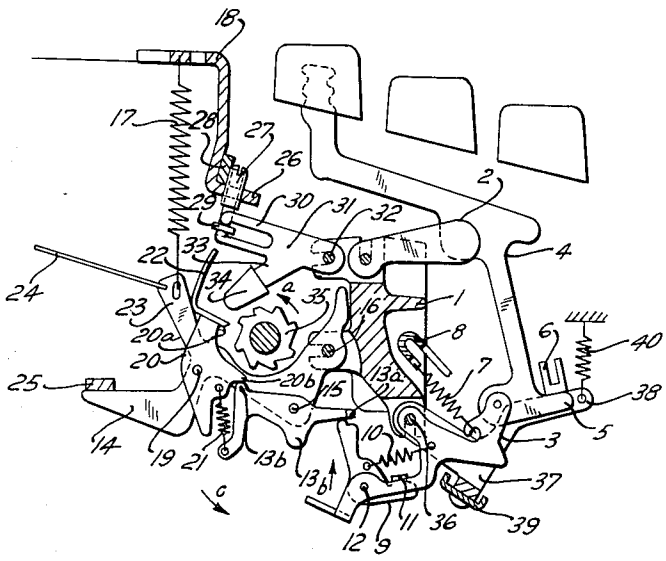
ABSTRACT: Each type action of a typewriter has a drive member connected with the type bar and a coupling member pivotally mounted on the drive member and cooperating in a coupled position with a power roll. The coupling member has a camming surface cooperating with an adjustable guide means mounted on the supporting frame of the typewriter, and camming the coupling member out of engagement with the power roll. By adjustment of the guide means different impacts of the type bar can be obtained, as required by types having different surface areas, or if particularly great numbers of copies have to be made.



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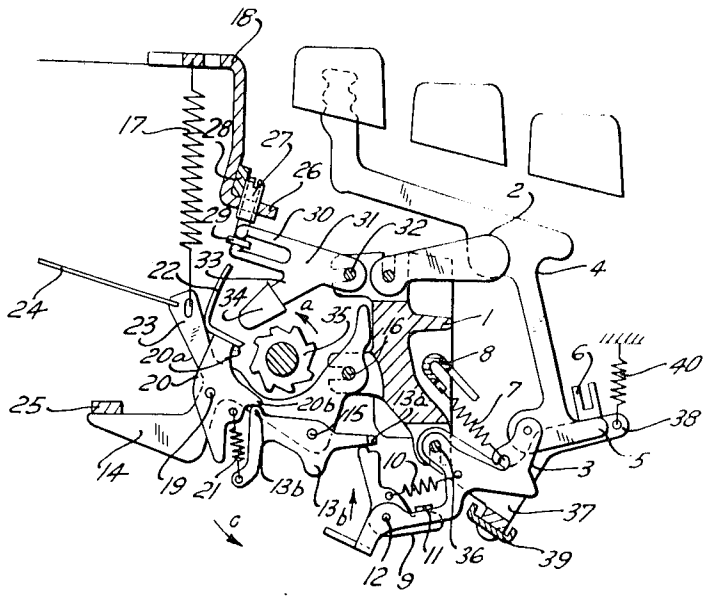
SHEET 1 OF 3

FIG. 1



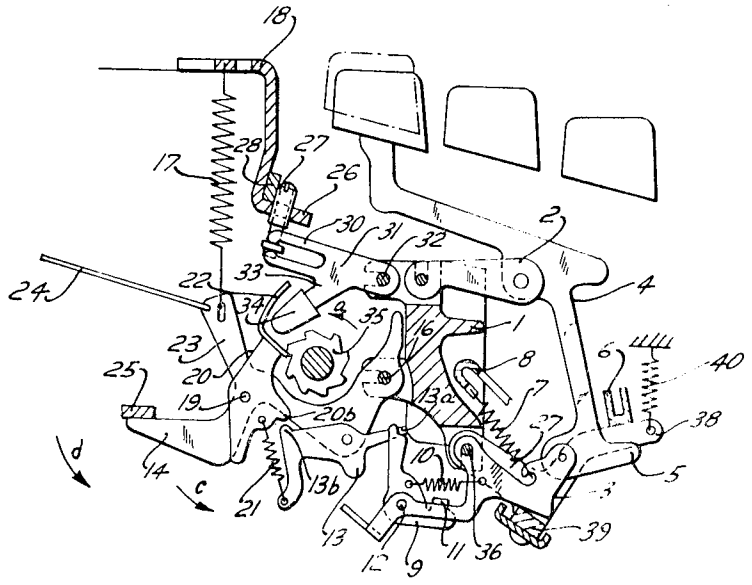


FIG. 2

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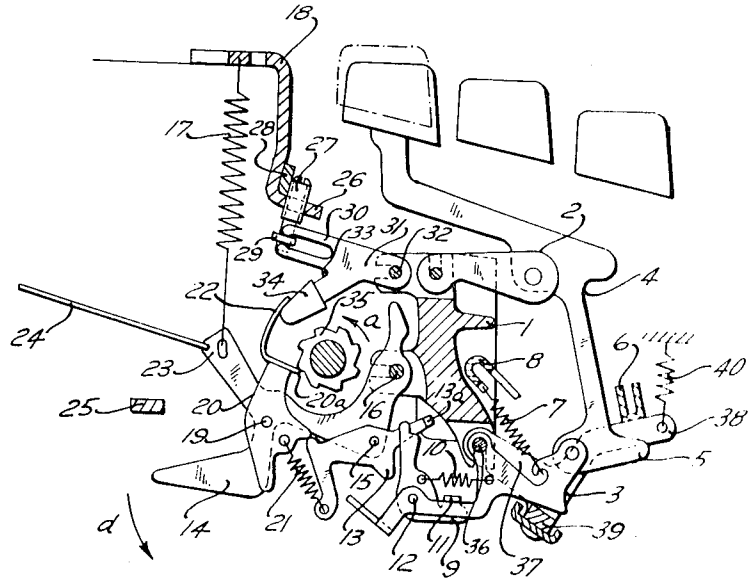
FIG. 3



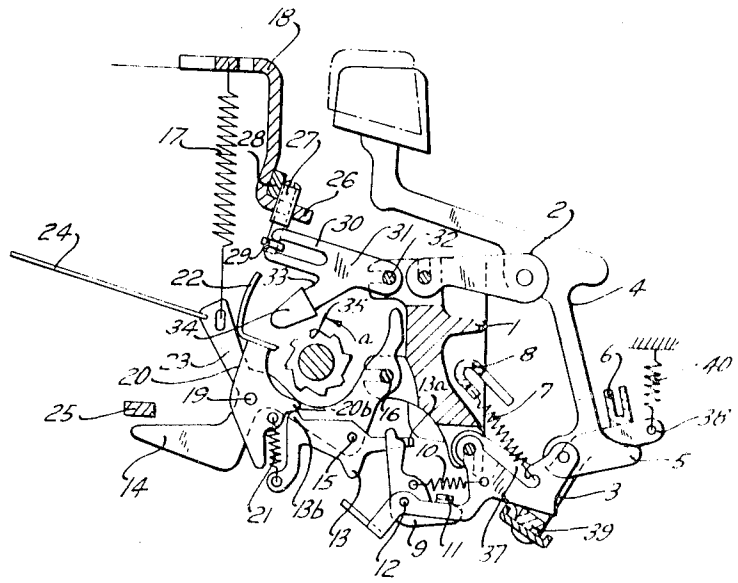


FIG. 4

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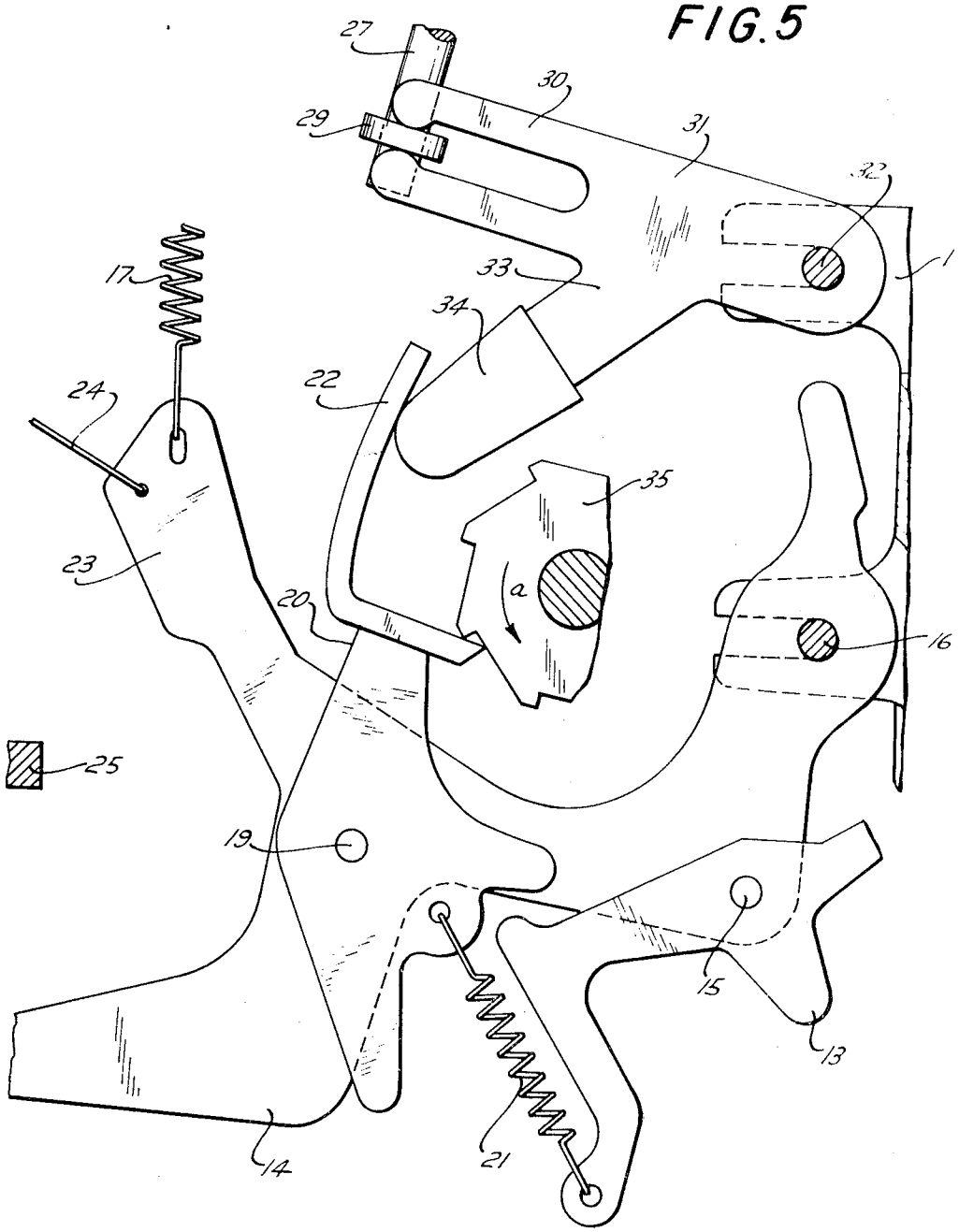
FIG. 5



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TYPE ACTION DRIVE

BACKGROUND OF THE INVENTION

Type actions in which a coupling member pivotally mounted on a drive member is operated by power roll, such as a snatch roll, are known, which provide a stop for engaging the coupling member during its movement with the power roll, and effect separation of the coupling member from the power roll.

The German Pat. Nos. 521,880 and 1,203,802 disclose type actions incorporating stops serving this purpose. However, in the constructions of the prior art, very great friction is produced between the coupling projection of the coupling member, and the tooth of the snatch roll engaging the same due to the relative movement between the two parts. For a moment, the coupling member and the snatch roll are forcefully pressed against each other before they separate.

The U.S. Pat. No. Re., 25,011 discloses a type action without a stop for separating the coupling member from the snatch roll, and a separation is effected by moving the drive member with the coupling member along a path which deviates from the periphery of the snatch roll. An adjustment of the impact force of the individual type actions is accomplished by bending the coupling member. In this construction, it is also possible that a tooth of the snatch roll exerts momentarily great pressure on the coupling member before the same is cammed by the tooth of the snatch roll out of engagement with the same.

SUMMARY OF THE INVENTION

It is one object of the present invention to overcome the disadvantages of known type action drives, and to provide a type action drive in which the separation of the coupling member from the power roll takes place gradually and smoothly without exertion of pressure on the coupled parts.

Another object of the invention is to provide a plurality of type action drives which can be individually and collectively adjusted in accordance with the desired impact force.

Another object of the invention is to move the coupling member by resilient means into coupling engagement with the power roll, but to positively move the coupling member out of engagement with the power roll by camming engagement between a part of the coupling member with a guide.

Another object of the invention is to gradually move the coupling member out of engagement with the power roll.

With these objects in view, the present invention is concerned with an improved type action drive for a typewriter having a power roll and supporting means.

One embodiment of the invention comprises a drive member mounted for turning movement about a first axis; a coupling member mounted on the drive member for turning movement about a second axis between an inoperative position and an operative position coupled with the power roll and driven by the same together with the drive member; manually operated means for moving the coupling member from the inoperative position to the operative position so that the drive member is driven and operates the type action; and a guide means mounted on the supporting means of a typewriter and having a guide surface engaged by another guide surface on the coupling member during movement of the coupling member with the power roll.

In accordance with the invention, one of the guide surfaces is a curved camming surface having a center of curvature substantially coinciding with the first axis so that the coupling member is gradually moved to the inoperative position during rotation of the power roll and is gradually withdrawn from the same.

In the preferred embodiment of the invention, the camming surface is provided on an arm of the coupling member and has a center of curvature substantially coinciding with the axis of the drive member. Preferably, the arm with the camming surface is located farther spaced from the second axis of the coupling member than the coupling projection which cooperates with the power roll.

By adjusting of the position of the guide means, the precise moment of engagement of the camming surface of the coupling member, and thereby the impact force of the type bar of the respective type action, can be determined.

Due to the fact that the camming surface has a center of curvature located in the turning axis of the drive member, the separation of the coupling projection of the coupling member from the tooth of the snatch roll is gradual and no substantial friction or pressure can develop.

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 drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary elevation illustrating a type action drive according to the invention in a position of rest;

FIG. 2 is a fragmentary side elevation illustrating the type action drive in a coupled position obtained by depression of a key;

FIG. 3 is a fragmentary elevation illustrating the type action drive in the moment of the separation of the coupling member from a snatch roll;

FIG. 4 is a fragmentary elevation illustrating the type action drive at the beginning of the return movements of the parts to the position of rest while the key is held in the depressed position; and

FIG. 5 is a fragmentary elevation illustrating the detail of the type action drive in coupled condition, similar to FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The supporting frame means of the typewriter which is provided with type action drives according to the invention, include a support **1** having slots in which an upper link **2** and a lower link **3** are mounted on pivot shafts. The other ends of links **2** and **3** are pivotally connected to a stem portion of a key lever **4** which has an abutment portion **5** abutting a stop bar **6**, common to a row of key levers **4**, under the action of spring **7** which connects a hook portion of link **3** with a partly shown bar **8**, which is either fixed on support **1**, or adjustably mounted on the same for varying the pressure required for operation of the keys. The action of spring **7** urges key lever **4** to its normal position of rest abutting stop bar **6**. As shown in FIG. 2, depression of key lever **4** moves abutment portion **5** away from stop bar **6**.

The lower link **3** has a downwardly projecting arm carrying a pivot on which a trigger **9** is pivotally mounted. A spring **10** connects trigger **9** with a point of link **3** so that trigger **9** is biassed to turn in clockwise direction, as viewed in the drawing, to a position in which a transversely projecting, bentover lug or projection **11** abuts the lower arm of link **3**. Trigger **9** cooperates with the end of an arm of a control lever **13** which is mounted for turning movement on a pivot pin **15** carried by a drive member **14**. Drive member **14** is mounted on support **1** for angular movement about a pivot **16**. A spring **17** is secured to arm **23** of drive member **14** and biases the same in clockwise direction to a position in which an arm of drive member **14** abuts a stop bar **25** common to all type actions. A wire link **24** connects arm **23** with a linkage connected with the type bar, not shown, and in the position of rest of drive member **14** shown in FIG. **1**, the type bar is in a position of rest. Drive member **14** carries a pivot pin **19** on which a coupling member **20** is mounted for angular movement. A spring **21** connects coupling member **20** with control lever **13** and biases coupling member **20** to turn in clockwise direction until abutting a projection on control lever **13** which holds coupling member **20** in the inoperative position in which a coupling projection **20***a* thereon is spaced from the teeth of snatch roll **35** which rotates continuously in the direction of the arrow *a*.

Coupling member 20 has a curved arm 22 whose rear face abuts arm 23 of drive member 14 in the position of rest shown in FIG. 1, whereby also the angular position of control lever 15 is determined so that the transverse projection 13*a* thereof is spaced from the recessed end portion of trigger 9.

A guide means 31 is mounted on a pivot pin 32 located in a slot of support 1 and has an arm 33 provided with a wear and noise resistant envelope 34 which is located in the proximity of arm 22 of coupling member 20. The other arm 30 of guide means 31 is forked and has a slot into which a projecting portion of an adjusting screw 27 projects. Adjusting screw 27 is threaded into a bore in a supporting bracket 18 which is fixed on the supporting means of the typewriter. An elastic layer 28 frictionally engages the head of screw 27 so that the same is secured against undesired turning which would change the position of portion 29, and thereby the position of the angular guide lever means 31.

The bar 26 is common to all type actions of a row, and by adjusting the position of the bracket 18, the positions of all angular guide lever means 31 of the row of type actions can be simultaneously adjusted, whereas by adjustment of individual screws 27, the guide lever means 31 of the respective type action is adjusted to vary the position of arm 33 with cover 34 relative to the front surface of the curved arm 34. During office use of the typewriter, screws 27 are adjusted to permanently hold arm 22 in a predetermined position in relation to the front surface of arm 33,

As will be explained hereinafter in detail, the concave front surface of arm 22 cooperates with the surface of the cover 34, and is a camming surface having its center of curvature substantially in the axis of pivot 16 of drive member 14.

On the pivot shaft 36, which supports the lower links 3 of the row of type actions, two lever arms 37 are mounted for angular movement which are connected by an abutment bar means 39 having an elastic cushion bar, which is engaged by links 3 in the position of FIG. 2 upon actuation of the key lever 4. Levers 37 have abutment portions 38 and are biased by spring 40 to abut stop bar 6 on which also the abutment portions 5 of the key levers 4 abut in the position of rest.

OPERATION

In the position of rest shown in FIG. 1, snatch roll 35 continuously rotates in bearings, not shown, of the supporting means 1. The coupling projection 20*a* of coupling member 20 is spaced from the teeth of the snatch roll 35, and arm 33,34 of guide means 31 is spaced from the concave camming surface of arm 22 of coupling member 20. Spring 17 holds drive member 14 in the operative position abutting stop bar 25 so that the type bar, not shown, is in a position of rest. Spring 7 holds key lever 4 with the key button in the normal inoperative position.

When a key lever 4 is depressed, as shown in FIG. 2, links 2 and 3 are displaced, abutment portion 5 moves away from stop bar 6, and link 3 abuts the elastic stop bar means 39 so that lever arms 37 slightly turn about pivot shaft 36 against the action of spring 40 so that the operator does not feel a solid stop, but a yielding limitation of the movement of key lever 4.

Due to the angular displacement of link 3, trigger 9 is raised in the direction of arrow *b* and pushes against the transverse bentover lug 13*a* of control lever 13 so that the same turns in the direction of the arrow *c*, see FIG. 1, and transmits a turning motion through spring 21 to coupling member 20 so that the coupling projection 20*a* engages a tooth of snatch roll 35 while projection 13*b* of control lever 13 separates from projection 20*b* of coupling member 20. As shown in FIG. 2, coupling member 20 is now in an operative position in which coupling projection 20*a* is located at the bottom of a notch between teeth of snatch roll 35, so that during rotation of the snatch roll 35 in the direction of the arrow *a* , coupling member 20 is rapidly accelerated while coupling projection 20*a* moves along a circular path corresponding to the periphery of the snatch roll about the axis of the latter.

Although coupling member 20 is angularly displaced in the operative coupling position, the concave camming front face of arm 22 is still spaced from the guide surface of arm 33,34 of guide means 31.

While snatch roll 35 drives coupling member 20, the motion is transmitted by pivot 19 to drive member 14 which is accelerated in the direction of the arrow *d* so that motion is transmitted to the type bar, not shown, so that the same moves toward the platen, not shown.

During the angular movement of drive member 14 about the axis of pivot 16, the camming surface of arm 22 of coupling member 20 moves to a position engaging the arm 34,33 of guide means 31, as shown in FIG. 3. While coupling member 20 with drive member 14 is further transported by snatch roll 35, the camming surface of arm 22 slides on the wear and noise resistant cover 34 of guide means 31, and the curvature of the camming face is selected so that coupling projection 20*a* is continuously and gradually withdrawn from the engaging tooth of snatch roll 35.

Due to the fact that the center of curvature of the concave camming surface of arm 22 substantially coincides with the axis of turning movement of drive member 14 defined by pivot 16, the withdrawal and retraction of coupling projection 20*a* from the engaging tooth of the snatch roll is continuous and gradual, and at no time during this movement, pressure has to be exerted by the tooth of the snatch roll on the coupling projection 20*a* for the purpose of camming coupling projection 20*a* out of engagement with the respective tooth of the snatch roll, If the motion of the coupling member is graphically illustrated over the time, the curve is continuous and has no break. FIG. 5 illustrates the position of FIG. 3 on a larger scale.

When frame means to the camming action between arm 22 and guide means 31, the engagement between the coupling member 20 and the snatch roll 35 has ended, spring 21 pulls coupling member 20 to a position in which its projection 20*b* abuts projection 13*b* of control lever 13 while coupling member 20 with arm 22 turns away from the arm 33,34 of guide MEANS 31. At the same time, spring 17 returns drive means 14 action the position of rest abutting stop bar 25. Even if key lever 4 is held in the depressed condition, as shown in FIG. 4, after the type action has produced an imprint, a repeated actuation of the type action is not possible, since the transverse lug or projection 13*a* of control lever 13 assumes a position forwardly of trigger 9 and 2, the same against the action of spring 10 so that the transverse lug 11 is withdrawn and spaced from link 3 until the same is turned in counterclockwise direction by spring 7 and lowers trigger 9 to a position in which it is released by the projecting lug 13*a*, and can be turned by spring 10 to the normal position of rest in which transverse projection 11 abuts link 3, as shown in FIG. 1. All parts are now in the position of rest, except key lever 4 which can be released at any time by the operator to be returned by spring 7 to the position of rest as shown in FIG. 1. Of course, key lever 4 can be released earlier, any time after coupling member 20 has assumed the operative position as shown in FIG. 2. It It is well known that type actions controlling small types, such as types representing a period or comma, should be associated with a lesser impact of the type bar than types representing large characters such as M or W. In order to adjust the impact force of any type action according to the invention in accordance with the size of the type face area, the respective adjusting screw 27 is turned so that portion 29 angularly displaces guide means 31 whereby the guide surface on arm 33,34 is displaced relative to the camming guide surface of arm 22 of coupling member 20. In this manner, the moment at which the camming surface engages the noise reducing cover 34 of arm 33 is varied, so that after adjustment of screws 27 of several type actions, the retraction of the respective coupling member 20 from the operative position coupled with snatch roll 35, takes place earlier or later, as required for producing different impact forces of type bars with types of different size. Evidently, the longer coupling member 20 remains coupled to the snatch roll 35, the greater will be the

impact of the type action, which may be suitable for a large capital letter. The adjusting screws **27** of the several type actions which are arranged in a row along snatch roll **35**, serve in this manner for individually adjusting the impact forces produced by the respective type actions. When the entire bracket **18** with the bar portion **26** is raised or lowered by adjusting screws, not shown, the impact forces produced by all type actions of the row, are simultaneously varied to the same degree, as is advantageous for adapting the typewriter to typing of a smaller or greater number of carbon copies, while the relative impact forces of the several type actions remain adjusted, as before, when bar **26** is adjusted.

The adjustment of the position of one guide means **31** individually, or of all guide means **31** of a row, will displace the center of curvature of the camming surface of arm **22** relative to the axis of pivot **16** about which drive member **14** turns. However, tests have shown that the effect of such displacement is negligible, and does not detrimentally affect the smooth and gradual withdrawal of coupling projection **20***a* from the tooth of snatch roll **35** under the control of the cooperating guide surfaces of arm **22** of coupling member and arm **33,34** of guide means **31**.

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 type action drives differing from the types described above.

While the invention has been illustrated and described as embodied in a type lever action in which a coupling member is gradually cammed out of engagement with the snatch roll, 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.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

1. In a typewriter having supporting means, and a rotary power roll, in combination, a plurality of type action drives, each type action drive comprising a drive member mounted on said supporting means for turning movement about a first axis; a coupling member mounted on said drive member for turning movement about a second axis between an inoperative position out of contact with said power roll, and an operative position coupled with said power roll and moving along a first path about said second axis while moving with said drive member along a second path about said first axis for operating the respective type action, said coupling member having a first guide surface; manually operated means for moving said coupling member from said inoperative position to said operative position; a guide means movably mounted on said supporting means and having a second guide surface engaged only by said first guide surface of the same type action during movement of said coupling member with said power roll, one of said first and second guide surfaces being a curved camming surface having a center of curvature coinciding with said first axis when the movement of said coupling member along said first and second paths causes separation of said coupling member from said power roll so that said first guide surface of said coupling member moves along said second guide surface to said inoperative position and smoothly disengages from said power roll; and a manual adjusting means independent of the other type action drives, and operatively connected with said guide means for displacing said guide means relative to said coupling member so that the moments of engagement between said first and second guide surfaces and of separation of said coupling member from said power roll can be independently varied for each type action drive.

2. Type action drive as claimed in claim **1** wherein said first guide surface is said camming surface and has a center of curvature coinciding with said first axis of said drive member.

3. Type action drive as claimed in claim **1** wherein said coupling member has a coupling projection and a guide arm transverse to said coupling projection and having said first guide surface; wherein said first guide surface is curved and is said camming surface; wherein said first guide surface is located farther spaced from said second axis than said coupling projection and has said center of curvature coinciding with said first axis; and wherein said guide means has a portion having said second guide surface and being in sliding engagement with said camming surface.

4. In a typewriter having supporting means, and a power roll, in combination, a type action drive comprising a drive member mounted on said supporting means for turning movement about a first axis; a coupling member mounted on said drive member for turning movement about a second axis between an inoperative position out of contact with said power roll, and an operative position coupled with said power roll and driven by said power roll together with said drive member, said coupling member having an arm with a first guide surface; manually operated means for moving said coupling member from said inoperative position to said operative position so that said drive member is driven and operates the type action; and a guide means including a guide lever mounted on said supporting means for turning movement and having a second guide surface engaged by said first guide surface during movement of said coupling member with said power roll and an arm formed with a slot; said first guide surface being a curved camming surface having a center of curvature substantially coinciding with said first axis so that said coupling member is gradually moved by said second guide surface to said inoperative position during rotation of said power roll; and manual adjusting means mounted on said supporting means and having an adjustable portion located in said slot, said adjusting means providing turning movement of said guide lever so that the moments of engagement between said guide lever and said camming surface and of separation of said coupling member from said power roll can be varied by adjustment of said adjusting means,

5. A plurality of type action drives as claimed in claim **4** comprising adjusting means mounted on said supporting means and being connected with said guide means of said type actions for simultaneously adjusting the positions of the same so that the moments of engagement between said guide means and said coupling members and of separation of said coupling members from said power roll can be collectively varied by said adjusting means.

6. A plurality of type action drives as claimed in claim **5** wherein said adjusting means include an adjustable bar, and a plurality of adjusting screws threadedly mounted on said bar and engaging said guide means of said type action drives, respectively, so that the position of each guide means can be individually adjusted by said adjusting screws, respectively.

7. Type action drive as claimed in claim **4** wherein said adjusting means includes an adjusting screw threaded into a bore of said supporting means and having said portion which is located in said slot.

8. Type action drive as claimed in claim **4** wherein said guide lever is angular and has a first arm formed with said slot and a second arm cooperating with said camming surface, and includes a pivot between said arms; and wherein said supporting means are formed with a slot receiving said pivot.

9. A plurality of type action drives as claimed in claim **4** wherein each type action drive comprises a key lever; spring biassed linkage means connecting said key lever with said coupling member for moving the same from said inoperative position to said operative position upon actuation of said key lever; and a stop bar resiliently mounted on said supporting means for stopping said key levers after actuation of said coupling members, respectively.

10. Type action drive as claimed in claim **1** wherein said coupling member has an arm with s aid first guide surface; wherein said first guide surface is said camming surface; wherein said guide means is mounted for turning movement; and wherein said manual adjusting means is mounted on said supporting means and being operatively connected with said guide means for angularly displacing the same so that the moments of engagement between said guide means and said camming surface and of separation of said coupling member from said power roll can be varied by adjustment of said adjusting means.