June 27, 1967 J. F. HERRMANN 3,327,829

CONTROL-BAR KEY-LEVER-ACTUATION STRUCTURE
FOR KEYBOARD MECHANISM
Filed Jan. 25, 1966

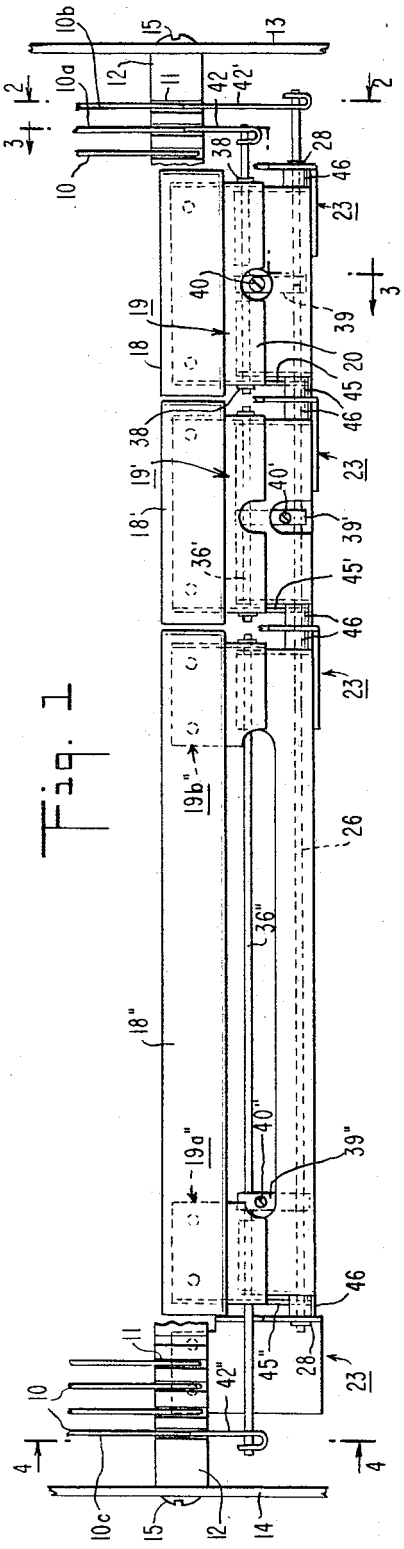

Fig. 1

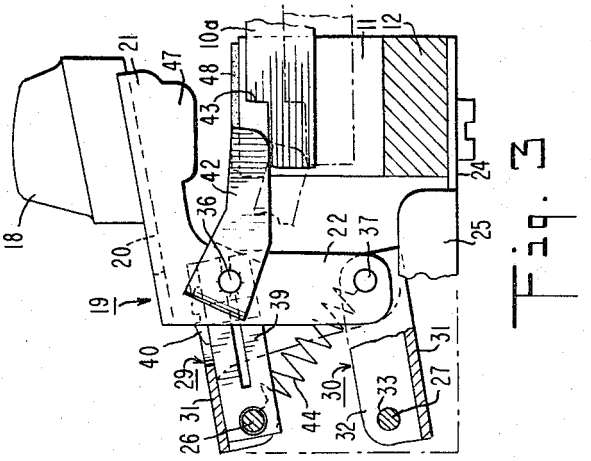

Fig. 3

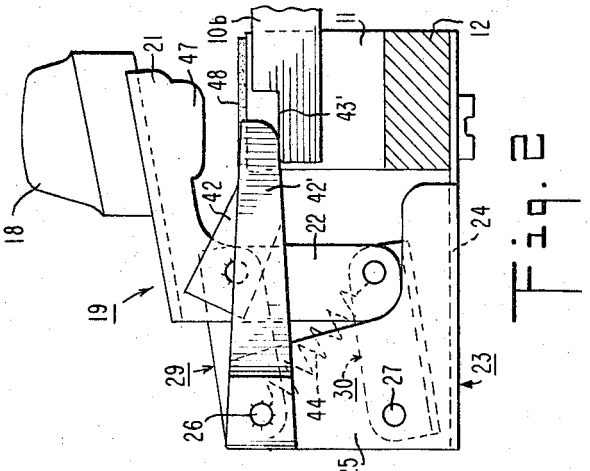

Fig. 2

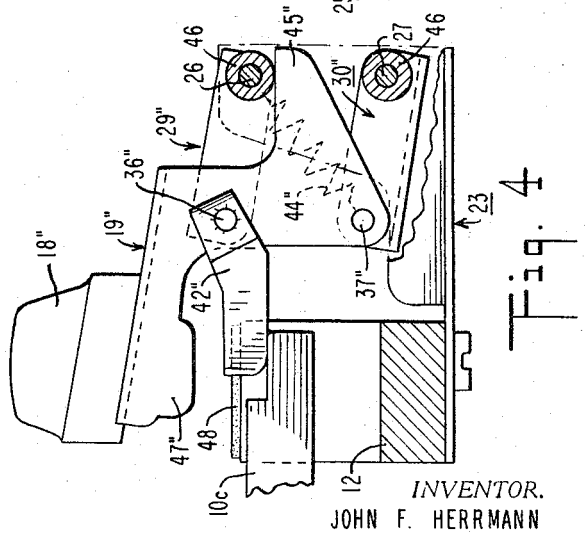

Fig. 4

INVENTOR.
JOHN F. HERRMANN

BY John A. Harvey

ATTORNEY

United States Patent Office 3,327,829 Patented June 27, 1967

3,327,829

CONTROL-BAR KEY-LEVER-ACTUATION STRUCTURE FOR KEYBOARD MECHANISM

John F. Herrmann, Pittsford, N.Y., assignor to Friden, Inc., a corporation of Delaware

Filed Jan. 25, 1966, Ser. No. 522,939
12 Claims. (Cl. 197—98)

The present invention relates to control bar support and actuation structures for keyboard mechanisms and, more particularly, to such structures which enable the operational positioning of the conventional space bar and one or more similar control bars along the forward edge of a manually operable keyboard.

It is an object of the present invention to provide a new and improved control bar support and actuation structure which enables as many as four or more control bars to be operatively positioned in line across the forward edge of a keyboard mechanism and, when so positioned, to operate individual key levers of the mechanism which may be located in individual positions anywhere within and even beyond the span of each control bar.

It is a further object of the invention to provide a novel control bar support and actuation structure which, while enabling positioning of plural control bars in line across the forward edge of a keyboard mechanism, does not require objectionably excessive control bar actuation travel as often is encountered in prior structures wherein each control bar is pivotally supported from a rear pivot axis corresponding to that upon which the key levers of the mechanism are conventionally pivotally supported.

It is an additional object of the invention to provide an improved control bar support and actuation structure which enables positioning of one or more control bars near the center forward edge of a keyboard mechanism and the actuation by each such bar of an individual key lever located at any position of the mechanism including the extreme ends thereof.

It is yet a further object of the invention to provide a new control bar support and actuation structure for a keyboard mechanism and one which not only provides a high degree of versatility in numerous diverse applications yet is of simple and relatively inexpensive contruction having minimized numbers of parts involving only a simple low-cost assembly.

Other and further objects and advantages of the invention will appear as a detailed description thereof proceeds in the light of the drawings forming a part of this application and in which:

FIG. 1 illustrates in plan view the construction of a control-bar key-lever-actuation structure embodying the present invention in a form suitable for a keyboard mechanism;

FIGS. 2 and 3 are end elevational views, partly in cross-section, along the planes 2—2 and 3—3 of the FIG. 1 construction; and

FIG. 4 is an end elevational view, partly in cross-section, taken along the plane 4—4 of the FIG. 1 structure.

The usual typewriter form of keyboard mechanism is conventionally provided with an elongated space bar positioned along the forward edge of the keyboard mechanism in spaced relation to the ends of the key levers thereof. This space bar, and shorter auxiliary control bars, are provided by the control-bar key-lever-actuation structure embodying the present invention and illustrated in plan view in FIG. 1. This structure is typically used in combination with a keyboard mechanism in the manner more particularly shown in the copending application of Hugh St. L. Dannatt entitled Keyboard Mechanism, Serial No. D 6348, and assigned to the same assignee as the present application. To this end, and as illustrated in FIG. 1, the forward ends of the key levers 10 of the keyboard

mechanism extend into guide slots 11 of a spacer bar 12 which is common to the keyboard mechanism and to the control-bar key-lever-actuation structure of the present invention. The spacer bar 12 is conveniently supported by the side plates 13 and 14 of the keyboard mechanism as by use of machine screws 15.

An outer manually operable control bar 18 is fixedly supported upon a platform frame member 19 conveniently fabricated of sheet metal providing an elongated platform 20 having turned-over end flange portions 21 providing spaced and parallel support leg projections 22.

The control-bar key-lever-actuation structure includes an elongated support structure comprised by sheet metal bracket members 23 having a base plate 24 secured by machine screws to the lower surface of the spacer bar 12 as shown, and by which the structure of the invention is fixedly secured forwardly of the keyboard mechanism in spaced relation to the ends of the key levers 10 thereof. Each of the bracket members 23 has a turned-over end portion which, for adjacent ones of the bracket members, provide spaced and parallel support projections 25. As illustrated in FIG. 1, a plurality of bracket members 23 are affixed to the spacer bar 12 in spaced relation across the end of the keyboard mechanism, and a pair of shafts 26 and 27 extend between the end ones of the bracket members 23 and are journaled in spaced parallel relation by all such members as shown. These shafts are conveniently provided with peripheral grooves (not shown) to receive C washers 28 near their ends and by which the shafts are positionally retained in the bracket members 23.

A pair of rigid elongated link platform members 29 and 30, conveniently fabricated of sheet metal providing a base portion 31 and overturned parallel end flanges 32, are rotatably supported and journaled at one end upon the shafts 26 and 27 which extend through apertures 33 in the end flanges 32. The opposite ends of the end flanges 32 of the link platform members 29 and 30 are similarly apertured rotatably to support the latter members upon a second pair of shafts 36 and 37 which extend between and are journaled in spaced parallel relation by the support leg projections 22 of the platform frame member 19. The shafts 36 and 37 are conveniently provided with peripheral grooves (not shown) near their ends to receive C washers 38 which positionally retain the shafts in the platform frame member 19.

A split-end clamp coupling bar member 39 is fixedly clamped by a machine screw 40 on the shaft 36 and is journaled on the opposing shaft 26, members 19 and 29 having notches for access to the machine screw 40. An arm member 42 is fixedly secured, conveniently by soldering or brazing, upon the end of the shaft 36 and extends into an opposing slot 11 of the spacer bar 12 where it is positioned in overlapping engageable relation with a notch 43 provided at the end of a key lever 10*a* also guided by the same slot 11 of the spacer bar 12.

A spring 44 has hooked ends conveniently engaging peripheral grooves (not shown) provided centrally of the shafts 26 and 37 to provide a bias force urging the platform frame member 19 and its control bar 18 to a non-operated position at which a projecting nose portion 45 (shown in FIG. 4) of the platform frame member 19 engages a spacer anti-friction bushing 46 provided on the shaft 26 at each end of the link platform member 29, spacer anti-friction bushings being similarly provided on the shaft 27 at each end of the link platform member 30. The manually operated position of the platform frame member 19 and control bar 18 is established by engagement of a depending portion 47 of the side flanges 21 of the frame member 19 with a resilient sheet material 48, such as rubber, affixed on the upper surface of the spacer bar 12 between the slots 11 of the latter.

It will be evident from the foregoing description of the control-bar key-lever-actuation structure that manual depression of the control bar **18** causes downward motion of the platform frame member **19** in an essentially straight-line character of movement by reason of the parallelogram support of the platform frame member by the link platform members 29 and 30 as rotationally journaled on the shafts **26**, 27 and 36, **37**. This motion is halted, when the control bar **18** is manually depressed to an operated position, by engagement of the platform frame member side portions **47** with the resilient material **48**. As the platform frame member 19 is thus manually moved downwardly to its operated position against the bias force of the spring **44**, the coupling clamp bar member **39** rotates about its journaled support on the shaft **26** and the bar member **39** in so moving provides corresponding rotation of the shaft **36** and with it the arm **42** to effect downward depression of the key lever **10***a* as indicated in broken lines in FIG. 3. Upon release of manual pressure on the control bar **18**, the platform frame member 19 is restored to non-operated position by the bias force exerted by the spring **44**, thus permitting the arm **42** and key lever **10***a* also to restore to their non-operated positions. Due to the fixed mechanical connections of the arm **42** and the clamp bar member **39** to the same shaft 36, it will be evident that the arcuate pivotal motion of the arm **42** occurs about the axis of the shaft **26**. This has the important advantage that the motion of the control bar **18** is amplified in effecting corresponding movement of the end of the arm **42** by reason of the mechanical advantage arising from the connection of the frame member 19 to the shaft **36** intermediate the spacing of the end of the arm **42** from the shaft **26**. Thus for any value of required operational displacement of the key lever **10***a*, the control bar **18** need move downward a lesser distance such as one approximately one-half the amount of movement of the key lever **10***a* for the physical dimensions illustrated by way of example in FIGS. 2 and 3. It is evident that the range of movement required of the control bar **18** accordingly is substantially less than would be the case where, as heretofore, the control bar is supported upon arms pivoting at the rear end of the keyboard mechanism on the same pivotal axis as the keyboard key levers.

The present control-bar key-lever-actuation structure is shown as also including an intermediate control bar **18'** and a much longer space bar **18''** aligned with the control bar **18** and each having the same general support and actuation construction and mode of operation as that just described for the control bar **18**. Mechanical elements and structural components employed in association with the control bar **18'** and which correspond to similar elements and components used in association with the control bar **18** are designated by similar reference numerals primed, and in similar manner elements and structural components employed in association with the space bar **18''** and which correspond to similar elements and components used in association with the control bar **18** are designated by similar reference numerals double-primed. Whereas it was earlier explained that the split end coupling clamp bar member **39** used with the control bar **18** is clamped by the machine screw **40** to the shaft **36** and is journaled on the opposing shaft **26**, the corresponding split end coupling clamp bar member **39'** used with the control bar **18'** is journaled on the shaft **36'** and is clamped by a machine screw **40'** on the shaft **26**. Also and as illustrated in FIGS. 1 and 2, there is affixed to the end of the shaft **26** an arm **42'** which extends into overlapping engageable relation with a notch **43'** provided at the front end of a key lever **10***b*. Thus manual depression of the control bar **18'** causes the clamp bar member **39'** to rotate the shaft **26** and thereby angularly move the arm **42'** to depress the key lever **10***b*. The construction and operation of the structure associated with the control bar **18'** is otherwise the same as that described in connection with the control bar **18** and will not be repeated. The split coupling clamp bar member **39''** associated with the structure of the space bar **18''** is clamped by a machine screw **40''** to the shaft **36''** and is journaled on the opposing shaft **26**. An arm **42''** secured on the end of the shaft **36''** as shown in FIGS. 1 and 4 overlaps the end of a key lever **10***c* and is effective to operate the latter in the same manner as described in connection with the operation of the key lever **10***a* by the structure described in connection with FIGS. 1 and 3. Since the space bar **18''** is shown as being appreciably longer than the control bars **18** and **18'**, it is convenient to employ at the ends of the space bar **18''** a pair of half-platform frame members **19***a''* and **19***b''* as illustrated in FIG. 1 rather than to use a unitary platform frame member extending from end to end of the space bar **18''**. The construction and operation of the structure associated with the space bar **18'** is, except as just noted, the same as that described in connection with the control bar **18**. It may be noted in this respect that although the control bars **18** and **18'** and especially the space bar **18''** have substantial lengths, the link platform members (i.e. 19 and 30) effectively extend over the length of each such bar and are so rigid and rigidly supported as to provide a very rigid operating structure so that the control bar or space bar has equal downward travel along its entire length no matter where manual pressure is applied along the length of the bar and accordingly remains level and has no tendency to tilt or see-saw.

While the control bars **18** and **18'** and the space bar **18''** are illustrated by way of example as arranged to operate end key levers **10***a*–**10***c* of a key lever mechanism, it will be evident that the arm **42** associated with the control bar **18** may be positioned anywhere along the shaft **36** to operate any key lever within the span of the control bar **18** as well as an end key lever as particularly described. It will further be evident that the arm **42'** may be positioned anywhere along the length of the shaft **26** to effect operation by the control bar **18'** of any desired key lever of the keyboard mechanism, and similarly that the arm **42''** may be positioned anywhere along the length of the shaft **36''** to operate any key lever within or to one side of the span of the space bar **18''**. Thus the control-bar key-lever-actuation structure of the present invention enables a plurality of control bars to be operatively positioned in line across the forward edge of a keyboard mechanism and, when so positioned, to provide wide flexibility in the selection of any one of a large number of key levers for operation by each control bar or space bar. The structure of the invention further does not require objectionally excessive control or space bar actuation travel, and provides a high degree of versatility in numerous diverse applications yet is of simple and relatively inexpensive construction having minimized numbers of parts involving only a simple low-cost assembly.

While there has been described a specific form of the invention for purposes of illustration, it is contemplated that numerous changes may be made without departing from the spirit of the invention.

What is claimed is:

1. A control-bar key-lever-actuation structure for a keyboard mechanism comprising a manually operable control-bar member, a support structure adapted to be fixedly secured to a keyboard mechanism in spaced relation to the ends of the key levers thereof, movable means providing parallelogram intercoupling of said control-bar member and said support structure for movable support of said control-bar member from said support structure and including two coupling shafts journaled in parallel spaced relation to one another individually by said control-bar member and said support structure, spring means for biasing said control-bar member to a non-operated position while permitting movement thereof to an operated position, an arm member fixedly secured to one of said shafts and adapted to extend into engageable

relation with a key lever of said keyboard mechanism, and a mechanical coupling bar fixedly secured at one end to said one shaft for angular rotation with said one shaft and journaled at its opposite end on the other of said shafts for angular drive motion of said one shaft by operation of said control-bar member between said non-operated and operated positions thereof.

2. A control-bar key-lever-actuation structure according to claim 1 wherein said movable means includes a pair of approximately parallel positioned rigid link members of which one is pivotally supported on said shafts and the other is pivotally supported on two further shafts individually journaled by said control-bar member and said support structure in spaced and parallel relation to each other and to said coupling shafts.

3. A control-bar key-lever-actuation structure according to claim 2 wherein said control-bar member and said support structure are each elongated and each has spaced and approximately parallel end support projections in which said shafts are journaled in parallel relation to one another.

4. A control-bar key-lever-actuation structure according to claim 2 in which each said link member has a platform portion and stiffening end flanges apertured to receive said each shafts for support of said link member thereon.

5. A control-bar key-lever-actuation structure according to claim 3 wherein said support structure includes at least one base portion and said parallel support projections are bent over therefrom to provide a support structure generally of U-shaped configuration, and wherein said control-bar member also includes a base portion having bent-over end flanges providing said support projections and thus provide a control-bar member having U-shaped configuration of lesser length than the spacing between the support projections of said support structure.

6. A control-bar key-lever-actuation structure according to claim 5 wherein said support structure includes a transverse support bar to which each said base portion is secured, and wherein said support bar is provided with a guide slot aligned with and receiving the free end of said arm member and the key lever adapted to be engaged thereby.

7. A control-bar key-lever-actuation structure according to claim 1 wherein said control-bar member is manually operable between said non-operated and operated positions thereof and includes a stop projection portion cooperating with the shaft journaled in said support structure to establish the non-operated position of said control-bar member.

8. A control-bar key-lever-actuation structure according to claim 6 wherein said spring means provides a bias force urging said stop projection portion into said cooperative relation with said shaft normally to bias said control-bar member to said non-operated position thereof.

9. A control-bar key-lever-actuation structure for a keyboard mechanism comprising a pair of manually operable control car members, a support structure adapted to be fixedly secured to a keyboard mechanism in spaced

relation to the ends of the key levers thereof, movable means providing independent parallelogram intercoupling of each said control-bar member and said support structure for movable support of each said control-bar member in side-by-side relation and from said support structure and including a pair of shafts journaled individually by individual ones of said control-bar members and a common shaft journaled by said support structure, a first arm member fixedly secured to the one of said pair of shafts journaled by a first one of said control-bar members and adapted to extend into engageable relation with a first key lever of said keyboard mechanism, a second arm member fixedly secured to said common shaft and adapted to extend into engageable relation with a second key lever of said keyboard mechanism, a first mechanical coupling member fixedly secured to the shaft carrying said first arm member and journaled on said common shaft, and a second mechanical coupling member fixedly secured to said common shaft and journaled on the other shaft of said pair of shafts.

10. A control-bar key-lever-actuation structure according to claim 9 wherein said movable means includes two pairs of rigid link members of which one link member in each pair is pivotally supported on said common shaft and is also pivotally supported on an individual shaft journaled by an individual one of said control-bar members and the other link member of each pair is pivotally supported on a further common shaft journaled by said support structure and is individually pivotally supported by a further shaft individually journaled by individual ones of said control-bar members.

11. A control-bar key-lever-actuation structure according to claim 10 wherein said each link member has an elongated platform portion and stiffening end flanges apertured to receive said shafts for support of said link member thereon.

12. A control-bar key-lever-actuation structure according to claim 9 wherein each said control-bar member is manually operable between non-operated and operated positions thereof and includes a stop projection portion cooperating with said common shaft to establish the non-operated position of said each control-bar member, and wherein spring means provides a bias force urging each said stop projection portion into said coperative relation with said common shaft normally to bias each said control-bar member to said non-operated position thereof.

References Cited

UNITED STATES PATENTS

1,001,370	8/1911	Douthat	197—98
1,030,503	6/1912	Clauder	197—27
2,141,028	12/1938	Benzing	197—27
2,901,079	8/1959	Barkdoll	197—17
2,971,625	2/1961	Rix	197—17
3,103,272	9/1963	Roggenstein	197—17
3,250,366	5/1966	Rix et al.	197—17

ROBERT E. PULFREY, *Primary Examiner.*

E. S. BURR, *Assistant Examiner.*