April 21, 1925. 1,534,272

W. F. KOKEN

FOOT REST OPERATING MECHANISM FOR RECLINING CHAIRS

Filed Dec. 14, 1923 2 Sheets-Sheet 1

Fig. 4.

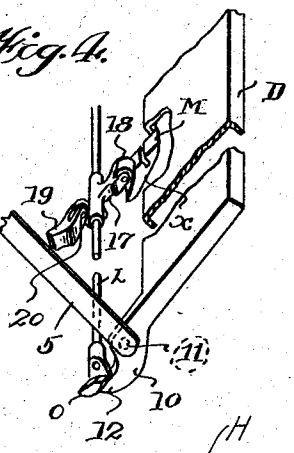
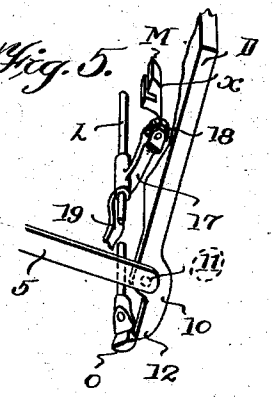


Fig. 5.



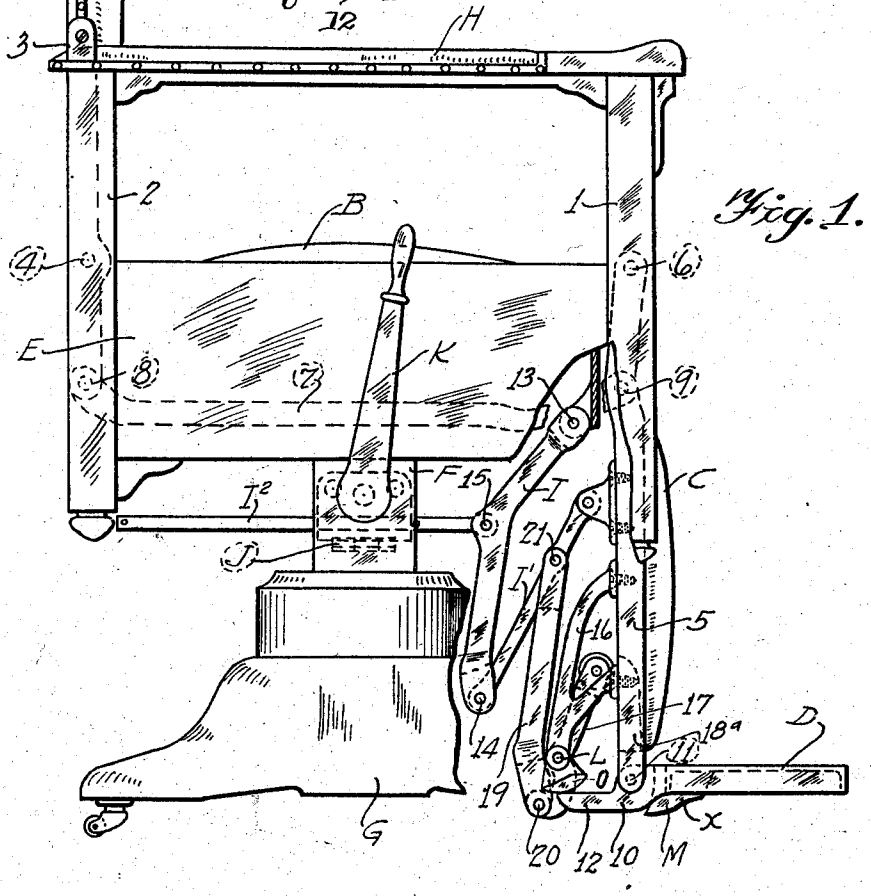


Fig. 1.

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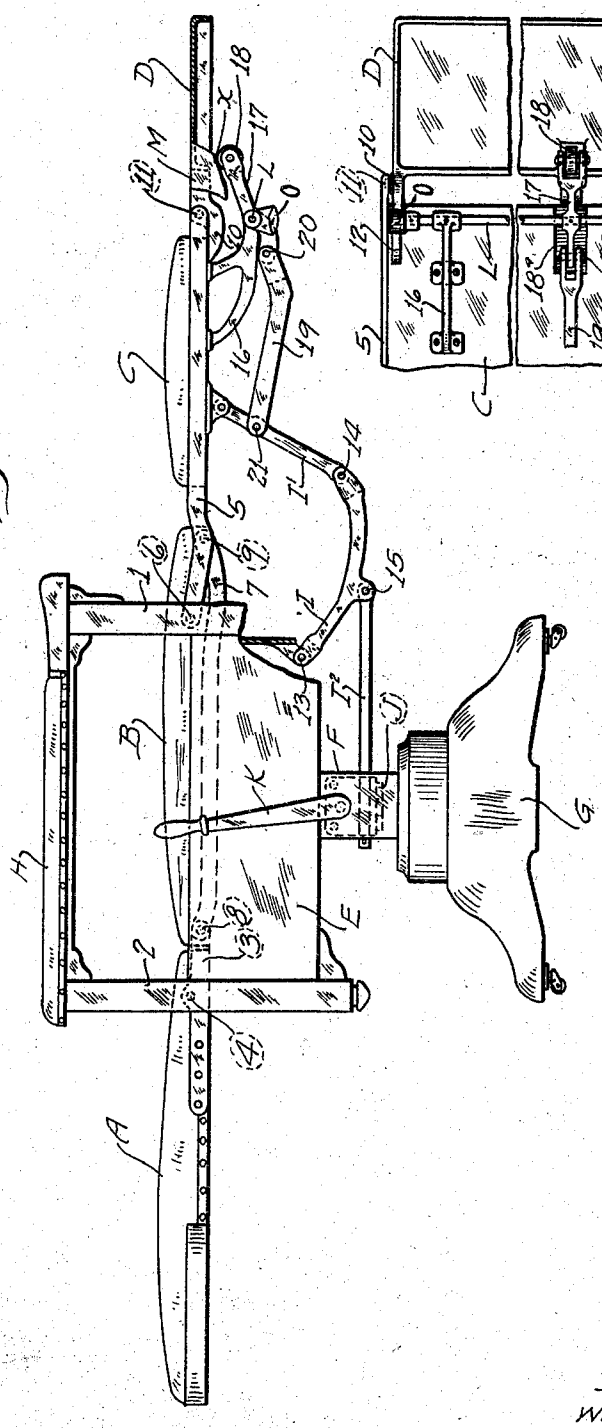


Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

WALTER F. KOKEN, OF ST. LOUIS, MISSOURI.

FOOT-REST-OPERATING MECHANISM FOR RECLINING CHAIRS.

Application filed December 14, 1923. Serial No. 680,722.

To all whom it may concern:

Be it known that I, WALTER F. KOKEN, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Foot-Rest-Operating Mechanisms for Reclining Chairs, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to adjustable chairs of the kind that are used by barbers, hair dressers and other specialists for supporting a person on whom the specialist is operating, and particularly chairs of the kind that are equipped with a swinging apron and a swinging foot rest mounted in such a way that the foot rest will turn from a position at substantially right angles to the apron into a position wherein it is disposed in longitudinal alignment with the apron during the operation of reclining the back of the chair.

The main object of my present invention is to provide a chair of the general type referred to that is equipped with mechanism for moving the foot rest relatively to the apron during the operation of raising and lowering the back of the chair so as to insure the foot rest being disposed in a proper position with relation to the apron when the back of the chair is in its fully reclined position and when said back is arranged in its upright position.

Another object is to provide a chair of the general type referred to in which the mechanism that is used to effect the movement of the foot rest relatively to the apron is so constructed that the foot rest will be rigidly held in a position at substantially right angles to the apron when the back of the chair is arranged in its upright position, without depending upon the engagement of rollers on the foot rest with the floor to hold the foot rest rigid at such times. Other objects and desirable features of my invention will be hereinafter pointed out.

Figure 1 of the drawings is a side elevational view of a chair embodying my invention, showing the back of the chair arranged in its upright position.

Figure 2 is a similar view, showing the back arranged in its fully reclined position.

Figure 3 is a bottom plan view of the apron and foot rest, illustrating said members adjusted in the position shown in Figure 2; and

Figures 4 and 5 are perspective views, illustrating the action of the cams and parts that co-operate with same for turning the foot rest relatively to the apron and for holding the foot rest rigid with respect to the apron.

Referring to the drawings which illustrate the preferred form of my invention, A designates the back, B designates the seat, C designates the apron and D designates the foot rest, the back, seat and apron being combined in such a manner that they will move in unison into longitudinal alignment with each other when the back is swung downwardly into its fully reclined position, shown in Figure 2, and will move into a position at substantially right angles to each other when the back is swung upwardly into its upright position, shown in Figure 1. Said parts are carried by a frame E which may either be a stationary frame or a frame that can be raised and lowered, the frame E of the chair herein illustrated being carried by a spindle F that is mounted in a base G. The arms H of the chair may either be of the type that move in unison with the back, seat and apron, or they may be stationary arms that are rigidly connected to front and rear uprights 1 and 2 on the frame E. The seat B is so arranged with relation to the arms that it will move forwardly and upwardly towards said arms when the back A is swung downwardly into its fully reclined position and will move rearwardly and downwardly away from said arms when the back is moved into its upright position. In the form of my invention herein illustrated the back A is rigidly connected to a pair of levers 3 that are pivotally connected at 4 to the rear uprights 2 on the frame E, and the apron C is rigidly connected to a pair of levers 5 that are pivotally connected at 6 to the front uprights 1 on the frame E. The seat B is carried by two links 7, shown in broken lines in Figure 2, whose rear ends are pivotally connected at 8 to the lower ends of the levers 3 and whose front ends are pivotally connected at 9 to the levers 5 that carry the apron, thereby producing a chair in which the back, seat and apron will move simultaneously either into the position shown in Figure 1, or into the position

shown in Figure 3 when the back is swung on its pivots 4. The foot rest D is oscillatingly mounted on the apron C preferably by brackets 10 on said foot rest which are pivotally connected at 11 to the lower ends of the levers 5 that carry the apron C, which brackets are equipped with extensions or arms 12 that bear against the underside of the apron when the back is fully reclined, as shown in Figure 2, and thus maintain the foot rest in a horizontal position in longitudinal alignment with the apron.

Any suitable means can be employed for holding the back, seat and apron in adjusted position, the means herein illustrated for this purpose consisting of a jointed reclining bar of the kind described in my prior Patent No. 1,437,060, dated November 28, 1922, and composed of an intermediate portion I oscillatingly mounted on the frame E of the chair, a link or front portion I′ that is pivotally connected to the apron C of the chair and a rear portion I^2 that is embraced by a reclining bar clamp J carried by the spindle F of the chair and constructed in such a way that it can be actuated to release the rear portion I^2 of the reclining bar by manipulating an operating lever K when it is desired to change the position of the back, seat and apron of the chair. The intermediate portion I of the reclining bar consists of a substantially Y-shaped lever having one of its arms pivotally connected at 13 to a bracket on the frame E, having one of its other arms pivotally connected at 14 to the front portion I′ of the reclining bar, and its third arm pivotally connected at 15 to the rear portion I^2 of the reclining bar. When the back and apron of the chair are arranged in an upright position, as shown in Figure 1, the intermediate portion I of the reclining bar will hang downwardly from the frame E, and when the back of the chair is swung downwardly into its fully reclined position, as shown in Figure 2, the intermediate portion I of the reclining bar will swing forwardly and upwardly into the position shown in Figure 2.

In a chair of the general type above referred to it is essential that the foot rest D be maintained in a position at substantially right angles to the apron C when the back A of the chair is arranged in its upright position and swung from its right angular position into horizontal alignment with the apron when the back is moved downwardly into its fully reclined position. In order to insure this movement of the foot rest relatively to the apron and insure the foot rest being held rigid with respect to the apron when the back A of the chair is arranged vertically or in a partly reclined position, I have equipped the chair with a foot rest operating mechanism that positively controls the movements of the foot rest relatively to the apron and holds the foot rest rigid with respect to the apron in certain positions of the apron. This is a very desirable characteristic of a chair of the general type referred to, as the portions of the chair engaged by the legs and feet of the occupant will move automatically into such positions as to permit the legs and feet of the occupant to assume a natural position when the back of the chair is moved from one of its extreme positions into its other extreme position. Due to the fact that the foot rest operating mechanism is so constructed that it will hold the foot rest rigid with relation to the apron, in certain positions of the apron, the frame E of the chair which carries the seat, back and apron can be raised and lowered so as to change the elevation of the occupant of the chair, because the floor and rollers on the underside of the foot rest are not relied upon to hold the foot rest rigid when the back of the chair is arranged in its upright position. In other words, my improved chair is so constructed that the foot rest D will be rigid enough to sustain the weight of the occupant, notwithstanding the fact that the foot rest is positioned some distance above the floor on which the chair stands, as is often the case with chairs of the type in which the seat and other co-operating parts of the chair can be bodily raised and lowered.

Various means can be used for effecting or controlling the movements of the foot rest relatively to the apron and for holding the foot rest rigid in certain positions of the apron, and while I have herein illustrated one form of foot rest operating mechanism that I have found to be very efficient, I do not wish it to be understood that my invention is limited to a chair equipped with a foot rest operating mechanism of this particular construction. Nor do I wish it to be understood that my invention is limited to a chair equipped with a jointed reclining bar, as herein illustrated, for various means could be used for holding the back, seat and apron of the chair in adjusted position without departing from the spirit of my invention. As shown in the drawings, the foot rest operating mechanism of the chair consists of a rock shaft L oscillatingly mounted in brackets 16 on the underside of the apron C, a rigid arm 17 on the rock shaft L provided with a roller 18 that acts upon a cam M on the foot rest D and cams O on the rock shaft L that act on the arms or extensions 12 of the brackets 10 on the foot rest. Movement is imparted to said operating mechanism preferably by a link 19 having one of its ends pivotally connected at 20 to the rigid arm 17 on the rock shaft L and having its opposite end pivotally connected at 21 to the front portion

I' of the jointed reclining bar. The cam M on the foot rest is arranged on the underside of said foot rest at the center of same, and the cams O on the rock shaft L are arranged at the ends of said rock shaft, as shown clearly in Figure 3, the brackets 16 on the apron that carry the rock shaft L projecting rearwardly and downwardly from said apron so as to cause said rock shaft to be arranged in proximity to the axis of movement of the foot rest.

When the back A of the chair is arranged in its upright position the extensions or arms 12 of the brackets 10 at the ends of the foot rest D will project under the cams O on the rock shaft L. At such times the rock shaft L is held securely at rest by the link 19 which joins the reclining bar to the lever 17, on the rock shaft L. Consequently, a downward load exerted on the foot rest D in a direction tending to swing the front edge of said foot rest downwardly, produced by the occupant of the chair standing on the foot rest, is counteracted or resisted by the arms 12 on the foot rest engaging the cams O on the rock shaft. When the back A of the chair is swung downwardly into reclining position, the apron C of the chair will swing forwardly and upwardly. During the first part of the forward and upward movement of the apron the foot rest D will be held at substantially right angles to the apron, due to the engagement of the arms 12 on the foot rest with the cams O on the rock shaft, but when the apron reaches a certain point in its forward and upward movement, the arms 12 pass out of engagement with the cams O, whereupon gravity causes the foot rest to turn relatively to the apron into such a position that it will be disposed in longitudinal alignment with the apron by the time the back of the chair reaches its fully reclined position shown in Figure 2. When the apron C is arranged in its vertical position, as shown in Figure 1, the roller 18 on the lever 17 on the rock shaft L is positioned at the rear side of said apron, but when the apron swings upwardly towards its horizontal position the link 19 that joins the rock shaft L to the jointed reclining bar causes said shaft to turn in such a direction that the lever 17 moves forwardly through a slot 18^a in the apron, thereby causing the roller 18 on said lever to engage the cam M on the underside of the foot rest D at about the time the arms 12 on the foot rest pass out of engagement with the cams O on the rock shaft. Consequently, by the time the foot rest reaches its horizontal position in longitudinal alignment with the apron C the roller 18 on the lever 17 will be in engagement with the cam M, as shown in Figure 2. At such times said roller and cam prevent the foot rest from being tilted upwardly, and the arms 12 on the foot rest which are then in engagement with the underside of the apron C prevent said foot rest from tilting downwardly. In the reverse movement of said parts, namely, when the back A of the chair is swung upwardly towards its vertical position, the lever 17 on the rock shaft L co-operates with the cam M on the foot rest to turn the foot rest into a position at substantially right angles to the apron C during the first portion of the downward movement of the apron, due to the fact that the shaft L starts to turn as soon as the apron C starts to move downwardly, and this oscillating movement of the shaft L causes the roller 18 on the lever 17 to exert pressure on the cam M in a direction to swing the front edge of the foot rest D upwardly. The parts of the foot rest operating mechanism are so proportioned and arranged that the arms 12 on the foot rest will move into operative relationship with the cams O at about the time the roller 18 on the lever 17 passes out of engagement with the convexed surface x of the cam M, thereby causing the foot rest D to be maintained in the position into which it has been moved by the lever 17 and cam M, the above described movements being illustrated clearly in Figures 4 and 5, wherein Figure 5 shows the roller 18 about to pass out of engagement with the cam M, and the arms 12 on the foot rest about to pass into operative engagement with the cams O. During the remainder of the downward movement of the apron C the cams O and the rock shaft L co-operate with the arms 12 on the foot rest to hold the foot rest in a position at substantially right angles to the apron, which relative position of the foot rest and apron is maintained until the back of the chair is again moved into its fully reclined position.

From the foregoing it will be seen that my invention greatly improves the operation of chairs of the type that comprise a swinging apron and a swinging foot rest, because it provides means for accurately controlling the movement of the foot rest relatively to the apron and causing the foot rest to turn automatically into a horizontal position as the back of the chair approaches its fully reclined position and into a position at right angles to the apron when the back of the chair starts to swing upwardly from its fully reclined position. When the back is fully reclined the foot rest is held in rigid relation with the apron, and during the downward movement of the apron after the foot rest has been turned into an angular position, said foot rest is held in rigid relation with the apron. Also when the back of the chair is in its upright position the foot rest is held rigid and is prevented from tilting downwardly, even though the occupant of the chair stands on the foot rest at a time when the foot rest is positioned some dis-

tance above the floor on which the chair is mounted.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A chair provided with an adjustable apron that is adapted to be moved from a vertical position into a horizontal position and vice versa, an adjustable foot rest combined with said apron, means for holding the foot rest rigid and in a position at substantially right angles to the apron when the apron is disposed vertically and during the first portion of the upward movement of the apron, and an independent means that assists in holding the foot rest in rigid longitudinal alignment with the apron when the apron is disposed horizontally, said independent means causing the foot rest to turn into angular relationship with the apron during the downward movement of the apron.

2. A chair provided with a swinging apron, a swinging foot rest combined with said apron, a rock lever carried by the apron for moving the foot rest, means for causing said lever to automatically turn the foot rest into a position at substantially right angles to the apron during the downward movement of the apron from its elevated position, arms on said foot rest that project rearwardly beyond the axis of movement of same, and means carried by the apron that co-operates with said arms to hold the foot rest rigid.

3. A chair provided with a swinging apron, a swinging foot rest combined with said apron, a rock lever carried by the apron for moving the foot rest, means for causing said lever to turn the foot rest into a position at substantially right angles to the apron during the downward movement of the apron from its elevated position, a cam carried by the apron, and a part on the foot rest that is adapted to move into engagement with said cam so as to lock the foot rest after the foot rest has been moved into the position referred to by said lever.

4. A chair provided with a swinging apron, a swinging foot rest combined with said apron, a cam carried by one of said members, and a cam engaging element carried by said other member and arranged so that it co-operates with said cam to hold said members in fixed relation in one position of the apron and to automatically release the foot rest during the upward movement of the apron.

5. A chair provided with a swinging apron, a foot rest pivotally mounted on said apron, a rock shaft carried by the apron and provided with a lever, a cam on the foot rest that co-operates with said lever to turn the foot rest into an angular position with relation to the apron, arms on the foot rest, independent cams on said rock shaft that co-operate with said arms to hold the foot rest in a certain position with relation to the apron, and means for causing said rock shaft to turn when the apron is moved from one position into a different position.

6. A reclining chair provided with a back and an apron that move in unison, a foot rest pivotally mounted on the apron, and an operating mechanism for the foot rest that is rendered operative by the movement of the apron, said operating mechanism comprising means for holding the foot rest rigid and in a position at substantially right angles to the apron when the back is in its upright position, means for causing the foot rest to move into longitudinal alignment with the apron when the back is arranged in its fully reclined position and means for thereafter turning the foot rest into a position at right angles to the apron and locking the foot rest in said position when the back is moved from its fully reclined position into its upright position.

7. A chair provided with a swinging apron, an adjustable back operatively connected with said apron, a foot rest pivotally mounted on the apron, mechanism for holding the back and apron in adjusted position, a transversely-disposed rock shaft carried by the apron, means actuated by said holding mechanism for operating said shaft when the position of the back is changed, and co-operating means on said rock shaft and foot rest for automatically turning the foot rest into a position at substantially right angles to the apron during the downward movement of the apron from its elevated position.

8. A reclining chair provided with a pivotally mounted back, a pivotally mounted apron that moves in unison with the back, a foot rest pivotally mounted on the apron, a reclining bar for holding the back and apron in adjusted position, and mechanism operatively connected with said reclining bar for resisting movement of the foot rest relatively to the apron in certain positions of the apron and for automatically swinging the foot rest relatively to the apron when the apron is moved from one position into a different position.

9. A chair provided with a swinging apron, a foot rest pivotally mounted on the apron, arms on the foot rest whose ends are adapted to move into engagement with the apron and co-operate with same to hold the foot rest in longitudinal alignment with the apron when the apron is in its elevated position, and a lever on the apron rendered operative by the downward movement of the apron for turning the foot rest into a position at substantially right angles to the apron.

10. A chair provided with a swinging

apron, a swinging foot rest carried by the apron, a rock shaft on the apron, a lever on said rock shaft for turning the foot rest into an angular position with relation to the apron when the apron moves downwardly from its elevated position, cams on said rock shaft, and arms on the foot rest that co-operate with said cams when the apron is in its upright position to hold the foot rest at substantially right angles to the apron and which co-operate with the apron to hold the foot rest in longitudinal alignment with the apron when the apron is in its horizontal position.

11. A reclining chair provided with an adjustable back, an adjustable apron, an adjustable foot rest carried by the apron, a jointed reclining bar for holding said elements in adjusted position, said reclining bar comprising an oscillating member connected by a link with the apron, and mechanism operatively connected with said link for holding the foot rest in rigid relation with the apron at right angles to same when the back is in its upright position and for permitting the foot rest to move under the influence of gravity into longitudinal alignment with the apron when the back is lowered.

12. A reclining chair, comprising a frame, an adjustable back and an adjustable apron mounted on said frame, a foot rest pivotally mounted on said apron, a reclining bar for holding the back and apron in adjusted position comprising a rockable member mounted on said frame and connected by a link with the apron, a rock shaft mounted in bearings on the underside of the apron, a lever on said rock shaft connected by a link with the link that joins the apron to the rockable member of the reclining bar, cams arranged at the ends of said rock shaft and adapted to co-operate with arms on the foot rest to resist movement of the foot rest in one direction relatively to the apron when the back of the chair is in its upright position, and a cam on the underside of the foot rest that co-operates with the lever on the rock shaft to turn the foot rest into a position at substantially right angles to the apron when the back of the chair is moved upwardly from its fully reclined position.

13. A reclining chair, comprising a frame, an adjustable back and an adjustable apron mounted on said frame, a foot rest pivotally mounted on said apron, a reclining bar for holding the back and apron in adjusted position comprising a rockable member mounted on said frame and connected by a link with the apron, a rock shaft mounted in bearings on the underside of the apron, a lever on said rock shaft connected by a link with the link that joins the apron to the rockable member of the reclining bar, cams arranged at the ends of said rock shaft and adapted to co-operate with arms on the foot rest to resist movement of the foot rest in one direction relatively to the apron when the back of the chair is in its upright position, and a cam on the underside of the foot rest that co-operates with the lever on the rock shaft to turn the foot rest into a position at substantially right angles to the apron when the back of the chair is moved upwardly from its fully reclined position, the arms on the foot rest being so arranged that they will bear against the apron, thus holding the foot rest in longitudinal alignment with same when the apron is in its horizontal position and will move into engagement with the cams on the rock shaft, thereby locking the foot rest at about the time the cam on the foot rest passes out of engagement with the lever on the rock shaft.

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