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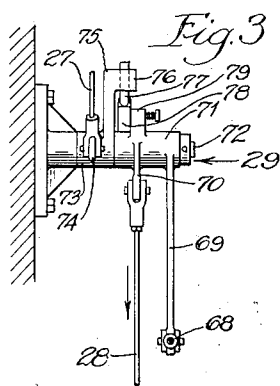
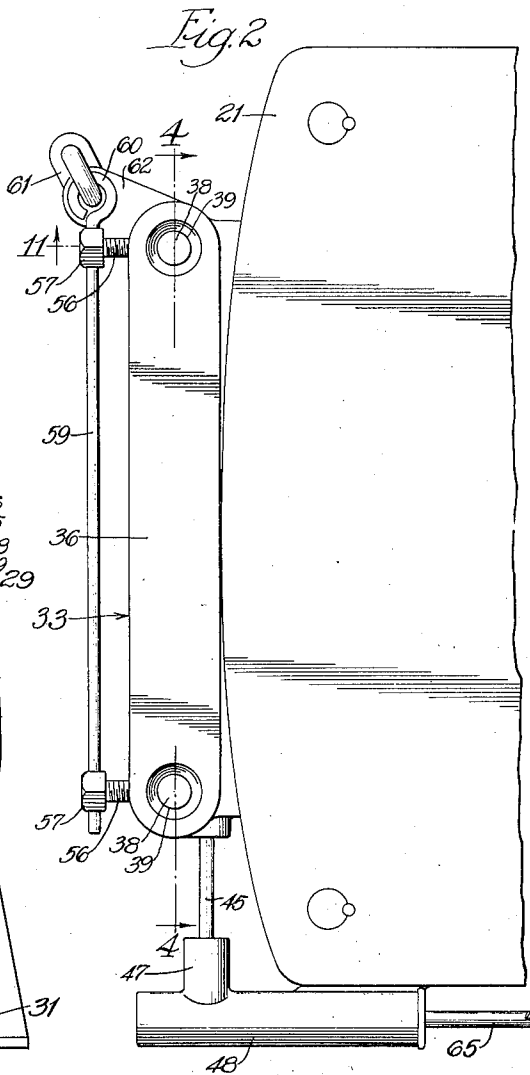
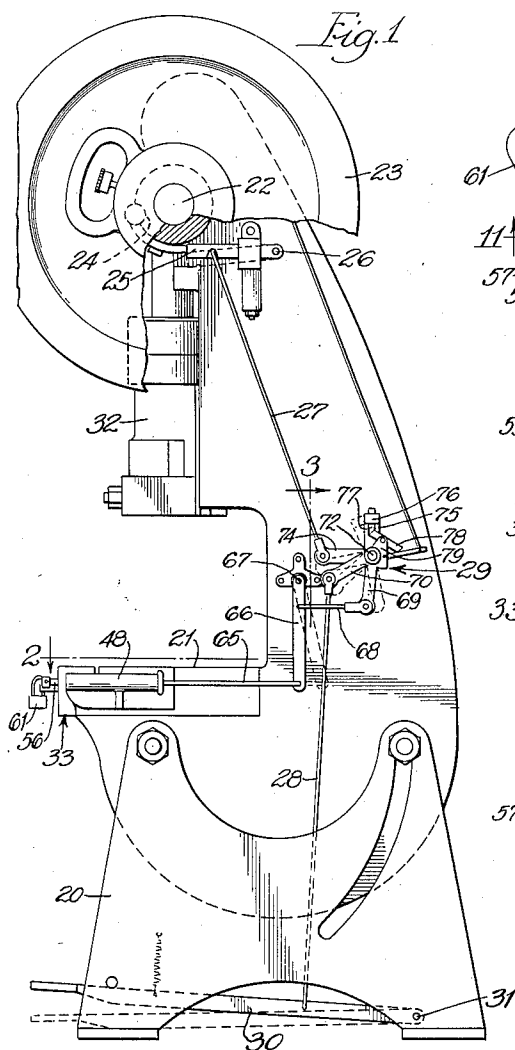
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1,970,262

SAFETY DEVICE FOR DIE PRESSES

Filed Feb. 7, 1934

2 Sheets-Sheet 1



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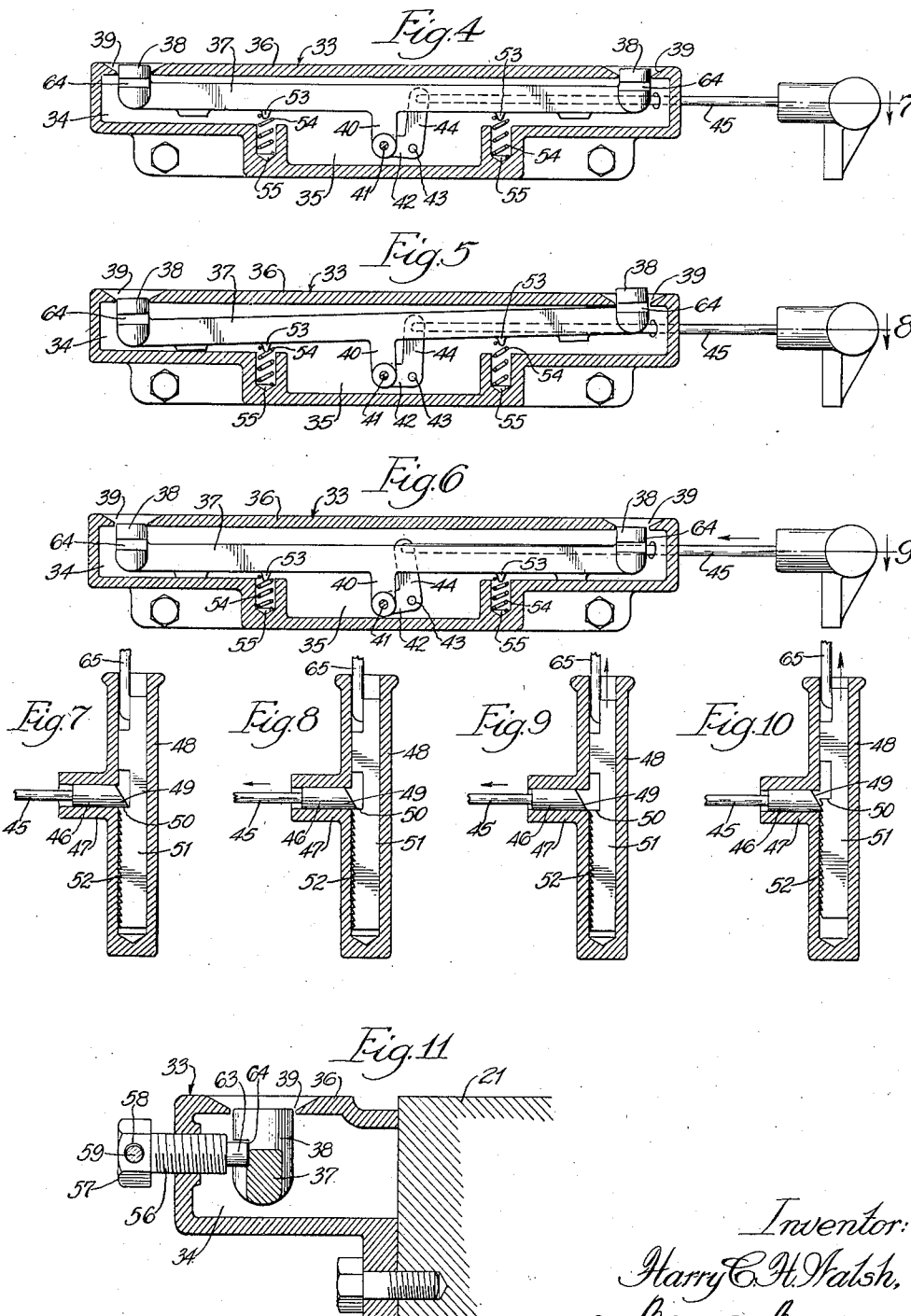
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SAFETY DEVICE FOR DIE PRESSES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

1,970,262

SAFETY DEVICE FOR DIE PRESSES

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Application February 7, 1934, Serial No. 710,081

15 Claims. (Cl. 192—131)

The attachments constituting the subject matter of the present invention are designed as an improvement upon the mechanisms shown and described in Patent No. 1,047,349, issued December 17, 1912.

The safety devices in question are applied to the bed plate of a die press, punch press, or similar machine, for the purpose of preventing an operator from placing his fingers or hands within the range of operation of the die stamp or press during the descent thereof and under conditions which might result in injury or mutilation.

Die presses of the character to which the present invention pertains are ordinarily operated by means of a foot treadle which actuates the clutch mechanism for engaging the crank shaft of the die press with the constantly rotating fly wheel, and in such circumstances, unless adequate safety appliances are provided, the hands of the operator will remain free during the descent of the die stamp or similar mechanism, with the result that accidents quite frequently occur.

The present invention is designed to require the conjoint operation of the hands as well as the foot of the operator in order to effectively engage the operating parts, so that it will be impossible for the operator to actuate the mechanism and leave his hands free while the die stamp is descending.

The mechanism described and claimed in the prior patent above referred to is designed for a similar purpose, but the present invention constitutes a distinct improvement thereon in the simplification of the operating parts and the provision of a more compact and readily applied safety device than that disclosed in the patent referred to. In particular, the present invention is directed to the provision of a pair of push buttons which the operator is required to depress in order to permit of a clutching engagement of the operating parts. Prior to the depression of both push buttons, save under special circumstances, the foot treadle remains locked, and in order to effectively actuate the clutch, it is necessary not only to depress the push buttons but to hold them depressed until the foot treadle has been completely depressed, thereby insuring a proper and effective clutching of the operating mechanism.

Further objects and details will appear from a description of the invention in conjunction with the accompanying drawings, wherein,—

Figure 1 is a side elevation of a die press employing the safety features of the present invention;

Fig. 2 is a plan view of the bed of the press, with the safety appliance arranged in front thereof;

Fig. 3 is a detail of certain portions of the foot treadle connections taken on line 3—3 of Fig. 1;

Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 2;

Figs. 5 and 6 are similar views showing the parts in different operating positions;

Figs. 7, 8 and 9 are sectional elevations taken respectively on lines 7, 8 and 9 of Figs. 4, 5 and 6, showing the latching mechanism in various positions of adjustment;

Fig. 10 is a similar view showing still another position of adjustment; and

Fig. 11 is a sectional detail taken on line 11 of Fig. 2.

The die press of the present invention comprises a main frame 20 of the usual configuration, which supports a bed plate 21 above which the frame extends to the usual elevation to afford a bearing for a crank shaft 22 on which is mounted the usual fly wheel. Clutch mechanism 24 of the conventional type is provided for clutching the parts together by the down swinging of a lever 25 pivoted at 26 and adapted to be actuated through a train of connections, which includes an upper link rod 27, a lower link rod 28, and bell crank mechanism 29 which will be hereafter described more in detail. The lower link rod 28 connects with the shank of a foot treadle 30 pivoted at 31 and projecting forwardly into convenient operating position near the front base portion of the machine. The crank shaft 22 operates the usual plunger 32, which need not be described in detail.

The above mechanisms, with the exception of the connections 29, are of the conventional character, so that further description thereof is deemed unnecessary.

The safety appliances more particularly forming the subject of the present invention comprise a casting 33 which is cored to afford an elongated chamber 34 deepened in the center to provide a shallow well 35. The top wall 36 of the casting lies in flush relation to the surface of the bed plate 21. Within the chamber 34 is located an elongated equalizer bar 37, which is upturned at each end to provide a push button 38 operating through a throated aperture 39. The equalizer bar in its center is provided with a depending lug 40 which is pivoted at 41 to the horizontal arm 42 of a bell crank lever 43, the vertical arm 44 of which is connected with a draw rod 45 extending

outwardly through the end of the elongated chamber.

The rod 45 terminates in a dog 46 slidably mounted within the inwardly projecting arm 47 of a housing 48, which is secured to the bed plate near the forward edge thereof. The dog 46 terminates in a beveled tooth 49 which when projected bears against a shoulder 50 formed in the side face of a ratchet bar 51, and immediately below the shoulder, the edge of the ratchet bar is serrated by the provision of rearwardly projecting teeth 52. The arrangement is such that when the dog is outwardly projected to bear against the shoulder 50, as in Figs. 7 and 8, the ratchet bar will be locked in position to prevent the operation of the foot treadle, and likewise, when the tooth of the dog engages any one of the teeth or serrations of the ratchet bar, further movement of the bar will be prevented, so that in order to permit a complete depression of the foot treadle it is necessary to hold the dog retracted until the ratchet bar 51 has been moved through the desired range of movement.

The equalizer bar 37 is provided on its under surface with nubs 53 on opposite sides of the lug 40, which nubs serve to center springs 54 operating within bores 55 equidistant from the center of the equalizer bar, so that, in order to operate the draw rod 45, as in Fig. 6, it is necessary for the operator of the machine to press down both of the push buttons, thereby requiring employment of both hands, so that the possibility of placing one or both hands within the range of movement of the operating parts of the die press or punch is prevented.

In some circumstances, however it is necessary to permit the operator to use one of his hands in the manipulation of large sheets or the like in the pressing operations, and under these circumstances the parts may be adjusted to permit the required degree of movement to be imparted to the bell crank 43 by the depression of one only of the push buttons 38. Figs. 2 and 11 illustrate the means provided to permit of this adjustment.

At each end of the casting 33 is located a set screw 56, which is threaded through the front wall of the casting and provided with a head 57 having a transverse aperture 58 through which extends a locking rod 59 provided at one end with a loop 60 adapted to receive a padlock 61 which is passed through an aperture in a lug 62, so that the set screws 56 can be locked against rotation.

As shown in Fig. 11, when either one of the set screws is adjusted inwardly, its inner reduced end 63 is brought into engagement with a recess 64 in the equalizer bar at or near the end thereof, so that, with the set screws thus adjusted, the inner end 63 furnishes a pivot or fulcrum for the equalizer bar, which then normally occupies the tilted position shown in Fig. 5, with one of the push buttons depressed to the limit and the other push button elevated abnormally, which thus affords a sufficient range of movement to permit the equalizer bar to act as a lever in imparting the required degree of movement to the bell crank 43.

The ratchet bar 51 connects with a link 65, the outer end of which is pivoted to the lower end of a swinging arm 66 pivoted at its upper end on a pivot 67, and connected by means of a link 68 with a bell crank lever arm 69, the companion arm 70 of which connects with the treadle draw rod 28, the arrangement being such that when the ratchet bar 51 is locked by the dog 46, it will be impossible to impart any downward movement to the treadle or the parts actuated thereby.

The bell crank arms 69 and 70 are formed on a sleeve 71, which is journaled upon a pintle 72 outstanding from the main frame of the machine, and said pintle also forms a journal mounting for a second bell crank comprising a sleeve 73 having a laterally extending arm 74 and an upwardly extending arm 75 projecting therefrom. The arm 74 connects with the draw rod 27, and the arm 75 is provided at its upper end with an overhanging head 76 through which is entered a contact pin 77 beveled at its lower end and engaged by a rocking pin 78 carried by an ear 79.

The arrangement of these parts is such that when the treadle is free to act, a depression of the treadle will impart a downward swinging movement to the arm 70 and an inner thrust to the pin 78, which in turn will impart a forward swinging movement to the bell crank arm 75 with a corresponding down swinging of the arm 74, which draws down the link 27 and the lever 25, thus setting the clutch pin and starting the operation of the main crank shaft 22.

The depression of the foot treadle throws the various connections into the respective positions indicated by dotted lines in Fig. 1, but it will be understood that the present invention is not primarily concerned with any particular form in the train of operating connections in so long as the same include a member which is connected with the ratchet bar 51, so that the entire train of connections will be locked by the locking of the ratchet bar.

The operation of the device will in the main be understood from the foregoing description, but may be briefly outlined as follows: Under ordinary conditions, where it is desired to engage both of the hands of the operator during the descent of the die stamp or other corresponding mechanism, both set screws 56 are retracted out of engagement with the equalizer bar, so that the latter must be depressed at both ends at the same time in order to impart a draw to the rod 45 and to effect a retraction of the dog to the extent necessary to release the ratchet bar 51. It is also important to require a continuance of the depression on the push buttons during the entire depression of the foot treadle, and the ratchet teeth 52 are provided to insure such continued depression, since otherwise the operator might, by mere momentary depression of the equalizer bar, release the dog, and immediately thereafter and before clutching engagement, employ his hands in an unauthorized manner which might result in injury. By the arrangement shown, it is necessary to maintain the parts in unlocked relation until the clutch is fully engaged and the operation begins. Where it is necessary, however, to permit to the operator the use of one of his hands, the parts may be adjusted as in Fig. 5, which transforms the equalizer bar into a lever and affords a sufficient range of movement at the free end of the bar to perform the operations previously described.

The device is simple and compact in form and is to a large extent self-contained, so that it may be readily applied to existing machines with but slight re-arrangement of the treadle controlled train of connections to include a link or similar member which connects with the ratchet bar.

Although the invention has been described with particularity as to detail, it is not the intention to limit the invention strictly to the form shown, since modifications in detail may be introduced without departing from the spirit of the invention.

I claim:

1. In combination with clutch actuated mechanisms of the class described, foot treadle mechanism and connections for actuating the clutch, and safety mechanisms including a slidably mounted ratchet bar movable with said clutch connections, said ratchet bar having a deep notch and an adjacent series of relatively shallow ratchet teeth, a dog normally engaged with said notch, and hand controlled members adapted when actuated to retract said dog to permit the foot treadle and clutch mechanisms to be operated.

2. In combination with clutch actuated mechanisms of the class described, foot treadle mechanism and connections for actuating the clutch, and safety mechanisms including a slidably mounted ratchet bar movable with said clutch connections, said ratchet bar having a deep notch and an adjacent series of relatively shallow ratchet teeth, a dog normally engaged with said notch, and an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range.

3. In combination with clutch actuated mechanisms of the class described, foot treadle mechanism and connections for actuating the clutch, and safety mechanisms including a slidably mounted ratchet bar movable with said clutch connections, said ratchet bar having a deep notch and an adjacent series of relatively shallow ratchet teeth, a dog normally engaged with said notch, and an equalizer bar provided at each end with a push button, connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, and means for pivoting one end of the equalizer bar in depressed position to permit effective action of the bar by depression of the free end thereof.

4. In combination with clutch actuated mechanisms of the class described, foot treadle mechanism and connections for actuating the clutch, and safety mechanisms including a slidably mounted ratchet bar movable with said clutch connections, said ratchet bar having a deep notch and an adjacent series of relatively shallow ratchet teeth, a dog normally engaged with said notch, and an equalizer bar provided at each end with a push button, connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, and a set screw adapted to be adjusted to engage and pivot one end of the bar in depressed position to permit effective operation of the equalizer bar by depression of the free end thereof.

5. In combination with clutch actuated mechanisms of the class described, foot treadle mechanism and connection for actuating the clutch, and safety mechanisms including a slidably mounted ratchet bar movable with said clutch connections, said ratchet bar having a deep notch and an adjacent series of relatively shallow ratchet teeth, a dog normally engaged with said notch, and an equalizer bar provided at each end with a push button, connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, and a set screw adapted

to be adjusted to engage and pivot one end of the bar in depressed position to permit effective operation of the equalizer bar by depression of the free end thereof, and means for locking said set screw in bar engaging position.

6. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, and hand actuated safety mechanism adapted when operated to retract said dog to unlock the foot treadle and clutch actuating mechanism.

7. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch and a series of relatively shallow ratchet teeth in adjacent relation to the notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, and hand actuated safety mechanism adapted when operated to retract said dog to unlock the foot treadle and clutch actuating connections.

8. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range.

9. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, and means for pivoting one end of the equalizer bar in depressed position to permit effective action of the bar by depression of the free end thereof.

10. In combination with clutch actuated mechanisms of the class described, including a foot

- treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, and a set screw adapted to be adjusted to engage and pivot one end of the equalizer bar in depressed position to permit effective operation of the bar by depression of the free end thereof.
11. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, a set screw adapted to be adjusted to engage and pivot one end of the equalizer bar in depressed position to permit effective operation of the bar by depression of the free end thereof, and means for locking said set screw in bar engaging position.
12. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch and a series of relatively shallow ratchet teeth in adjacent relation to the notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range.
13. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch and a series of relatively shallow ratchet teeth in adjacent relation to the notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, a set screw adapted to be adjusted to engage and pivot one end of the equalizer bar in depressed position to permit effective operation of the bar by depression of the free end thereof, and means for locking said set screw in bar engaging position.
14. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch and a series of relatively shallow ratchet teeth in adjacent relation to the notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, and a set screw adapted to be adjusted to engage and pivot one end of the equalizer bar in depressed position to permit effective operation of the bar by depression of the free end thereof.
15. In combination with clutch actuated mechanisms of the class described, including a foot treadle and connections for actuating the clutch, said connections including a bell crank, a slidably mounted ratchet bar connected and movable with said bell crank, said ratchet bar being provided on its inner edge with a notch and a series of relatively shallow ratchet teeth in adjacent relation to the notch, a dog mounted for slidable movement in a line transverse to the line of movement of the ratchet bar and normally engaging the notch in said ratchet bar and adapted upon retraction to release said ratchet bar, an equalizer bar provided at each end with a push button, and connections between the dog and the medial portion of the equalizer bar for retracting the dog upon depression of the medial portion of the equalizer bar when moved through a predetermined range, a set screw adapted to be adjusted to engage and pivot one end of the equalizer bar in depressed position to permit effective operation of the bar by depression of the free end thereof, and means for locking said set screw in bar engaging position.

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