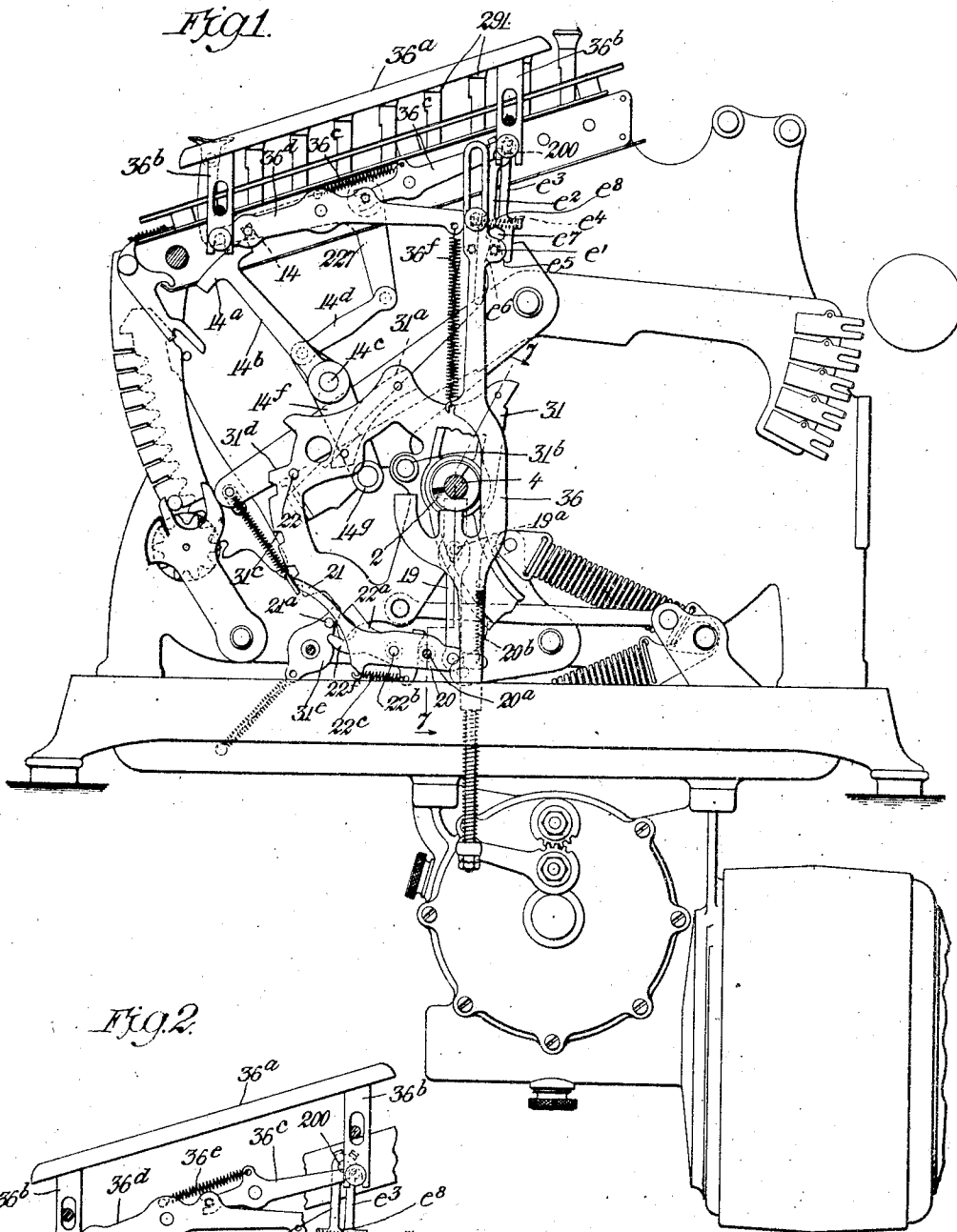


W. J. KILPATRICK.
 ADDING MACHINE.
 APPLICATION FILED NOV. 25, 1908.

928,981.

Patented July 27, 1909.

2 SHEETS—SHEET 1.



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 2 SHEETS—SHEET 2.

Fig. 3.

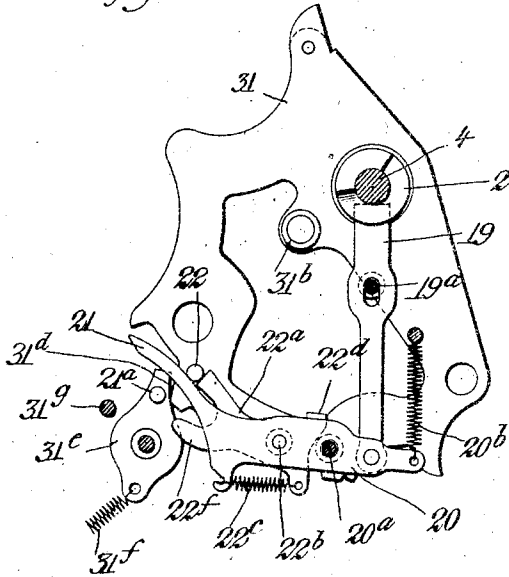


Fig. 4.

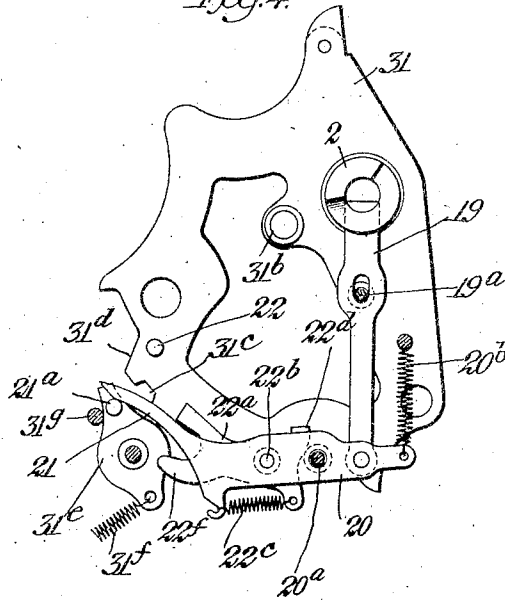


Fig. 5.

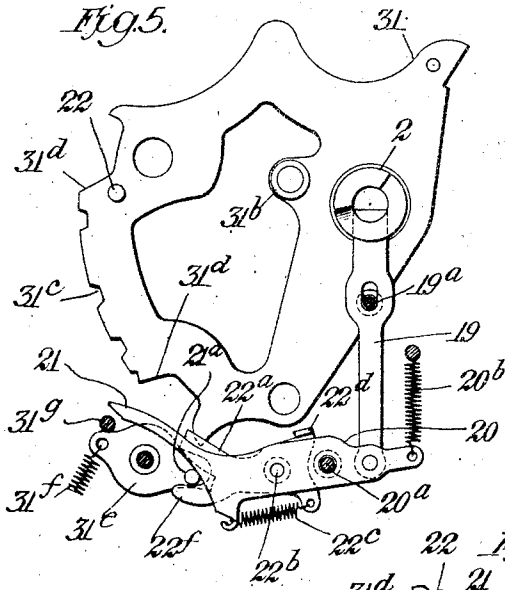


Fig. 7.

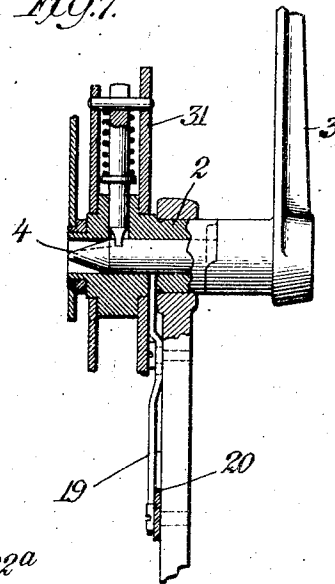
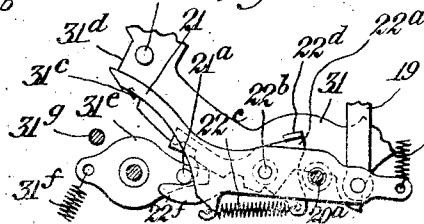


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ADDING-MACHINE.

No. 928,981.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed November 25, 1908. Serial No. 434,405.

To all whom it may concern:

Be it known that I, WILLIAM J. KILPATRICK, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

The present invention relates more particularly to adding machines adapted to be operated by power, as by an electric motor, and machines adapted to be either so operated or operated by hand. Reference may be had to Jesse G. Vincent patent No. 866,750, dated September 24, 1907, for an example of an adding machine equipped for operation either by an electric motor or by hand and in fact the present invention is here illustrated and described as applied to the particular type of adding machine shown in said patent.

One object of the invention is to prevent misoperation of the machine due to release of the motor starting device and manipulation of other controlling devices before the motor has taken effect upon the working parts of the machine. It has been found in practice that an electric motor applied to an adding machine is apt to be a trifle tardy in starting to operate the machine and this makes it possible for the key or starting device to be released and another controlling device operated, as for example a total key at a time when the result of such manipulation would be likely to result disastrously. To overcome this trouble it is proposed by the present invention to provide for temporarily detaining the starting device in the position to which it is moved when releasing the motor, thereby preventing a recovery to normal quickly enough to permit of any such misoperation as above mentioned.

Another object of the present invention is to provide an improved form of means for disabling the full stroke devices when the machine is being operated by power, at the same time providing for automatically re-enabling such devices when a handle is applied for operating the machine manually. Reference may be had to Burroughs Adding Machine Company's British Patent No. 12,083^A of 1907, which shows the same type of adding machine disclosed in said Vincent U. S. patent and illustrates one form of means for disabling the full stroke devices.

By the present invention it is proposed to accomplish the result with a less amount of friction than inherent in the construction of said British patent, both in the matter of movement of parts resulting from introduction and removal of the detachable handle and in connection with the movement of parts in regular operations of the machine when the full stroke devices have been disabled by removal of the handle. An additional improvement over the prior construction lies in the provision of means for disabling certain auxiliary or supplemental full stroke devices which have heretofore been employed in these machines for preventing a reverse movement of the parts after starting back to normal and before the main full stroke devices can come into play.

With the above and incidental objects in view, the invention consists in certain novel features of construction and combinations of parts the essential elements whereof are recited in the appended claims and a preferred form of embodiment of which is illustrated in the drawings and described in detail hereinafter.

Of said drawings, Figure 1 represents in sectionalized right side elevation an adding machine of the type shown in said prior patents, with the improvements of the present invention applied thereto; Fig. 2 is a detached sectionalized right-side elevation of motor starting devices; Figs. 3, 4 and 5 are similar sectionalized right-side elevations of full-stroke devices, showing the same under different conditions; Fig. 6 is a similar view illustrating a still different condition; and Fig. 7 is a vertical section taken on the line 7-7 of Fig. 1.

In view of the disclosures of said prior patents, it will not be necessary to describe in detail all of the parts of the machine proper or more than briefly refer to the parts of the motor attachment or the detachable handle construction. A vertically movable bar 36 which operates detent devices for releasing the motor, such as described in said Vincent patent, is lifted by depression of a finger bar or key 36^a located to the right of the banks or rows of aount keys 291. This is effected through the action of legs 36^b of said bar upon levers 36^c and 36^d connected by a spring 36^e and the lever 36^c connected by a spring 36^f with said bar 36 and carrying a stud engaging a slot of said bar.

Said lever 36^a also carries a stud 14 coöperating with the segmental upper end 14^a of an arm 14^b secured to a rock shaft 14^c, a crank arm of which is connected by a link 14^d with the total key bell crank lever 227. This same construction is illustrated and described in Burroughs Adding Machine Company's Patent No. 18,628 of 1906 and, as there explained, the purpose is to prevent operation of the total key after the starting bar 36^a has been depressed or, vice versa, the operation of said starting bar before the total key has been fully depressed. Another safeguard also disclosed in said last-mentioned British patent comprises an arm 14^e on the rock shaft 14^c carrying a roller 14^f coöperating with a flange 31^a on the full-stroke sector 31, to prevent depression of the total key when the machine is in operation and, vice versa, to prevent operation of the machine with the total key partially depressed.

In carrying out the object first above explained provision is made for temporarily detaining the vertical bar 36 in elevated position so as to prevent a recovery of the starting devices before the motor takes effect upon the machine and thus preventing a misoperation such as might result from a depression of the total key, after the motor is released. Of course said total key cannot be depressed after the sector 31 has been set in motion, but the action of the motor is sometimes a trifle tardy in starting the parts, so that the total key might inadvertently be depressed, either resulting in an erroneous performance of the machine or in some damage thereto. To prevent any such thing happening the vertical bar 36 is formed with an ear *e* carrying a laterally projecting stud *e'*, preferably a roller stud, and there is suspended from a shaft or cross-rod 200 a pair of detents or jaws *e''* and *e'''* adapted to embrace said stud upon the lifting of the bar 36 and temporarily detain the latter. Said detents or jaws are loosely mounted upon the shaft and held closed by a spiral spring *e'''* connecting suitable ears formed upon them. The lower portions of the jaws are formed with divergent confronting edges *e''* and *e'''* and back of the same with pockets *e'''* for receiving the stud *e'*. When the bar 36 is elevated the stud moves into the flaring mouth formed between the edges *e''* and *e'''* of the jaws and by acting upon said edges spreads apart the jaws, which spring together again when the stud has passed into the pockets *e'''*. The lower edges of the latter then detain the stud and the bar 36 and connected parts, preventing recovery of the same prior to the forcible depression of the bar 36 by the action of the sector stud 31^b upon a forward branch of said bar 36 in the manner explained in said prior patents. The lower edges of the pockets *e'''* are sufficiently bev-

eled or inclined to provide for the forcing apart of the jaws and escape of the stud when this action of the stud 31^b on the bar 36 takes place, though the round form of the stud might be fully relied upon to produce the camming effect in this connection. The jaw *e''* is preferably elongated at its lower end to insure against the stud *e'* getting out of register with the flaring mouth formed by the edges *e''* and *e'''*. The opening movement of the jaws is preferably limited by forming on the upper ends of the jaws lugs *e''''* adapted to meet.

It will be seen that the above described construction will effectually prevent any misoperation of the machine which might otherwise take place by reason of a premature recovery of the starting devices when the motor was tardy in taking effect upon the machine.

Passing now to the full stroke devices, the sector 31 is as usual provided with a notched periphery 31^c terminating in abrupt edges 31^d forming sides of pockets in which the usual full stroke pawl 31^e rights itself at the extremes of the movement of said sector, a spring 31^f being as usual applied to said pawl so as to constantly tend to straighten the same. Such full stroke devices are used when the machine is being operated by hand to prevent incomplete movement of the parts and consequent derangement and erroneous operation of the mechanism, but when the machine is power-operated the full stroke devices can be dispensed with and in fact it is preferable to disable them so as to prevent any possibility of a lock-up due to the speedy operation of the machine when motor driven.

Carrying out the present invention, a thrust bar 19 is arranged to slide up and down through a slot in the tubular shaft 2 to which the sector 31 is secured, said bar being acted upon by the conical end of a stud 4 carried by the detachable handle 3, the latter being constructed as usual to come into driving engagement with the shaft 2 when its stud is thrust through the same. The thrust bar 19 is slotted to embrace a stud 19^a on the frame of the machine and its lower end is pivotally connected to a lever 20 to the rear of the frame stud 20^a on which said lever is pivoted. A spiral spring 20^b connects the rear extremity of said lever with another frame stud so as to constantly tend to elevate the rear arm of the lever and the thrust bar 19, projecting the upper end of the latter into the bore of the shaft 20 as illustrated in Fig. 4. The forward arm of the lever 20 is formed with a curved cam finger 21 adapted to coöperate with a stud 21^a projecting laterally from the pawl 31^e.

When the handle is detached and the lever correspondingly positioned as in Figs. 4 and

5, with its cam finger depressed, the pawl 31^a will be completely disabled by being held entirely away from the sector 31. This results from the fact that the spring 20^b presses said cam finger against the stud 21^a and as soon as the pawl is tilted one way or the other by action of either end edge 31^d of the sector 31 against it, said cam finger further tilts it until the movement is stopped by abutment of said pawl against a fixed stud 31^e. Fig. 4 illustrates the effect when the handle is detached with the sector rocked forward and down and Fig. 5 illustrates the effect when the handle is detached with the sector in its normal position. In the former instance the full stroke pawl would be in the upper pocket of the sector and would be rocked forward as to its acting end by contact with the upper edge 31^d, and then rocked further by the cam finger 31 until stopped by the stud 31^e. In the other instance the acting end of the pawl would be in the lower pocket of the sector and would be rocked rearwardly by contact with the lower end edge 31^e and then rocked further by the cam finger. In either case it will be seen that the acting end of the pawl is moved so far as to be taken entirely out of position for contact with the full stroke sector. Consequently in further operations of the machine no friction at all will occur in the full stroke mechanism. When the handle is inserted the bar 19 is thrust down and the lever 20 rocked, elevating the cam finger 21 and releasing the pawl 31^a so that it can coact with the sector 31 in the usual manner, as illustrated in Fig. 6. Of course it must be understood that the spring 20^b is superior to the spring 31^d, or else capable of overpowering the latter through leverage.

In previous constructions of adding machines such as shown in said prior patents it has been customary to supplement the full stroke devices above described, so as to prevent a reverse movement just after the parts start to return to normal. A number of operations take place just at this point, as for example the throwing of the counter into mesh with its operating racks, and it is quite important to prevent a quick reverse movement of the parts after once starting back to normal. The sector 31 can of course move an appreciable distance before the pawl 31^a comes into engagement with the first notch of the raised peripheral edge 31^c. To prevent a reverse movement during the time a supplemental pawl has heretofore been employed, pivoted on a frame stud and adapted to cooperate with the stud on the sector. Such a pawl is shown in the above-mentioned patent to Vincent and the British Patent No. 12083^a, and the pawl is shown with a stud similar to the stud 21^a for operating upon this supplemental pawl.

to displace the latter when the primary pawl is tilted by contact with the lower terminal edge 31^d of the sector, thus permitting a stud on the sector to pass the auxiliary pawl when the sector rocks forward and down. Upon the reversal of the primary pawl at the end of such movement of the sector the auxiliary pawl is released and as the sector starts back to normal position its stud passes the acting end of the auxiliary pawl, which immediately springs behind such stud, preventing a reverse movement of the sector at a time when the primary pawl cannot operate to prevent such movement. In the accompanying drawings the numeral 22 designates a laterally projecting stud on the full stroke sector similar to the stud heretofore employed, but the auxiliary pawl is not pivoted upon a frame stud, as heretofore, but is carried by the lever 20. Such pawl is designated by the numeral 22^a and its pivot by the numeral 22^b. A spiral spring 22^c connects a depending ear of the pawl in rear of its pivot with a depending ear of the lever 20 so as to tend constantly to rock the forward part of the pawl upward, such movement being limited by the contact of a flange 22^d of the pawl against the top edge of the lever as illustrated in Figs. 3 and 4. The auxiliary pawl is branched or bifurcated at its forward end to provide a portion to coact with the stud 22 in the usual manner and a lower portion or finger 22^e for cooperating with the stud 21^a on the pawl 31^a. The operation of this auxiliary pawl as a full stroke device is much the same as usual, the tilting of the pawl 31^a by contact with the lower terminal edge 31^d of the sector causing the stud 21^a to rock the pawl so that the sector stud 22 will pass the same in the forward and downward rocking of the sector. Then as the pawl 31^a reverses the auxiliary pawl is released to coact with said stud 22 in the manner illustrated in Fig. 3, where the sector is represented as having started on its return movement and the pawl 22^a is represented as having sprung behind the stud 22, the pawl 31^a having of course righted itself.

Now the purpose of mounting the auxiliary pawl on the lever 20, instead of on a frame stud, as usual, is to provide for disabling said auxiliary pawl as well as the primary pawl when the handle of the machine is detached. In Fig. 3 the handle is in place, so that the forward arm of the lever 20 is elevated and the auxiliary pawl positioned to be effective, and the same thing is true as to Fig. 6, though of course the auxiliary pawl is there shown out of line with the stud 22 because the sector is moving forward and downward. It will be noted, however, that in Figs. 4 and 5, where the handle is detached and the forward arm of the lever 20 correspondingly depressed, the auxiliary pawl 22^a is bodily lowered out of line with

the stud 22 so that it cannot contact therewith at any time, so long as the handle remains detached.

It will now be seen that all of the full stroke devices above described are so arranged that when the handle is detached there will be no friction in the full stroke mechanism because no parts are running against each other. Furthermore, it will be noted that there will be a minimum of friction in the movement of parts when the handle is being inserted or withdrawn.

While as will now be apparent the above described devices are well calculated to thoroughly fulfil the objects primarily stated, yet it is to be understood that the constructions here shown are susceptible of modification within the scope of the invention.

What is claimed is:

1. In a power driven machine of the class described, the combination with a movable starting member, manipulative means for moving the same, and a power operated element of the machine acting initially to restore said starting member; of a detent for temporarily holding the latter in the position to which it is moved by the manipulative means.

2. In a power driven machine of the class described, the combination with a movable starting member, manipulative means for moving the same, and a power operated element of the machine acting initially to restore said starting member; of a detent for temporarily holding the latter through friction in the position to which it is moved by the manipulative means.

3. In a power driven machine of the class described, the combination with a movable starting member, manipulative means for moving the same, and a power operated element of the machine acting initially to restore said starting member; of a detent for temporarily holding the latter in the position to which it is moved by the manipulative means, said detent being yieldingly held in operative position.

4. In a power driven machine of the class described, the combination with a movable starting member, manipulative means for moving the same, and a power operated element of the machine acting initially to restore said starting member; of spring-closed jaws for temporarily holding the latter in the position to which it is moved by the manipulative means.

5. In a power driven machine of the class described, the combination with a movable starting member having a projecting stud, manipulative means for moving said member, and a power operated element of the machine acting initially to restore said starting member; of spring-closed jaws for engaging the stud of the latter to temporarily hold it in the position to which it is moved

by the manipulative means, said jaws having divergent confronting edges forming a flaring mouth to receive the stud and divergent holding edges back of said mouth.

6. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter, of means for disabling the pawl under control of the handle, said means operating, with the handle detached, to prevent any engagement between the pawl and the sector except the initial engagement which swings the pawl to position for engaging the outermost edge of the sector.

7. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of a pawl-displacing member controlled by the handle and operating, with the latter detached, to prevent any engagement between the pawl and the sector except the initial engagement which swings the pawl to position for engaging the outermost edge of the sector.

8. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of a spring-actuated pawl-displacing member controlled by the handle and operating, with the latter detached, to prevent any engagement between the pawl and the sector except the initial engagement which swings the pawl to position for engaging the outermost edge of the sector.

9. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of a pawl-displacing member in the form of a cam-lever controlled by the handle and operating, with the latter detached, to prevent any engagement between the pawl and the sector except the initial engagement which swings the pawl to position for engaging the outermost edge of the sector.

10. In a machine of the class described, the combination, with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of a spring-actuated pawl-displacing cam-lever, and a thrust-bar coupled thereto and adapted to be operated by the handle.

11. The combination with a power drive, a detachable handle, an oscillatory full-stroke sector, a double acting pawl cooperating therewith, and an auxiliary pawl displaced by the first mentioned pawl when the latter is riding on the outermost edge of the sector and adapted on reversal of the first mentioned pawl to become effective to prevent reverse movement of the sector when once started and until the first mentioned pawl becomes effective to prevent such

movement; of means for disabling both pawls under control of the handle.

12. In a machine of the class described, the combination, with a power drive, a detachable handle, a full-stroke sector having a notched periphery and deepened end edges beyond the same and a lateral stud, a pivotal spring-straightened pawl adapted to be tilted by contact with either such deepened end edge and to then traverse the notched periphery and right itself upon the passing of the latter, and an auxiliary pawl spring drawn to position for coaction with the aforesaid stud and adapted to be displaced by the first mentioned pawl when tilted one way, the said stud passing by the end of the auxiliary pawl as the sector nears the end of its movement in the direction for so tilting the first-mentioned pawl, and said auxiliary pawl being then released by the righting of the first-mentioned pawl so that upon initial return movement of the sector the auxiliary pawl springs behind the stud; of means under control of the detachable handle for disabling both pawls.

13. In a machine of the class described, the combination, with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of means for disabling the pawl under control of the handle, said means operating, with the handle detached, to prevent any engagement between the pawl and the sector except the initial engagement which swings the pawl to position for engaging the outermost edge of the sector, an auxiliary pawl displaced by the first-mentioned pawl when the latter is riding on the outermost edge of the sector and adapted on reversal of the first mentioned pawl to become effective to prevent reverse movement of the sector when once started and until the first mentioned pawl becomes effective to prevent such movement; said auxiliary pawl being disabled as an incident to the disablement of the first-mentioned pawl.

14. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of a pawl-displacing member controlled by the handle and operating, with the latter detached, to prevent any engagement between the pawl and the sector except the initial engagement which swings the pawl to position for engaging the outermost edge of the sector, and an auxiliary pawl displaced by the first-mentioned pawl when the latter is riding on the outermost edge of the sector and adapted

on reversal of the first-mentioned pawl to become effective to prevent reverse movement of the sector when once started and until the first-mentioned pawl becomes effective to prevent such movement; said auxiliary pawl being carried by the aforesaid pawl-displacing member and adapted to be moved to an inoperative position by the same when it is rendered ineffective by detachment of the operating handle.

15. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector, and a pawl cooperating with the latter; of a spring-actuated pawl-displacing cam-lever, a thrust-bar coupled thereto and adapted to be operated by the handle; and an auxiliary pawl mounted upon said cam-lever and adapted to be displaced by the first-mentioned pawl when the latter is riding on the outermost edge of the sector and adapted on reversal of the first-mentioned pawl to become effective to prevent reverse movement of the sector when once started and until the first mentioned pawl becomes effective to prevent such movement; said auxiliary pawl adapted to be moved to inoperative position when the cam-lever shifts upon detachment of the operating handle.

16. In a machine of the class described, the combination with a power drive, a detachable handle, a full-stroke sector having a notched periphery and deepened end edges beyond the same and a lateral stud, a pivotal spring-straightened pawl adapted to be tilted by contact with either such deepened end edge and to then traverse the notched periphery and right itself upon the passing of the latter, of a lever spring-drawn to position for disabling said pawl; a thrust-bar connected to said lever and adapted to be operated by the handle in the application thereof to the machine; and an auxiliary pawl pivotally mounted upon said lever and spring-drawn to position for coaction with the aforesaid stud and adapted to be displaced by the first-mentioned pawl when tilted one way, the said stud passing by the end of the auxiliary pawl as the sector nears the end of its movement in the direction for so tilting the first-mentioned pawl, and said auxiliary pawl being then released by the righting of the first-mentioned pawl so that upon initial return movement of the sector the auxiliary pawl springs behind the stud.

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