Oct. 23, 1962 O. J. DAUBENBERGER 3,059,488

MANURE SPREADER

Filed Sept. 28, 1960 2 Sheets-Sheet 1

Fig. 2.

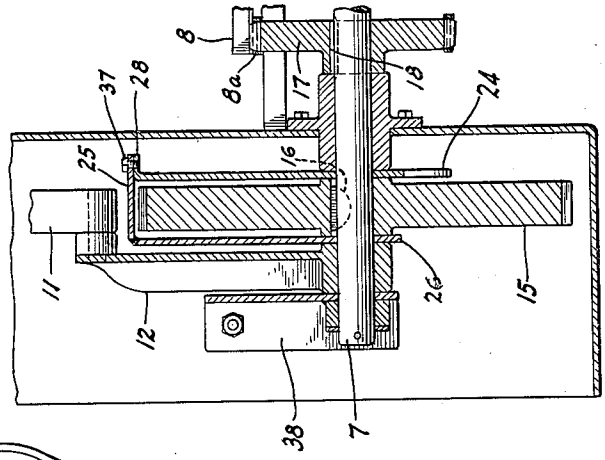
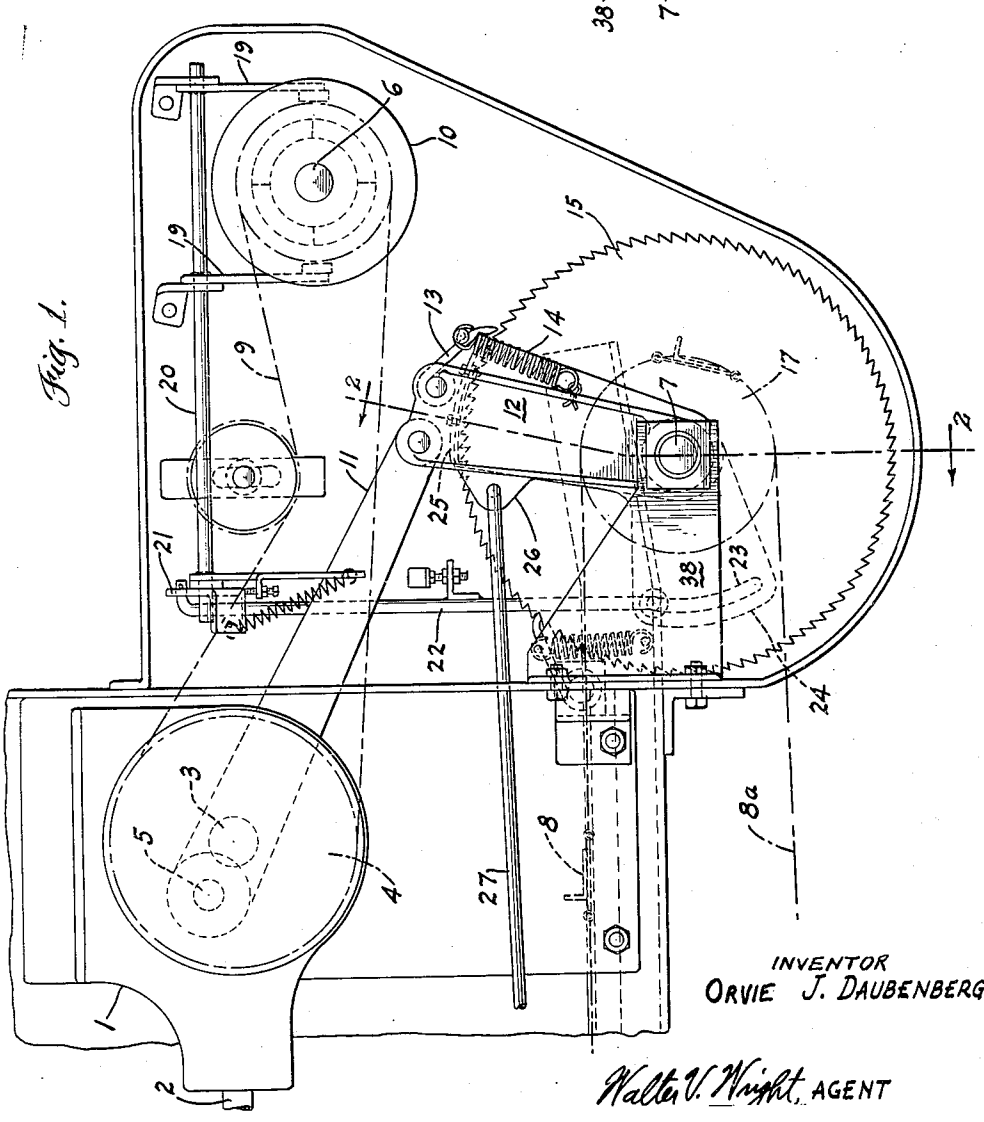


Fig. 1.



INVENTOR
ORVIE J. DAUBENBERGER

Walter V. Wright, AGENT

Oct. 23, 1962 O. J. DAUBENBERGER 3,059,488

MANURE SPREADER

Filed Sept. 28, 1960 2 Sheets-Sheet 2

Fig. 3.

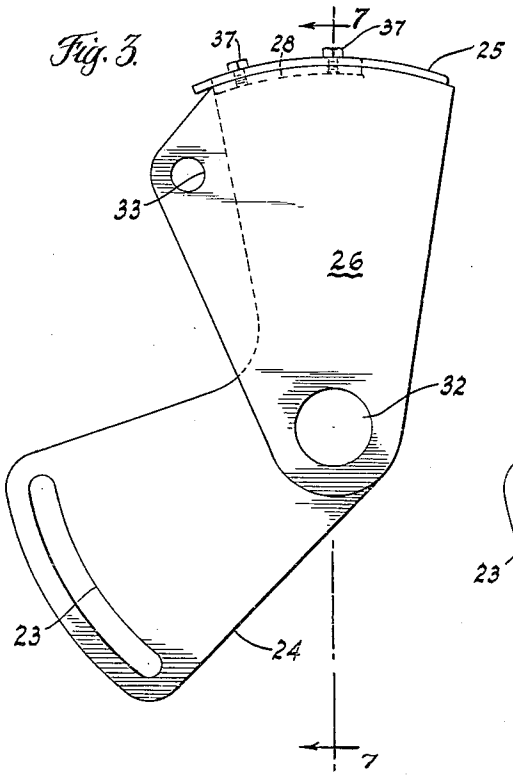


Fig. 4.

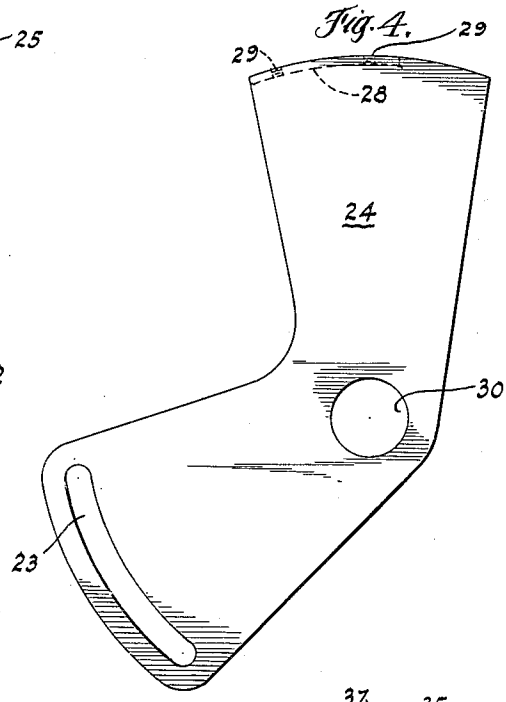


Fig. 5.

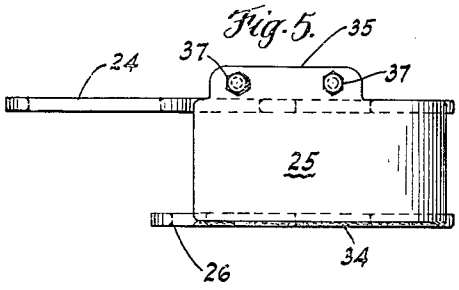
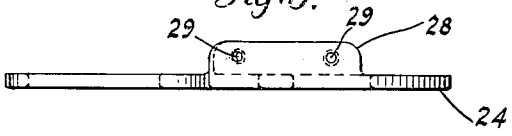


Fig. 6.



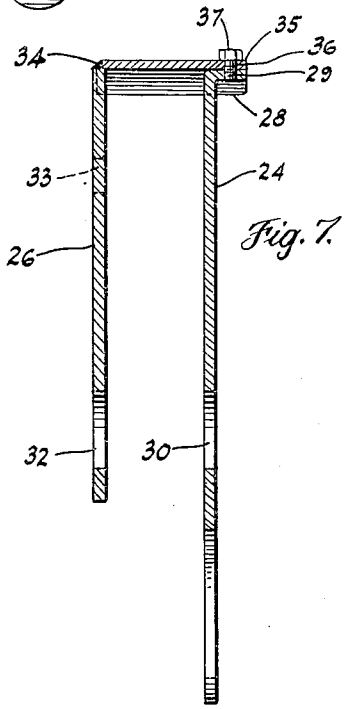


Fig. 7.

INVENTOR

ORVIE J. DAUBENBERGER

Walter V. Wright AGENT

United States Patent Office 3,059,488 Patented Oct. 23, 1962

3,059,488
MANURE SPREADER

Orvie J. Daubenberger, Chandler, Ariz., assignor to Sperry Rand Corporation, New Holland, Pa., a corporation of Delaware

Filed Sept. 28, 1960, Ser. No. 58,996
3 Claims. (Cl. 74—118)

This invention relates to manure spreaders of the type wherein a movable apron is employed to intermittently feed manure rearwardly over the bed of the spreader to the distributing, or scattering mechanism. Specifically, this invention is an improvement in the apron drive mechanism of U.S. Patent 2,699,337 issued January 11, 1955.

In the above patent a single rod enables the operator to control both the operation of a throw out clutch in the distributor drive mechanism and the extent of the feed increments of the pawl and ratchet-wheel driven feed apron. This is accomplished by an inverted U-shaped control member mounted on the apron driven shaft. One leg of the U-shaped member extends radially along the inboard side of the apron drive ratchet wheel, the other leg of the U-shaped member extends radially along the outboard side of the ratchet wheel and the bight of the U is disposed concentrically over a portion of the teeth of the ratchet wheel. Control means extend from the inboard leg of the U-shaped control member to the distributor throw out clutch. At control rod extends forwardly from the outboard leg of the control member to the operator. Movement of the control rod by the operator serves to oscillate the U-shaped control member about the apron shaft. This moves the bight of the U, which constitutes a pawl shield, into the path of the drive pawl for the ratchet wheel and prevents driving engagement of the pawl with the wheel. If movement of the control rod by the operator is great enough, the distributor clutch will be disengaged by the control means extending between the inboard leg of the U-shaped control member and the clutch.

It sometimes happens, in spreaders of the above type, that the apron becomes locked. For example, it is common practice to fill the spreader one day, let it stand over night and spread the manure the next day. In cold weather this may result in the apron becoming frozen to the spreader bed. To insure against damage to the apron, the ratchet wheel of the drive mechanism is keyed to the apron drive shaft by a key which is adapted to break when subjected to a force exceeding a predetermined amount. Therefore, in the event of locking of the apron, the relatively inexpensive key is sheared and the drive mechanism and apron remain unharmed. While this safety feature is highly successful in preventing damage to the drive mechanism, it represents the crux of a series of vexing, time-consuming problems of a different nature which arise when one attempts to replace a sheared key.

The ratchet wheel and the U-shaped control member must be assembled on the apron shaft as a unit. The shaft is rotated until the key slot is turned upwardly and the key is set therein. The U-shaped control member is placed in position over the ratchet wheel with the shaft holes in the legs thereof aligned with the shaft hole in the ratchet wheel. The inboard leg of the control member is provided with a key slot extending radially from the hole provided therein for the apron shaft. The key slot in the ratchet wheel is aligned with the key slot in the inboard leg. These members are then inserted over the shaft, and the key therein, as a unit. Due to the key slot in the inboard leg, this leg passes completely over the key to its inboard position on the apron shaft.

The ratchet wheel comes to rest over the key with the key seated in the ratchet wheel key slot.

At the same time the U-shaped control member and the ratchet wheel unit are inserted over the apron shaft, an arcuate lost motion control slot in the inboard leg of the control member must be inserted over the control rod for the distributor drive throw-out clutch. Since the slot extends over an arc of approximately 25°, it is not particularly difficult to accomplish the simultaneous assembly of these parts. The apron shaft is rotated to position its key in approximately the proper angular position, relative to the control rod, to pass through the aligned key slots on the inboard leg and the ratchet wheel at the same time that the clutch control rod passes through the center of the lost motion slot in the inboard leg of the control member. Since the control slot extends over a 25° arc, it is a simple matter to visually position the key within the 25° arcuate tolerance provided by this slot.

Once the above assembly is completed, the control member is limited to movement within the 25° arc defined by the clutch control slot; while the ratchet wheel and key are free to rotate with the apron shaft through 360°. Thus, the alignment of the key slots in the control member and ratchet wheel is lost during the operation of the spreader. This alignment can be re-established only when the apron shaft is located within a certain 25° arc of its circle of travel.

Failure of the key, however, may occur at any position in the 360° of travel of the apron shaft. Unfortunately, locking of the apron and, hence, failure of the key normally occurs when the spreader is loaded. The apron shaft cannot be rotated to locate the key therein in the required angular position for reassembly of the control member and ratchet wheel until the farmer digs out a substantial portion of frozen manure and frees the apron shaft. He may then rotate the apron shaft by the apron until the key slot therein is in proper position for reassembly of the U-shaped control member. Then, after the new key is inserted, the ratchet wheel and control member may be reassembled on the shaft as a unit, in the manner set forth above, and the manure reloaded into the spreader. This is a very unpleasant, time-consuming operation involving considerable manual labor.

It is a primary object of this invention to eliminate the problems concerned with replacement of a sheared key in spreaders of the above type.

It is a further object of this invention to improve the mounting of the clutch control member while simplifying the fabrication thereof.

It is another object of this invention to improve the structure of the apron drive of the above patent, thereby simplifying and reducing the cost of assembly thereof.

These and other objects of the invention will become more apparent from the specification and drawings wherein:

FIG. 1 is a side elevational view of the drive mechanism for the apron and distributing mechanism of a manure spreader;

FIG. 2 is a cross sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a side elevational view of the assembled pawl shield and control plates contructed in accordance with the present invention;

FIG. 4 is a view similar to FIG. 3 showing the inboard control plate alone;

FIG. 5 is a plan view of FIG. 3;

FIG. 6 is a plan view of the member of FIG. 4; and

FIG. 7 is a cross sectional view taken on the line 7—7 of FIG. 3.

A manure spreader apron and distributor drive mechanism of the type disclosed in the above mentioned patent is shown in FIG. 1 of the drawings with applicant's improvements incorporated therein. The numeral 1 indicates a gear box having an input shaft 2 connected to the P. T. O. of the draft vehicle, or to any conventional source of power (not shown). The output shaft 3 of gear box 1 carries a sprocket 4. Eccentrically mounted on sprocket 4 is a crank pin 5.

The drive shaft 6 of the distributor mechanism (not shown) and the drive shaft 7 of feed apron 8 are both driven from output shaft 3 of gear box 1 in the following manner: an endless chain 9 trained around sprocket 4 and the drive side of clutch 10 on shaft 6 continuously drives distributor shaft 6. A pitman 11, one end of which is carried by crank pin 5, serves to oscillate the arm 12 about apron shaft 7. Arm 12 carries a drive pawl 13 which is biased by spring 14 into engagement with the teeth on ratchet wheel 15. Ratchet wheel 15 is connected to apron shaft 7 by a key 16 (FIG. 2). A small sprocket 17 also keyed to shaft 7, as at 18, engages the chain 8a of apron 8 and imparts the intermittent movement of shaft 7 thereto.

The distributor clutch 10 is controlled by a pair of arms 19 carried by a rod 20 which is mounted for oscillation about its own axis. The forward end of rod 20 carries a rocker arm 21, one end of which carries the upper end of vertically disposed reciprocable rod 22. The lower end of rod 22 is bent outwardly 90° and received in a lost-motion slot 23 in a first control plate 24. Plate 24, as best seen in FIG. 2, is mounted on shaft 7 adjacent one side of ratchet wheel 15.

A pawl shield 25 is carried by the radially extending end of a second control plate 26 which is carried on shaft 7 adjacent the other side of ratchet wheel 15. Shield 25 extends concentrically over a portion of the teeth on ratchet wheel 15 and is connected to one radially extending end of first plate 24. A reciprocable control rod 27 extends forwardly from plate 26 to the towing vehicle (not shown) whereby it may be reciprocated manually by the operator of the vehicle.

It will be clear from FIG. 1 that reciprocation of rod 27 to the left will oscillate plates 24 and 26 and pawl shield 25 counterclockwise about shaft 7. This, via rod 22, arm 21, rod 20 and arms 19, disengages clutch 10 while removing pawl shield 25 from the path of drive pawl 13. Movement of rod 27 to the right, from its FIG. 1 position, will permit clutch 10 to remain engaged, due to lost-motion slot 23 in plate 24, and cause pawl shield 25 to be projected into the path of drive pawl 13. Pawl 13 will then ride on top of shield 25 for a portion of its stroke and therefore drive ratchet wheel 15 less than the maximum amount.

The function of the above structure, as far as the manure spreading operation is concerned, is identical to that of U.S. Patent 2,699,337. It is upon the failure of ratchet wheel key 16 that the full benefits of applicant's improved structure are realized.

Attention is now directed to FIGS. 2 through 7 wherein applicant's improved control means is more clearly shown. The first, or clutch, control plate 24, as seen in FIG. 4, is bell crank shaped. An arcuate slot 23 of approximately 25° is provided in one leg of the plate to receive the outwardly bent end of vertically extending clutch control rod 22. At the radially extending end of the other leg of plate 24 is provided a right angle flange 28 having two threaded bolt holes 29 (FIG. 6). Flange 28 is adapted to project away from ratchet wheel 15 when plate 24 is mounted for operation on shaft 7. In the central portion of plate 24, a hole 30 is provided to receive shaft 7.

The second, or pawl shield, control plate 26 is generally wedge-shaped (FIG. 3) and has a large unbroken cylindrical hole 32 at the vertex thereof to receive shaft 7. A second, smaller hole 33 is provided along the edge of the plate which will face the front on the spreader when the control device is assembled on shaft 7. Hole 33 is provided to receive the bent end of fore-and-aft extending control rod 27. A pawl shield 25 is welded, as at 34, or otherwise made integral with the radially extending end of control plate 26. Shield 25 is generally rectangular in plan and arcuate in cross section as seen in FIGS. 5 and 3, respectively. An elongate lateral extension 35 forms an integral part of shield 25. Extension 35 is shaped to conform with flange 28 on plate 24 and defines two unthreaded bolt holes 36 (FIG. 7). Shield 25 is connected to flange 28 of plate 24 by a pair of bolts 37.

Attention is now directed to FIG. 2. Here it will be seen how the device of this invention simplifies both the intial assembly of the control mechanism and the replacement of key 16 upon failure thereof.

Installation of both the distributor clutch control plate and the apron drive control plate is completely independent of ratchet wheel 15 or key 16 in shaft 7. Upon failure of key 16, bolts 37 are removed to free clutch control plate 24 from pawl shield 25. Bearing plate 38, arm 12, plate 26 and ratchet wheel 15 are then removed axially of shaft 7 and the new key 16 is inserted in the shaft. To reassemble the device, ratchet wheel 15 is inserted over the shaft and new key 16 therein. Plate 26 is then inserted over the shaft 7 and shield 25 is connected to flange 28 of plate 24 by bolts 37. Arm 12 and bearing plate 38 are then inserted over the shaft.

The plate 24 is initially installed before key 16 and need never be removed thereafter. This eliminates the need for a key slot in this plate, thus improving the bearing surface of the plate on shaft 7. Most important, however, is the fact that a key 16 can be replaced in the same position of shaft 7 where the failure occurs. Since plate 24 need not be removed to replace a key, and the key slot in ratchet wheel 15 need only be aligned with key 16; reassembly of these parts is readily accomplished in any angular position of shaft 7.

If the apron freezes and the key shears, the former need only replaec the key and go about other chores until the heat of day melts the apron free. The task of manually unloading and reloading as much as one hundred and thirty bushels of manure to enable replacement of a sheared key is eliminated.

While this invention has been described in connection with a particular structure, it will be understood that it is capable of further modification and this application is intended to cover any variations, uses or adaptations of the invention following, in general, the principles of the invention as come within known or customary practice in the art to which the invention pertains as come within the scope of the invention and the limits of the appended claims.

Having thus described my invention, what I claim is:

1. In a manure spreader apron drive having a shaft, a toothed ratchet wheel mounted on said shaft, frangible means keying said ratchet wheel to said shaft, a drive pawl engageable with the teeth on said ratchet wheel, means oscillating said drive pawl through a fixed arc of travel about the perimeter of said ratchet wheel; the improvement comprising means controlling the point along said arc of travel at which said pawl engages said ratchet wheel teeth whereby the extent of movement of said wheel may be selectively rendered less than the arc of travel of said pawl, said control means comprising a pair of separate plates mounted on said shaft, one plate being disposed on each side of said ratchet wheel in close proximity thereto, said plates having aligned holes therethrough forming unbroken cylindrical walls engaging the periphery of said shaft, said plates being oscillatable through a fixed arc about said shaft and extending radially beyond the periphery of said ratchet wheel, a pawl shield concentrically disposed relative to said ratchet wheel and overlying a portion thereof whereby said drive pawl may ride over said pawl shield for a portion of its

drive stroke thereby being held disengaged from said ratchet wheel teeth, a control rod connected to one of said plates for setting the position thereof relative to the arc of travel of said drive pawl, said pawl shield being integrally connected to the radially extending end of one of said plates, and means removably connecting said pawl shield to the radially extending end of the other of said plates whereby said pawl shield and its integrally connected plate may be separated from the removably connected plate to facilitate the remounting of said ratchet wheel in the event of failure of said keying means.

2. In a manure spreader apron drive having a shaft, a toothed ratchet wheel mounted on said shaft, frangible means keying said ratchet wheel to said shaft, a drive pawl engageable with the teeth on said ratchet wheel, means oscillating said drive pawl through a fixed arc of travel about the perimeter of said ratchet wheel; the improvement comprising means controlling the point along said arc of travel at which said pawl engages said ratchet wheel teeth whereby the extent of movement of said wheel may be selectively rendered less than the arc of travel of said pawl, said control means comprising a pair of separate plates mounted on said shaft, one plate being disposed on each side of said ratchet wheel in close proximity thereto, said plates having aligned holes therethrough forming unbroken cylindrical walls engaging the periphery of said shaft, said plates being oscillatable through a fixed arc about said shaft and extending radially beyond the periphery of said ratchet wheel, an arcuate shield plate fixedly mounted to the radially extending end of one of said pair of plates, said shield plate being concentrically disposed relative to said ratchet wheel and engaging the radially extending end of the other of said pair of plates, bolt means removably connecting said shield plate to the other of said pair of plates, a control rod connected to one of said plates for positioning said shield plate in the arc of travel of said drive pawl whereupon said drive pawl will ride on said shield plate for at least a portion of its drive stroke and be prevented from drivingly engaging the teeth on said ratchet wheel, said bolt means being readily removable to separate said shield plate from the other of said pair of plates to facilitate

the remounting of said ratchet wheel in the event of failure of said keying means.

3. In a manure spreader apron drive having a shaft, a toothed ratchet wheel mounted on said shaft, frangible means keying said ratchet wheel to said shaft, a drive pawl engageable with the teeth on said ratchet wheel, means oscillating said drive pawl through a fixed arc of travel about the perimeter of said ratchet wheel; the improvement comprising means controlling the point along said arc of travel at which said pawl engages said ratchet wheel teeth whereby the extent of movement of said wheel may be selectively rendered less than the arc of travel of said pawl, said control means comprising a first plate mounted on said shaft adjacent one axial side of said ratchet wheel, a second plate mounted on said shaft adjacent the other axial side of said ratchet wheel, said plates having aligned holes therethrough forming unbroken cylindrical walls engaging the periphery of said shaft, said plates being oscillatable through a fixed arc about said shaft and extending radially beyond the periphery of said ratchet wheel, a flange on said first plate at the radially extending end thereof, said flange projecting axially away from said ratchet wheel, an arcuate shield plate fixedly mounted on the radially extending end of said second plate, said shield plate extending concentrically over a portion of said ratchet wheel to said first plate, an extension on said shield plate overlying and engaging the flange on said first plate, bolt means removable connecting said shield plate extension to said flange and a control rod connected to said second plate for positioning said shield plate in the arc of travel of said drive pawl thereby preventing said pawl from drivingly engaging said ratchet wheel teeth, said bolt means being readily removable to separate said shield from said first plate to facilitate the remounting of the ratchet wheel in the event of failure of said keying means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,325,206	Raybon	Dec. 16, 1919
2,487,449	Knudson	Nov. 8, 1949
2,699,337	Best	Jan. 11, 1955