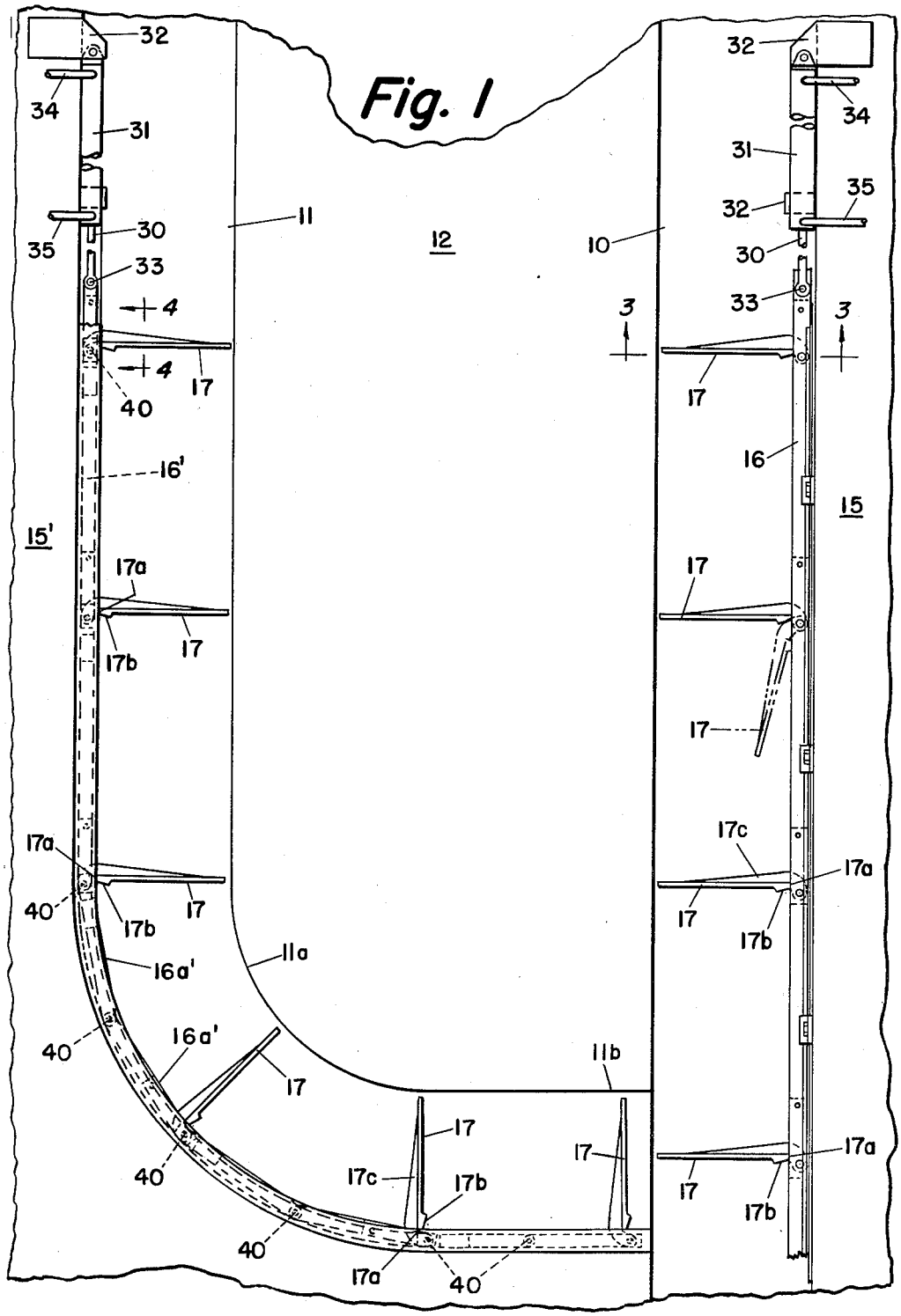
July 24, 1962 H. M. WENGER 3,045,811

BARN GUTTER CLEANER

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Fig. 1



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BARN GUTTER CLEANER

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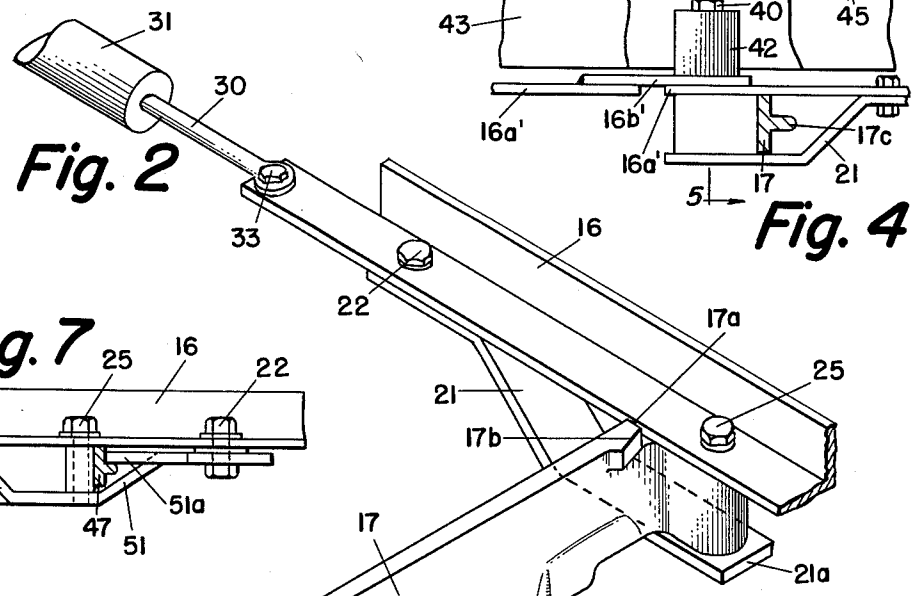


Fig. 2

Fig. 4

Fig. 7

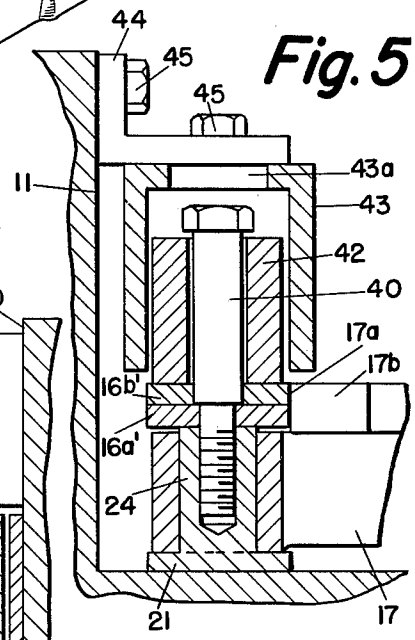


Fig. 5

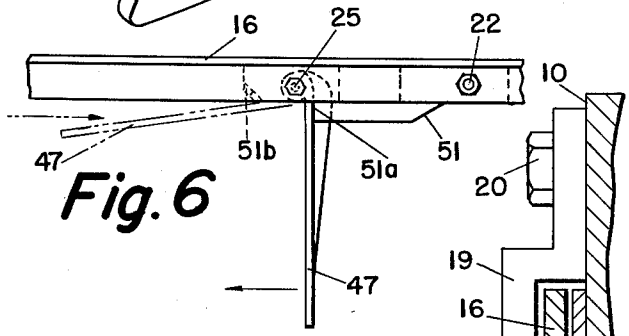


Fig. 6

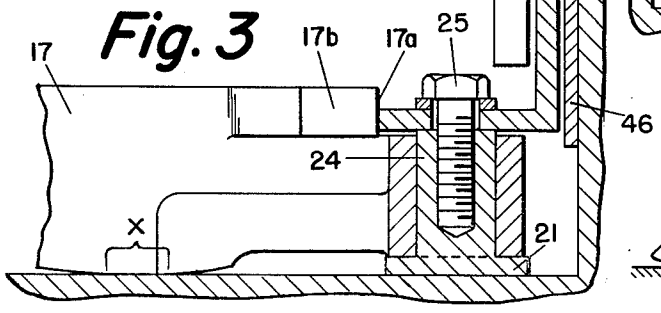


Fig. 3

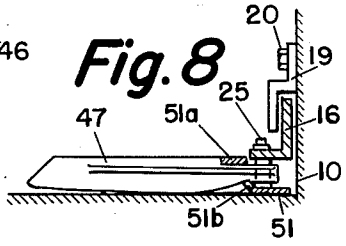


Fig. 8

United States Patent Office 3,045,811 Patented July 24, 1962

3,045,811

BARN GUTTER CLEANER

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Filed Aug. 12, 1959, Ser. No. 833,333
7 Claims. (Cl. 198—224)

This invention relates to a device for cleaning barn gutters or the like of manure or other refuse and has for an object the provision of a reciprocable apparatus or device of simple construction for rapidly and efficiently moving refuse along barn gutters or the like to a suitable discharge outlet.

The present invention is particularly applicable to cleaning the gutters in dairy barns. Such barns ordinarily include gutters positioned at the rear of the stalls. The stalls are usually arranged in long banks, back to back, with an island or path being positioned between adjacent gutters or troughs. In the past, various types of cleaning devices have been employed for removing the manure or refuse from these troughs. Such devices or mechanisms have frequently included paddle members disposed at spaced locations in the trough and which extend across the trough to move the refuse therealong. Various types of mechanisms have been employed for operating such paddle members and these mechanisms have included rather complicated arrangements for controlling the movement of the paddle members on the forward and reverse strokes so as to move the paddle members clear of the material on the reverse stroke which the paddle members pushed along the gutter on the forward stroke. In order to keep the cattle from stepping on the barn gutter cleaning device, it is preferable to locate such devices entirely within the gutter. This has created a problem for the operating mechanism of the device of how to keep the mechanism from becoming clogged or otherwise rendered inoperative due to an accumulation of refuse between and around the moving parts of the mechanism. This problem has been attempted to be solved in various ways including periodic flushing of the gutters with water and by the use of various mechanisms. The present invention overcomes these problems by employing a very simple rugged device which efficiently sweeps the gutters clean of the refuse and at the same time automatically maintains the operating mechanism free from obstruction by any accumulation of such refuse.

It is a further object of the invention to provide a cleaning device for barn gutters or the like wherein the gutter sweeping paddles are constructed for rapid movement between their operating and folded positions so as to permit the use of a shorter stroke of the device by enabling the paddles to be in their operating position during a greater portion of each working stroke.

It is another object of the invention to support the operating mechanism for the paddles at an elevation above the bottom of the gutter and to prevent this mechanism from becoming clogged with refuse.

It is a further object of the invention to provide a barn gutter cleaning device adapted to be reciprocable in gutters which include both straight and curved portions so that the refuse from one gutter may be pushed around a curve at the end thereof for discharge into an adjacent gutter so as to eliminate excess linkage and provide a substantial saving on installation.

In accordance with one aspect of the invention, there is provided a device for cleaning barn gutters or the like having a reciprocable elongated member slidable longitudinally in a refuse-collecting gutter. A plurality of runner members are secured to the elongated member at spaced locations and the runner members are adapted to engage the bottom of the gutters for supporting the

elongated member at an elevation above the bottom of the gutter. Each of the runner members includes structure for maintaining the corners of the gutters in which they ride clear of refuse so as to prevent a buildup of refuse beneath the elongated member which would interfere with its operation. The elongated member has a plurality of gutter-sweeping paddles pivotally connected to it at spaced locations and these paddles are swingable from an operative position substantially at right angles to the elongated member into a folded position adjacent the elongated member. Provision is also made for maintaining the paddles in their operative position during movement of the reciprocable elongated member in one direction and maintaining them in folded position on movement of the reciprocable elongated member in the opposite direction. In order to minimize the time required to move the paddles from their folded to open position, the working faces of the paddles, which are adapted to engage the refuse in the gutter, are offset with respect to the axes of the pivots for the paddles. Additionally, to minimize the friction between the bottom of the gutter and the bottom edges of the paddles, the latter are so shaped as to engage the bottom of the gutter only along a short length thereof at a location intermediate the ends of the paddles. The paddles are connected to the elongated member in such manner that they may be removed and replaced without the need for removing the elongated member from the gutter.

Further in accordance with the invention, the barn gutter cleaning device may be utilized in gutters which include curved portions as well as straight portions. In installations of this type, at least part of the elongated member is divided into short sections pivotally connected one to the other for movement around the curve in the gutter and means is provided for guiding the elongated member including the short sections thereof disposed closely adjacent one wall of the gutter and extending around the curve and beyond so that the paddles are maintained centrally of the gutter through both straight and curved portions of the gutter.

For a more detailed disclosure of the invention and for further objects and advantages thereof, reference is to be had to the following description taken in conjunction with the following drawings in which:

FIG. 1 is a plan view of a portion of a barn floor showing the present invention installed in a pair of adjacent gutters, one of which includes a curved portion so that it empties into the adjacent gutter near the end thereof;

FIG. 2 is a fractional perspective view of a portion of the device for cleaning barn gutters shown in FIG. 1;

FIG. 3 is a fractional sectional view taken along the lines 3—3 in FIG. 1;

FIG. 4 is a fractional elevation view, partially in section, taken along the lines 4—4 in FIG. 1;

FIG. 5 is a fractional sectional view taken along the lines 5—5 in FIG. 4;

FIG. 6 is a top plan view of a modification of the invention;

FIG. 7 is a front elevation view of the modification shown in FIG. 6; and

FIG. 8 is a side elevation of the modification shown in FIG. 6.

Referring to FIG. 1, there is shown a partial plan view of floor area in a dairy barn or the like. The floor area includes a pair of gutters **10** and **11** which are disposed closely adjacent the rear of stalls, not shown, and are adapted to receive manure or other refuse. The gutters **10** and **11** are formed in the cement floor and are separated by an island **12**. The gutter **11** includes a curved portion **11***a* so that the refuse from gutter **11** may be transferred into gutter **10** which is adapted to extend through the wall of the barn into the barnyard for ultimate

removal. The discharge end 11*b* of gutter 11 is disposed at an elevation above the corresponding end of gutter 10.

The gutter 10 is provided with a barn cleaning device 15 which includes an elongated member 16. The elongated member 16 may be a continuous member through its length or it may be made up of a plurality of sections which are secured together. The elongated member 16 must have sufficient rigidity or stiffness to be able to actuate the paddle members 17 which are adapted to sweep the manure or refuse from the bottom of the gutters. One suitable construction for the elongated member 16 is angle iron as shown in FIGS. 2 and 3. The horizontal portion of the angle iron provides a place for attachment of the paddle members 17 while the vertical portion of the angle iron provides structure for cooperation with the guide members or clips 19, FIG. 3, which are adapted to be secured to one of the side walls of the gutters 10 as by screws 20. The elongated member 16 is adapted to be supported on an elevation above the bottom of the gutter 10 by means of a plurality of spaced runner members 21, FIG. 2. The runner members 21 preferably are formed from steel strip material and are removably secured to the elongated member 16 at their rear end by means of a bolt 22. The forward ends of runners 21 are bent down, away from the elongated member 16 and are adapted to engage the bottom of the gutter. The paddle members 17 are adapted to be hinged on a vertical pivot pin 24, FIG. 3, which is secured at its bottom end, as by welding, to the runner 21. While the pivot pin 24 may be secured to the elongated member 16 in any suitable manner, in the preferred form of the invention, the pin 24 is tapped to receive a screw 25. With this construction the paddles 17 and the runners 21 may be readily removed and replaced merely by removing the bolt 22 and the screw 25 without disturbing the elongated member 16 from its position within the gutter 10.

The elongated member 16 is adapted to be reciprocated within the gutter 10 by any suitable arrangement. The arrangement shown in FIG. 1 is preferred and comprises a plunger 30 which is adapted to be operated by a hydraulic cylinder 31. As may be seen in FIG. 1, the cylinder is secured within the gutter by means of a cylinder anchor bracket 32 which is cemented into the gutter wall, or, if desired, it can be bolted to the wall. The bracket 32 preferably extends throughout the length of the cylinder 31 and thus provides rigid support therefor. The cylinder 31 is of the heavy duty, rugged type which needs no protection from cattle stepping on it and is not affected by the corrosive action of the manure. The end of the plunger 30 is secured to the adjacent end of the elongated member 16 as by a bolt 33. The hydraulic power unit, not shown, for the cylinder 31 may take any suitable form such, for example, as the unit disclosed in my Patent 2,812,055. Briefly, such unit includes a motor and a pump, the latter being connected to a suitable fluid reservoir. Such unit also includes a suitable control valve device, not shown, to which are connected the flow lines 34 and 35 from the opposite ends of the hydraulic cylinder 31 for providing the reciprocating movement of the elongated member 16 at desired intervals and rates of speed.

The spacing between the paddle members 17 in regard to their connection to the elongated member 16, FIG. 1, is less than the total stroke of the hydraulic cylinder 31. For example, with a spacing of about twenty-eight inches between the paddle member 17, a stroke of about seventy-eight inches has been found to be satisfactory. It is to be understood that this spacing and stroke may be changed for different installations. However, in all instances the length of stroke will be greater than the spacing between the paddle members.

The paddle members 17 are constructed so that their working faces, which are adapted to engage the refuse on the operating or forward stroke of the elongated member 16, are offset to the rear of the axis of each of their respective pivots 24. This may be seen in FIGS. 1 and 2. Also, as may be seen in FIG. 3, the bottom of the paddle member 17 is so shaped that it engages the bottom of the gutter 10 only through a short length *x* thereof which is disposed intermediate the ends of the paddle member 17. By reason of this construction, the paddles do not tend to slide a substantial distance along the gutter in folded position during the initial portion of the forward stroke of member 16 as has been the case in prior arrangements, but instead the paddles rotate about their pivots substantially simultaneously upon reversal of the movement of the elongated member 16. This causes the paddles 17 to move rapidly from their folded position to their operating position as indicated by the respective phantom line and solid line positions shown in FIG. 1, thereby permitting the paddles 17 to be in their operating position over a greater portion of the stroke of member 16. This enables the use of a shorter overall length of stroke for member 16 and permits the use of shorter operating cylinders, less expensive equipment and permits faster operation and more efficient removal of litter or refuse from the gutters.

By supporting the elongated member 16 above the bottom of the gutter on the runners 21, the refuse does not collect beneath the member 16 and clog the operation of the mechanism. In the past with prior arrangements, where it was customary to employ an operating bar disposed in the bottom corner of the gutters, the manure or refuse frequently became packed beneath the bar and caused the paddles to be tilted at an angle above the bottom of the gutter. When this occurred, the device was no longer capable of cleaning the gutters and thus it was necessary to shut down the mechanism and remove the litter which clogged the normal operation of the device.

In accordance with the present invention, the elongated member 16 is supported a substantial distance above the bottom of the gutter by the runners 21. Additionally, the forward ends of the runners 21 are provided with a scraping or cleaning portion 21*a*, FIG. 2, which is adapted to ride in the corner of the gutter and scrape the refuse therefrom so as to avoid buildup. The forward end 21*a* of the runners 21 scrapes the refuse from the corner on its forward movement and causes the refuse to move away from the adjacent wall of the gutter into the path of the paddle 17 which sweeps it along the gutter due to the successive reciprocating movements of the elongated member 16 by the cylinder 31.

To maintain the paddles 17 in their respective operating and folded positions, as shown in FIG. 1, the paddles 17 are provided with a pair of stops 17*a*, 17*b*, which are integral with the paddles, FIGS. 2 and 3. When the paddles 17 are in their operating or full-line position, as shown in FIG. 1, the stop 17*a*, FIG. 2, is in engagement with the horizontal section of the angle iron 16. When the paddles are moved to their folded position, they are prevented from moving beyond the phantom-line position shown in FIG. 1 by reason of engagement of the stop or surface 17*b* on the paddle 17 with the horizontal section of the angle iron of elongated member 16. It is necessary that the folded position of the paddles 17 be maintained at a predetermined acute angle away from the elongated member 16 and not parallel to it in order to permit the paddles 17 to be rapidly moved to their opened or operating position.

The foregoing description has been concerned primarily with the device 15 shown in FIG. 1 in connection with the straight gutters or channel 10. A similar device 15' is shown in connection with the curved gutter 11. However, there are certain changes and construction details which aid the device in negotiating the curved section 11*a* of the gutter. For example, the elongated reciprocable member 16', at least through the portion thereof that passes around the curve 11*a*, comprises a plurality of short sections 16*a*' which are pivotally interconnected one to the other by a pivot 40 at the ends thereof. The sections 16*a*' preferably are made from flat bar stock

rather than angle iron. The pivot 40 as shown in FIG. 5 comprises a shouldered screw member which is adapted pivotally to carry at the upper end thereof a roller 42 which is adapted to be received for rolling engagement with the side wall of a guide channel 43. The guide channel 43 preferably is an inverted U-shaped channel and is adapted to be secured to the side wall of the gutter 11, along the straight and curved portions thereof, FIG. 1, by a plurality of brackets 44 and screws 45, FIGS. 4 and 5. The lower end of the pivot 40 is threaded and adapted to be received in the tapped opening in the pivot 24 for the paddle 17. As may be seen in FIG. 4, each of the sections 16*a'* is provided at one end thereof with an extension member 16*b'*. One end of the extension 16*b'* is adapted to be welded to the adjacent end of member 16*a'* and the overhanging end of extension 16*b'* is provided with an opening through which passes the pivot 40, FIG. 5. There is sufficient clearance between the opening in extension 16*b'* and the pivot 40 so that there will be pivotal action between the adjacent sections 16*a'* as they pass around the curve 11*a* in the gutter 11. Thus it will be seen that the pivots 40 provide a dual function, namely a bearing surface for the rollers 42 and means for securing the sections 16*a'* of the elongated member 16 to the pivots 24 and the respective runner members 21. By reason of the fact that the runners 21 support the sections of the elongated member a substantial distance above the bottom of the gutter 11, the refuse within the gutter does not interfere with the operation of the rollers 42 in their cooperation with the channel member 43 in guiding the paddles 17 around the curve 11*a* in gutter 11.

The device 15' is actuated by a cylinder 31 and associated parts of similar construction to the cylinder 31 and associated parts described in connection with the device 15 in the gutter 10. It will be recalled that in the installation given as an example above the paddles 17 on elongated member 16 in gutter 10 were disposed at spaced locations of approximately twenty-eight inches and the stroke of the device was approximately seventy-eight inches. For such installation, the paddles 17 on device 15' are disposed in similar locations through the straight portion thereof, and on the portion which is adapted to pass around the curve 11*a*, the sections 16*a'* are approximately fourteen inches long, with one paddle 17 being disposed on every other section 16*a'*, thus making a spacing of approximately twenty-eight inches between adjacent paddles. In FIG. 1, the device 15' has been illustrated in its maximum forward position whereby the leading paddle 17 pushes the refuse from the discharge end 11*b* of gutter 11 into the adjacent gutter 10. The bottom of the discharge end of gutter 11 is disposed above the bottom of the adjacent portion of the gutter 10 so that the refuse will drop into the gutter 10 and be pushed along to the outlet end thereof by the paddles 17 on the device 15.

As may be seen in FIGS. 4 and 5, the channel section 43 is provided with an opening 43*a* in line with the shouldered screw or pivot 40. This permits access to the head of the screw 40 and enables replacement of the runners 21 without the need for removing the channel member 43 or the elongated member 16'. The runners 21 are substantially the only parts of the devices 15 and 15' which may need to be replaced because of wear. The paddles 17 are subject to a negligible amount of wear since they engage the bottom of the gutters through only the short distance indicated as *x* in FIG. 3. The paddles 17 are of cast metal construction and are provided with a flange 17*c* at the rear side thereof to increase their weight in the proper area with respect to area *x* so as to assist in the rapid opening and closing of the paddles. To prevent wear on the elongated member 16, a suitable pad 46, FIG. 3, is inserted between the side wall of gutter 10 and the vertical section of member 16. The corresponding elongated member 16' in gutter 11 does not engage the side wall of the gutter 11 as it is maintained in predetermined spaced relation thereto by means of the rollers 42 which ride within the channel member 43, FIG. 5.

The runners 21 which have been described above, are of the preferred construction, since they may be used in either left-hand or right-hand applications as indicated by their use on either of devices 15 and 15' in the respective gutters 10 and 11. In such arrangements, the stop structure for controlling the positions of the paddles 17 is carried by the respective paddles, as indicated by stops 17*a* and 17*b* in FIGS. 2, 3 and 5. It is to be understood that the stop structure may be provided on the runner members if desired. In the modification shown in FIGS. 6–8, the paddles 47 are of generally similar construction to the paddles 17 with the exception that the paddles are adapted to engage stop structure on the runners 51 rather than to engage the elongated member 16 or 16'. The essential difference in the runners 51 with respect to the runners 21 resides in the fact that the runners 51 include a stop 51*a*, FIGS. 6–8, which is adapted to engage the rear of the paddle 47 and maintain the paddle 47 in a substantially perpendicular position wtih respect to the elongated member 16 and the gutter during the operating or forward stroke. The runner 51 is also provided with a turned up corner 51*b* at the forward end thereof. This corner 51*b* is adapted to be engaged by the paddle 47 to maintain the latter in the folded position, as shown in phantom line, FIG. 6. It will be noted that the forward end of the runner 51, FIG. 8, acts as a plow similar to the forward end of the runner 21 in the foregoing embodiment. Thus the runners in all embodiments are adapted to keep the corner of the gutter free of refuse and prevent any interference thereof with the operation of the reciprocable elongated members. It will be noted that the construction of the runners 51 will be reversed depending upon which corner of the gutter they are adapted to ride in. Thus in order to minimize the quantity of spare parts to be kept on hand for repairs, the construction illustrated in FIGS. 1–5 is preferred. In those installations, it is necessary only to have left-hand and right-hand paddles 17 as the same runners 21 may be used with either type of paddle. In the modification shown in FIGS. 6–8 it is necessary to have right-hand and left-hand paddles 47 as well as corresponding right-hand and left-hand runners 51.

From the foregoing, it will be seen that the present invention provides an improved cleaning device for barn gutters or the like which is of simple, rugged construction and provides trouble-free operation with only a minimum amount of wear on the parts.

While preferred embodiments of the invention have been described and illustrated, it is to be understood that further modifications of the invention may be made without departing from the scope and spirit of the invention as set forth in the appended claims.

What is claimed is:

1. A device for cleaning barn gutters or the like comprising a reciprocable elongated member adapted to extend lengthwise of a refuse-collecting gutter, a plurality of runner members secured to said elongated member at spaced locations, said runner members being adapted to engage the bottom of the gutter for supporting said elongated member at an elevation above the bottom of the gutter, a vertical pivot interconnecting each of said runner members and said elongated member, a pivoted paddle hingedly mounted on each said vertical pivot and adapted to engage the bottom of the gutter at a location intermediate the ends of said paddle, and structure on one of said members engageable with said paddles to maintain said paddles in a position substantially perpendicular to said elongated member during the forward stroke thereof to advance the refuse along the gutter and to permit said paddles to pivot to a predetermined folded position adjacent said elongated member during the reverse stroke thereof.

2. A device for cleaning barn gutters or the like according to claim 1 wherein said structure for controlling the positions of said paddles is carried by said runner members.

3. A device for cleaning barn gutters or the like comprising a reciprocable elongated member slidable longitudinally in a refuse-collecting gutter, a plurality of runner members secured to said elongated member at spaced locations, said runner members being adapted to engage the bottom of the gutter for supporting said elongated member at an elevation above the bottom of the gutter, each of said runner members having structure for maintaining the corners of the gutter in which they ride clear of refuse, and a plurality of gutter-sweeping paddles pivoted at longitudinally spaced points to said elongated member and swingable from an operative position substantially at right angles to said elongated member into a folded position adjacent said elongated member, and means for maintaining said paddles in said operative position during movement of said reciprocable elongated member in one direction and maintaining them in said folded position on movement of said reciprocable elongated member in the opposite direction.

4. A device for cleaning barn gutters or the like comprising a reciprocable member adapted to extend lengthwise of a refuse-collecting gutter, a plurality of runner members secured to said reciprocable member at spaced locations, said runner members being adapted to engage the bottom of the gutter for supporting said reciprocable member at an elevation above the bottom of the gutter, a plurality of gutter-sweeping paddles, each said paddle being pivoted to a corresponding one of said runner members and swingable from an operative position substantially at right angles to said reciprocable member into a folded position adjacent said reciprocable member, means for maintaining said paddles in said operative position during movement of said reciprocable member in one direction and for maintaining said paddles in said folded position during movement of said reciprocable member in the opposite direction, said paddles having working faces which are adapted to engage the refuse in the gutters to move refuse along the gutter with concurrent movement of said reciprocable member, said working faces of said paddles being offset to the rear with respect to the axis of each of the respective pivots for said paddles.

5. A device for cleaning barn gutters or the like according to claim 4 wherein the bottom edge of said paddles which is adapted to engage the bottom of the gutter is curved so that said paddle members engage the bottom of said gutter only at a location intermediate the ends of said paddles, whereby the friction between said paddles and the gutter is reduced to provide quicker movement of said paddles between said operative and folded positions.

6. A device for cleaning barn gutters or the like having a curve comprising a reciprocable elongated member slidable longitudinally of a refuse-collecting gutter, a plurality of runner members secured to the bottom of said elongated member at spaced locations, said runner members being adapted to engage the bottom of the gutter for supporting said elongated member throughout the length of the gutter at an elevation above the bottom of the gutter, a plurality of gutter sweeping paddles vertically pivoted at said spaced locations to said elongated member and to corresponding ones of said runner members and swingable about their vertical pivots from an operative position substantially at right angles to said elongated member into a folded position adjacent said elongated member, at least part of said elongated member being divided into short sections pivotally connected one to the other for movement around a curve in the gutter, and means for guiding said elongated member including said short sections thereof disposed closely adjacent one wall of the gutter and extending around the curve and beyond so that said paddles are maintained centrally of the gutter through both straight and curved portions of the gutter.

7. A device for cleaning barn gutters or the like according to claim 6 wherein said guiding means includes guide structure extending longitudinally along the gutter and secured to the side thereof, and roller means carried by said elongated member for engagement with said guide structure.

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