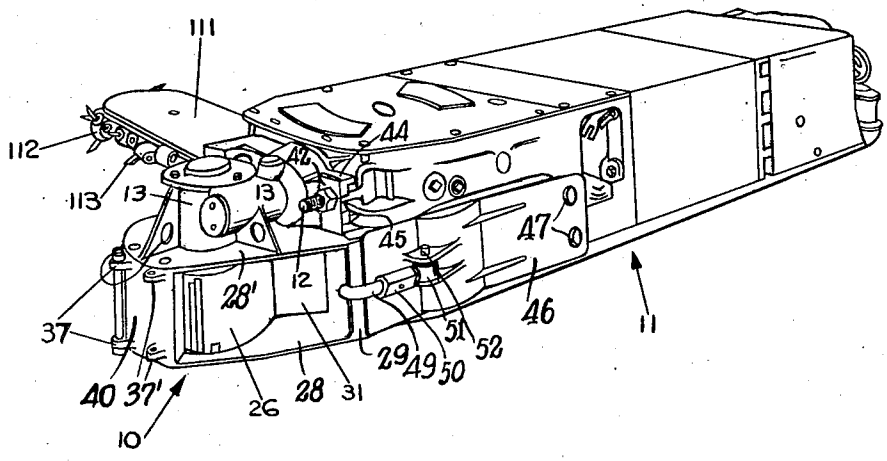
May 25, 1943. A. Y. SAVILLE 2,320,307

KERF CLEANER OR GUMMER

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Fig. 1



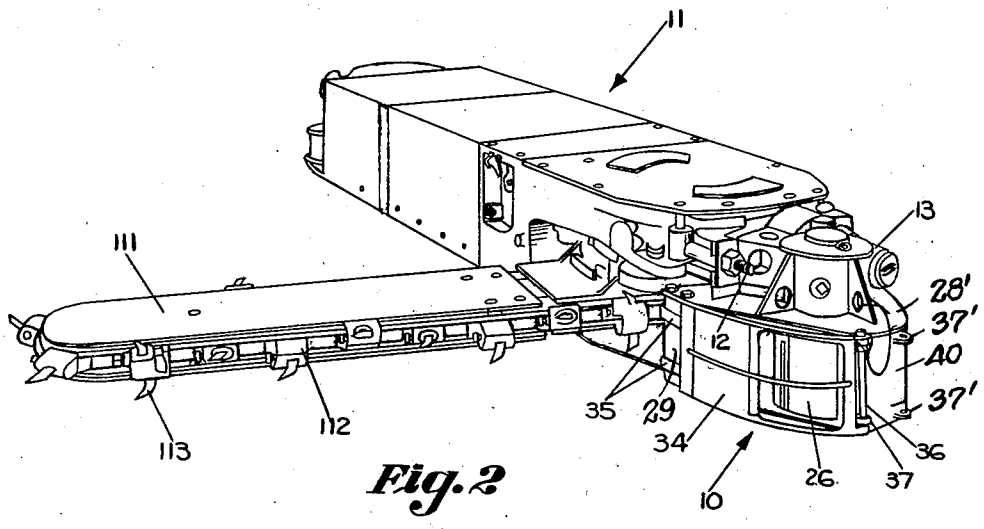


Fig. 2

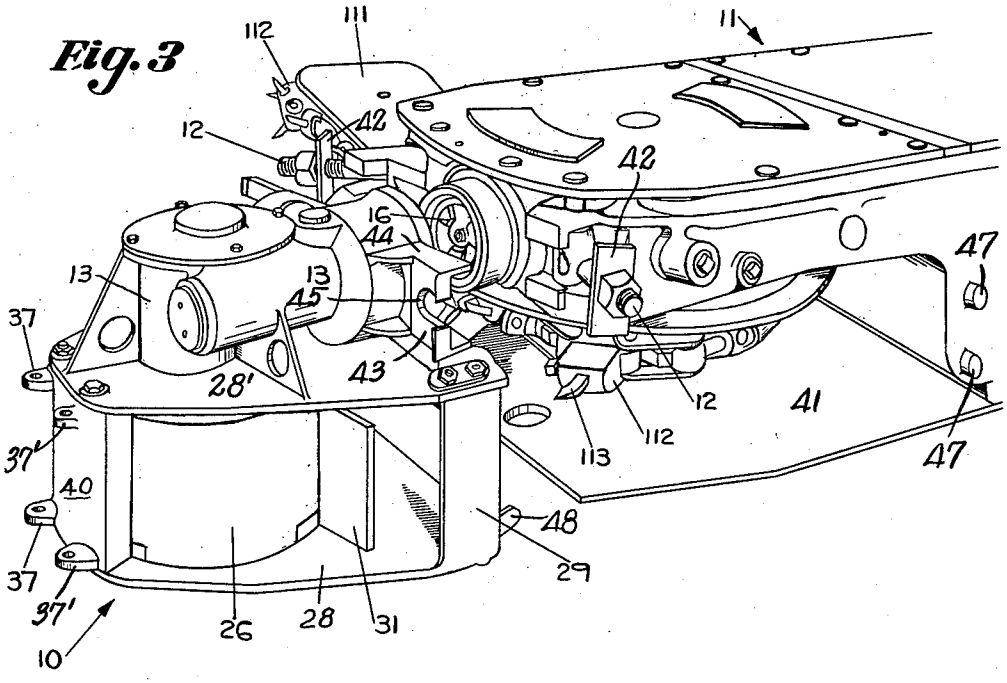
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KERF CLEANER OR GUMMER

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Fig. 3



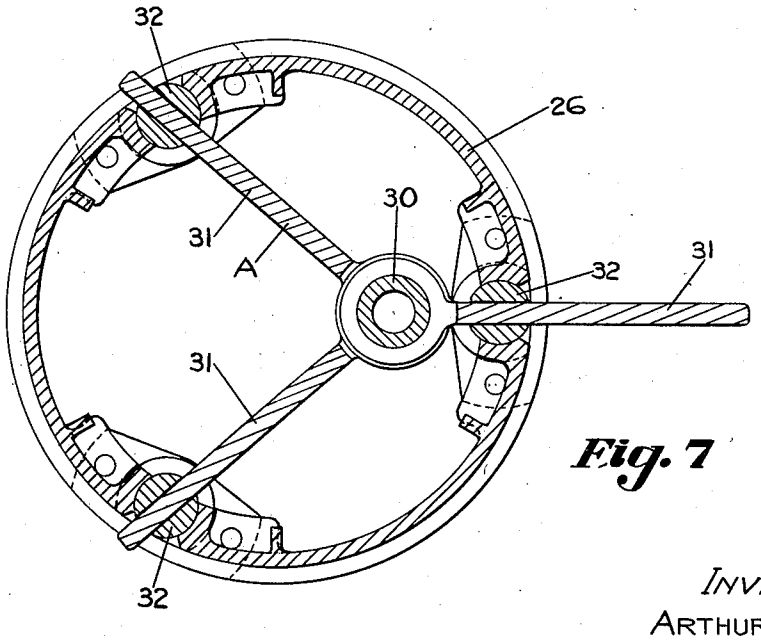


Fig. 7

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KERF CLEANER OR GUMMER

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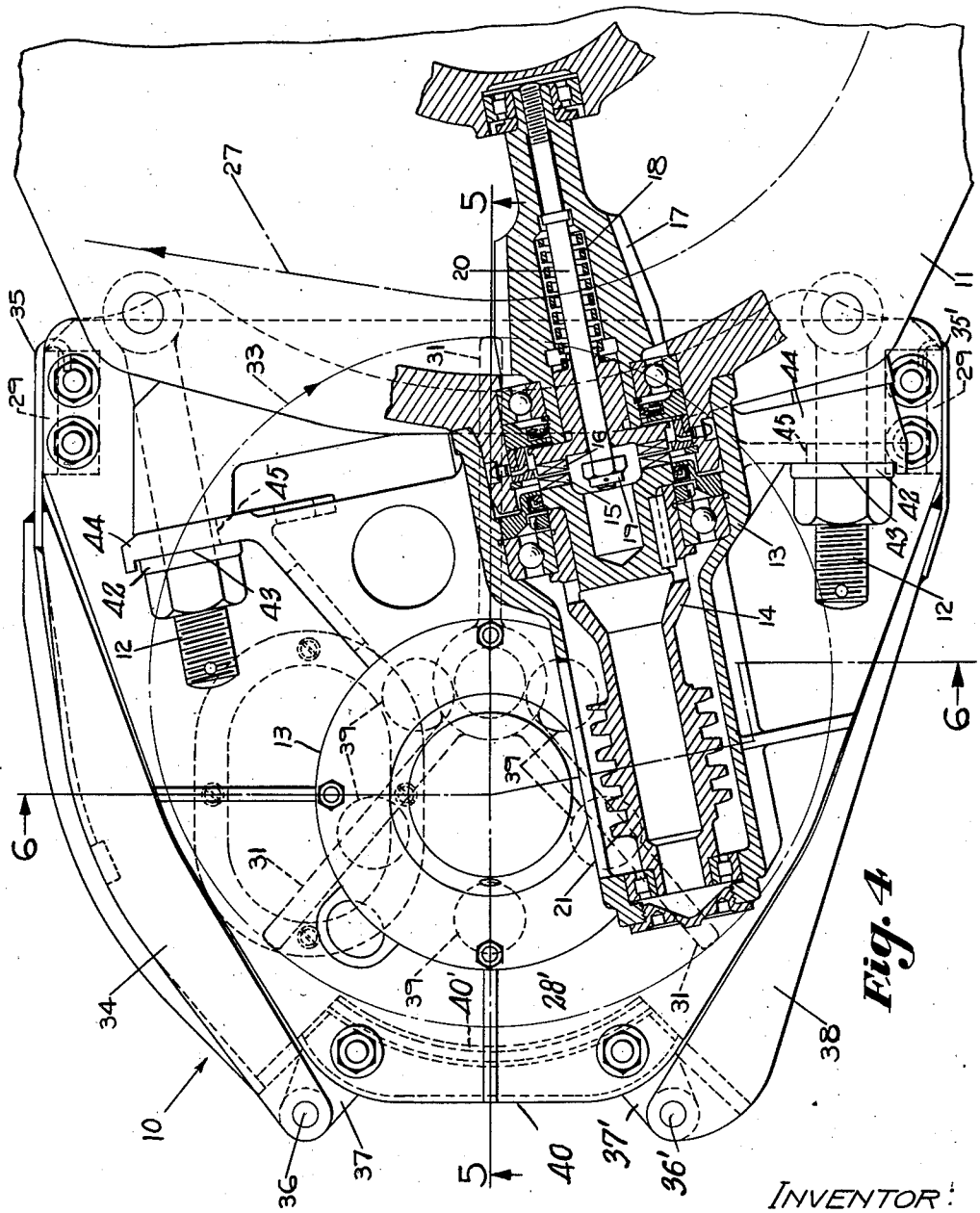


Fig. 4

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KERF CLEANER OR GUMMER

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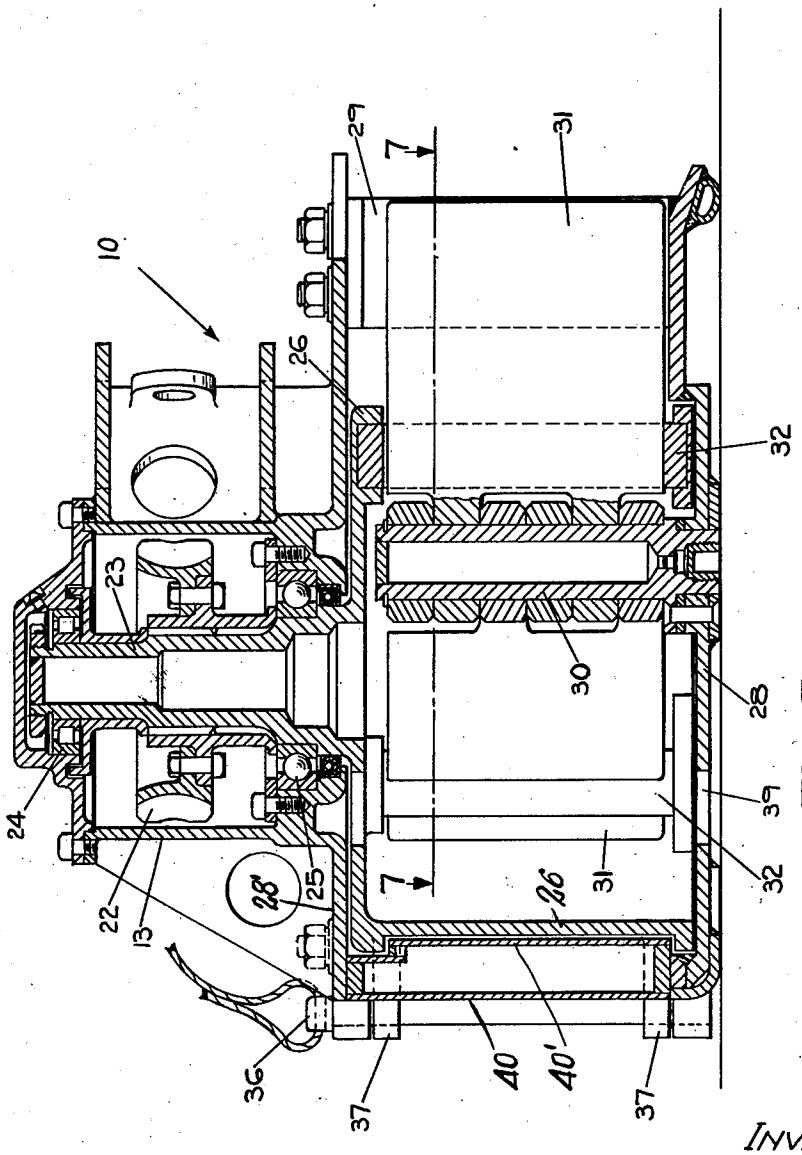


Fig. 5

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KERF CLEANER OR GUMMER

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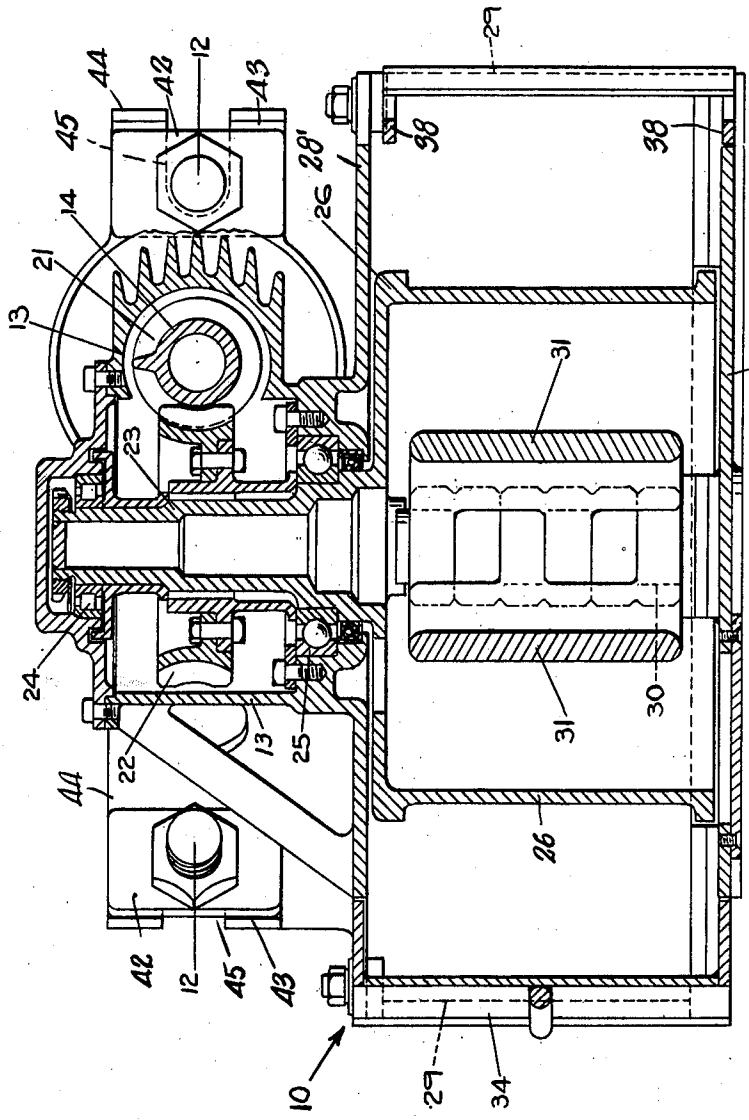


Fig. 6

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2,320,307

UNITED STATES PATENT OFFICE

2,320,307

KERF CLEANER OR GUMMER

Arthur Y. Saville, Wakefield, England, assignor to The Jeffrey Manufacturing Company, a corporation of Ohio

Application October 2, 1939, Serial No. 297,541
In Great Britain October 24, 1938

17 Claims. (Cl. 262—30)

This invention relates to kerf cleaners or gummers for use with coal cutting machines and has for its principal object to provide a device adapted to collect cuttings delivered by a cutter chain of a coal cutting machine and to deposit them clear of the cut while at the same time leaving the track of the machine comparatively clear.

Another object of the invention is to provide such a device which has a plurality of blades which are rotatable about a common axis, which axis is so disposed with respect to the cutter chain that on rotation said blades will be effective to sweep cuttings from the vicinity of said cutter chain.

Another object of the invention is to provide a device of the above mentioned type which is adapted to be disposed in proximity to the cutter chain and which includes a plurality of blades to which a rotary motion about a common axis may be imparted with means adapted to cooperate with said blades in such a manner that during complete revolution the effective area of each blade will vary between zero, or substantially zero, and a predetermined maximum, the maximum effective area being attained when the blade is brought to a position where its outer extremity is nearest the cutter chain.

A further object of the invention is to provide a device of the above mentioned type which includes a cowl or the like to which a rotary motion may be imparted and a plurality of blades mounted for rotation about a common axis which if offset with respect to the axis of rotation of the cowl, said blades being adapted to project through the cowl wall and so constructed and arranged that they will be progressively extended and retracted on rotation of said cowl.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings,

Figs. 1 and 2 are perspective views of a mining machine including the structure of my invention as seen from opposite sides thereof;

Fig. 3 is an enlarged view showing the apparatus of my invention removed from but closely adjacent to the head end of a mining machine to which it is to be attached;

Fig. 4 is an enlarged plan view of the mechanism of my invention shown attached to the head end of a mining machine with parts shown in section;

Fig. 5 is a sectional elevational view taken on the line 5—5 of Fig. 4 looking in the direction of the arrows;

Fig. 6 is a sectional elevational view taken on the line 6—6 of Fig. 4 looking in the direction of the arrows; and

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 5 looking in the direction of the arrows with parts omitted in the interest of clearness.

Referring to the accompanying drawings, it will be seen that the gummer or kerf cleaner comprises a self-contained unit designated generally by the reference character 10 which is adapted to be detachably secured to the head or cutting end of a coal cutting machine designated generally by the reference character 11, which coal cutting machine includes a laterally extending kerf cutter 111 constituting what is generally known in the art as a long wall type of mining machine.

The cutter bar 111 is provided with the conventional endless cutter chain 112 carrying picks or bits 113, which cutter chain 112 is driven from an electric motor carried by the main frame of the machine 11 in the manner well understood in the art.

The gummer 10 is detachably secured to the machine 11 by means of quick acting clamp screws 12, or any other similar means.

In the embodiment illustrated the unit comprises a gear casing 13 in which a shaft 14 is disposed, said shaft having a jaw clutch member 15 keyed thereto which is adapted when the unit is in position as shown in the drawings to cooperate with a corresponding jaw clutch member 16 associated with a bevel pinion 17 which is in turn adapted to mesh with the normal crown wheel of the coal cutter. The clutch member 16 is slidably mounted to allow for engagement and disengagement thereof with the member 15 but a driving connection is provided between said member 16 and the bevel wheel 17 through the medium of suitable splines or the like. A spring 18 is adapted normally to urge the clutch member 16 outwardly into its operative position, said spring also being adapted to provide for slippage in the event of an overload. The outward movement of the member 16 is limited when the gummer is detached by means of a nut 19 which is carried by a spindle 20. The shaft 14, to which the drive is thus transmitted when the gummer unit is mounted in position on the coal cutter, carries a worm 21 which latter is in turn adapted to mesh with a worm wheel 22 (Fig. 6) carried by

a vertical shaft 23 which constitutes the main shaft of the gummer unit. The shaft 23 is suitably journalled in bearings such as 24 and 25 and carries at its lower end a cowl 26 to which a rotary motion is imparted on rotation of said shaft 23 which is effected due to the worm 21 and worm wheel 22 on engagement of the jaw clutch members 15 and 16 and operation of the coal cutter.

It will be seen from the drawings that the cowl 26 will rotate about a vertical axis which is parallel to that about which the cutter chain indicated by a chain dotted line 27 is adapted to revolve. Disposed below the lower end of the cowl 26 is a plate or the like 28 which is connected to a flange-like portion or plate 28' of the casing 13 by means of suitable vertical plates or the like 29 which may be welded or otherwise secured to the plate 28 and connected at their upper ends to said flange-like portion by means of suitable bolts. Mounted on the plate 28 is a shaft 30 which is adapted to project into the cowl 26 and is so arranged as to be offset with respect to the axis of rotation of the latter, while being parallel to such axis as is clearly indicated in the drawings. Rotatably mounted on the shaft 30 are three blades 31, the arrangement being such that said blades are independent of each other and are each adapted to project through a separate slot formed in the cowl wall. In the embodiment illustrated a slotted trunnion 32 is disposed in each slot in the cowl wall and is adapted to receive and guide the blade projecting therethrough, the trunnions being supported in any suitable manner. On rotation of the cowl 26 the blades 31 will be rotated about the fixed shaft 30 due to the cooperation of said blades with the slotted trunnions but owing to the fact that the shaft 30 is offset with respect to the axis of rotation of the cowl the blades are caused to slide in and out of the slots in the trunnions as will be appreciated more clearly from Figure 7. Assuming, for example, that on commencement of rotation of the cowl 26 one of the blades 31, which is designated A in Figure 7, is so positioned that its outer edge is flush with the periphery of said cowl, then during rotation of the cowl the blade A will slide in its slot until it reaches a position diametrically opposite its starting position wherein it will project a maximum distance from the cowl. Upon rotation it will be retracted until at the completion of one revolution the tip of the blade is again flush with the periphery of the cowl.

When the unit is applied to the coal cutter the arrangement is such that the blades 31 will project the maximum distance from the cowl 26 at a point nearest the cutter chain which is indicated at 27 in Figure 4, in which latter the path of movement of the outer edges of the blades is indicated by a further chain dotted line 33. As the blades 31 are rotated away from the chain to sweep the cuttings from the path thereof they will be retracted into the cowl being caused to project again and to assume their operative position as they are again brought into the vicinity of said chain.

Removably mounted at one side of the gummer unit frame is a side guard 34 which is adapted to prevent cut coal from rolling into the return path of the blades. The guard 34 is adapted to be removably mounted on the unit and for this purpose it is provided at one end with hooks or the like 35 which are adapted to engage one of the vertical plates 29 in the manner shown in Figure 4, while at the opposite end it is secured by means of a pin 36 which is adapted to project through apertures in suitably disposed brackets 37 carried by the vertical plate 40 at the outer end of the unit. The guard 34 is, as above mentioned, detachable and may, if desired, be mounted on the opposite side of the unit if it is required to reverse the direction of cutting. On the other side of the gummer unit a directional chute or the like 38 of any suitable form may be provided which is mounted in a similar manner to the guard 34 and is also adapted to be transferred to the other side of said unit if the direction of cutting is reversed.

The chute 38 is shown in plan in Fig. 4 and in section in Fig. 6 which is a view taken on the line 6—6 of Fig. 4 looking in the direction of the arrows. It will become obvious by reference to these views that the chute 38 comprises horizontal plates spaced apart vertically and provided at their forward ends with hooks 35' which are adapted to engage one of the vertical plates 29 as shown in Fig. 4. The opposite ends of these plates are hinged to the pin 36' which is adapted to project through apertures in suitably disposed brackets 37' carried by the vertical plate at the outer end of the unit, as shown in Figs. 2, 3 and 4. It will thus be seen that the upper and lower plates of the chute 38 are in approximate horizontal alinement with the plates 28 and 28' of the unit and the wide open space between the upper and lower plates of the chute 38 affords free movement of the cuttings away from the unit without clogging where the blades 31 are in receded position shown in dotted lines at the left of Fig. 4. It should also be noted that the guard plate 34 has a large opening extending between the plates 28 and 28' where the blade 31 moves past the plate 40'. Such opening is shown in Fig. 2 and is for the purpose of eliminating fines or dust and prevent the latter from passing into the interior of the cowl 26.

With the arrangement illustrated in Figure 4, with the cutter chain moving in the direction of the arrow on line 27, the blades 31 will be rotated in the direction indicated by the arrow on the line 33 and will discharge the cuttings through the directional chute 38 it being noted that said blades are fully extended at the point nearest to the cutter chain. Preferably the plate 28 is provided with a plurality of holes or apertures 39 within the cowl 26 (Figs. 4 and 5) which are adapted to provide for free release of small holdings and dust which might otherwise accumulate in the inside of the cowl 26 and so impose an additional load on the mechanism.

The drive to the gummer unit may be imparted in many ways other than that described and illustrated but preferably the arrangement should be such that the gummer unit may be quickly and readily detached from the coal cutter when the latter has to be flitted or the picks changed although in certain cases access to the cutter picks may be provided by detaching a separate guard enclosing the cutter chain sprocket.

Fixed to the frame of the mining machine 11 is a bottom plate 41 spaced below the chain cutter driving sprocket and together with the plate 28 adapted to rest on and slide over the mine bottom during operation of the mining machine. Mounted on the swingable bolt 12 is a plate 42 which is adapted to fit against the face 43 of the bracket 44 which is rigidly secured to the top plate 28' of the unit 10. The bolt 12 is movable

into the slot 45 when the bottom plate 28 is fitted up against the adjacent edge of the bottom plate 41.

The rapid travel of the cutter bits as they travel around the chain driving sprocket throws the cuttings from the plate 41 to the plate 28 where such cuttings can be positively engaged by the advancing and retracting blades 31. In order to assure such throwing of all of the cuttings into the path of travel of the blades 31 it is preferable to close the open space shown in Fig. 3 between the plate 41 and the frame of the mining machine. The guard plate 46 is therefore provided as shown in Fig. 1. Spaced openings in this guard plate are fitted over the pins 47 which project from the mining machine frame and the other end of the guard plate 46 is fitted against the stop 48 at the bottom of the upright 29 as shown in Fig. 3. This may be done after the clamping bolt 12 has been adjusted to the position shown in Fig. 1.

A hook 49, as shown in Fig. 1, is connected by means of a turnbuckle 50 to the device 51 which is pivoted at 52 to the guard plate 46 intermediate the ends of the latter.

By comparing Fig. 1 with Fig. 4 it will be seen that the guard plate may serve to guide the cuttings onto the plate 28 into the path of the blades 31 before there is any tendency for the cutter bits to move the cuttings to the face of the mine vein. Therefore the cuttings will be taken hold of by the blades 31 before such cuttings tend to emerge from the mining machine frame adjacent the mine face. In a long wall operation the machine travels toward the right as viewed in Fig. 1 and the chain at the rear side of the cutter bar travels toward the left as viewed in Fig. 2. The presence of the guard plate 46 mounted as shown in Fig. 1 assures discharge of the cuttings behind the path of travel of the long wall mining machine.

The eccentric mounting of the blades 31 results in their having an accelerating motion as they sweep the cuttings away from the chain while at the same time they are angled forward to form a pocket which holds the cuttings against centrifugal force and increases the efficiency of operation. The cuttings discharged by the blades are piled neatly behind the machine, a pressure discharge being obtained so that as the cuttings are piled up behind the machine any additional material is forced in at the bottom of the pile already present whereby the dispersion of dust into the atmosphere is prevented. Furthermore, that there is no likelihood of any cuttings being returned to the cutter chain is owing to the fact that the blades retract into the cowl after discharge has been effected and also owing to the action of the blades the unit cannot become jammed by pieces of coal wedging between said blades and any other part of the structure. Finally, with a device constructed in accordance with the invention, reversal of the drive for either direction of cutting may be readily effected and it is possible for the tips of the blades when fully extended to be brought reasonably close to the picks on the cutter chain whereby the highest possible efficiency is obtainable.

The plates 40 and 40' form parts of a box-like structure clamped between the bottom and top plates 28, 28' of the supporting frame of the gummer or kerf-cleaner. The inclined face of such box-like structure as seen in Figs. 3 and 4 may serve as an abutment to counteract any tendency of the cuttings being swept along the inner face of the plate 40'. However, as indicated by the chain dotted line 33 in Fig. 4, the outer ends of the blades while moving in a clockwise direction, will not come in contact with the plate 40' but will move in close proximity thereto. The arrangement is such that the blades or flights will each reach out to a maximum extent when nearest the kerf-cutter as shown in Figs. 1 and 4. The blade 31 will then be at right angles to the outer surface of the drum 26. At such time the next succeeding blade will be withdrawn entirely from the cuttings since its projection from the drum is then substantially zero. Such zero position of the blade is reached as the withdrawn blade approaches the rearwardly and outwardly inclined abutment face of the box-like structure comprising the plates 40, 40'.

It will thus be seen that the blades act on the cuttings to positively move them away from the kerf-cutter without any tendency of moving such cuttings back toward the kerf-cutter. The withdrawal of the blades successively to zero positions precludes the carrying of the cuttings around back to the kerf-cutter even though the cuttings may pile up considerably where deposited by the blades. Even the newly formed cuttings positively pushed into piled up previously deposited cuttings can not cause carrying around of the cuttings back to the kerf-cutter because such action would be prevented by the rearwardly and outwardly inclined abutment face of the box-like structure comprising the plates 40, 40', such abutment face extending from top to bottom of the supporting frame between the bottom and top plates 28, 28'.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I therefore wish not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. In mining apparatus, the combination with a mining machine having a kerf cutter, of a cuttings cleaner adjacent said kerf cutter comprising a rotating blade, a cylindrical member through which said blade projects having a center axis spaced from the axis of rotation of said blade, means for rotating said cylindrical member and said blade whereby said blade successively projects and recedes relative to the cylindrical member to vary its effective sweeping area, said axes being so positioned that the effective sweeping area of said blade is a maximum when at substantially its nearest point to said kerf cutter and is substantially zero before reaching a diametrically opposite position.

2. In mining apparatus, the combination with a motor driven mining machine having a kerf-cutter provided with a chain cutter, of a unit for disposing of the cuttings produced by said chain cutter, means for detachably connecting said unit to the frame of said mining machine in position to receive the cuttings from said chain cutter, said unit comprising a cowl and an impeller movable relatively thereto with the impeller connected to the cowl to be driven thereby on an axis eccentric relative to the axis of the cowl, and means for driving said cowl from the motor on the mining machine when said unit is attached to the mining machine frame and

thereby effect operation of said impeller including movement thereof relatively to said cowl.

3. In mining apparatus, the combination with a motor operated mining machine having a kerf-cutter provided with a chain cutter, of a cuttings cleaner removably attached to the frame of the mining machine and comprising a drum and impeller means connected thereto to be driven thereby, and means for connecting said drum to the mining machine motor for operation thereby, said impeller means being mounted within said drum for variable projection therefrom.

4. In mining apparatus, the combination with a mining machine having a kerf-cutter provided with a chain cutter, of a cleaning unit connected to said mining machine for operation thereby and comprising flight means and a drum connected thereto to drive the same, and a guard pivoted to the frame of said unit on a vertical axis and provided with an opening near the pivot for egress of cuttings not removed by the flight means on the opposite side of the unit.

5. In mining apparatus, the combination of a mining machine having a kerf-cutter provided with a chain cutter, and a cleaning unit connected to said mining machine for operation thereby and comprising a flight means and a cowl connected thereto to drive the same, said cowl means being mounted on a frame having a horizontal bottom plate in position to slide over the mine bottom with openings in such bottom plate within the cowl for egress of cuttings entering such cowl from said plate.

6. In mining apparatus, the combination with a mining machine having a kerf cutter, of a supporting frame connected to said mining machine, a rotary flight, and means for imparting a rotary motion to said flight while varying its cuttings sweeping area from substantially zero to a predetermined maximum to effect positive movement of the cuttings away from the kerf cutter, the maximum effective area of the flight being attained when the outer extremity of the flight is nearest the kerf cutter, and the zero area being reached when the cuttings are remote from the kerf cutter.

7. In mining apparatus, the combination with a mining machine having a kerf cutter, of a rotary cowl, a plurality of blades projecting through said cowl to present working areas, mechanism for supporting said blades for rotation on an axis offset with respect to the axis about which the cowl rotates, and means for rotating said cowl to effect rotation of said blades on their offset axis and thereby project the blades to a maximum extent when adjacent to the kerf cutter and thereafter withdraw the blades from the cuttings successively.

8. In mining apparatus, the combination with a mining machine having a chain kerf cutter, of a support connected to said mining machine, a cylindrical member mounted on said support to rotate relatively thereto on an upright axis, a plurality of blades mounted to rotate on a single upright axis spaced from said first-named upright axis, said blades projecting through the peripheral portion of said cylindrical member, and means for rotating said cylindrical member on its axis to effect rotation of the blades on their said single upright axis and to cause said blades to successively project from the cylindrical member to a maximum extent when adjacent the kerf cutter and then to recede when the blade sweeps the cuttings away from the kerf cutter.

9. In mining apparatus, the combination with a mining machine having a chain kerf cutter, of a support connected to said mining machine, a cylindrical member mounted on said support for rotation relatively thereto on a vertical axis, a blade mounted to rotate on a vertical axis spaced from said first-named vertical axis and projecting through the peripheral portion of said cylindrical member, means for rotating said cylindrical member to effect successive projection and recession of said blade relatively to said cylindrical member to vary the effective sweeping area of the blade, the blade being projected to its maximum when near said kerf cutter and to a minimum when farthest from said kerf cutter, and an abutment on said support to prevent cuttings being swept by the blade beyond its position of minimum projection.

10. In mining mechanism, the combination with a mining machine having an endless chain cutter, of a supporting frame connected thereto to move bodily therewith, a drum mounted in said frame to rotate relatively thereto on a vertical axis, a cuttings sweeping blade mounted to rotate on another vertical axis and associated with said drum so that its gathering face will swing toward the surface of the drum as the blade sweeps past its closest position with respect to the chain cutter, and means for effecting rotation of the drum and of the blade in a direction to effect removal of the cuttings from the chain cutter.

11. In mining apparatus, the combination with a motor driven mining machine adapted to rest on and slide over a mine bottom and including a chain kerf cutter, of a supporting frame adapted to rest on such mine bottom, means connecting said supporting frame to the mining machine to slide over the mine bottom therewith, a drum mounted on said supporting frame to rotate relatively thereto on a vertical axis, a cuttings impeller associated with said drum and pivoted to said frame to rotate on a vertical axis fixed relative to said frame and spaced from the vertical axis of the drum, and means operable from the motor of the mining machine to secure rotation of the drum and rotation of the impeller on their spaced vertical axes to secure a variable sweeping action of said impeller to move cuttings away from said kerf cutter.

12. In a mining machine, the combination with a frame carrying a kerf cutter, of a positive action cuttings cleaner adjacent said kerf cutter for removing cuttings, said cleaner comprising a rotary flight, and means for varying the effective working area of said flight from a maximum to a minimum during each rotation thereof.

13. In mining apparatus, the combination with a mining machine having a chain kerf-cutter, of a cuttings cleaner including sweeping means mounted for rotation on a vertical axis in combination with mechanism for controlling said sweeping means to sweep the coal cuttings away from the chain cutter by positive movement in a horizontal direction without moving the swept cuttings back toward the kerf-cutter, mechanism for connecting said cuttings cleaner to said mining machine to move bodily therewith, and means for connecting said cuttings cleaner to said mining machine for operation from the latter, the construction and arrangement being such that when the sweeping means is rotated on a vertical axis the said controlling mechanism renders said sweeping means inac-

tive as it returns toward said kerf-cutter so as to leave the swept cuttings remote from the kerf-cutter and not move any back toward the kerf-cutter.

14. In mining apparatus, the combination with a mining machine having a chain kerf-cutter, of a cuttings cleaner comprising a sweeping blade and a rotary device associated therewith to effect reciprocation of the blade relatively to said device to positively move the cuttings away from the kerf-cutter and then withdraw from the cuttings to leave them remote from the kerf-cutter without sweeping them back toward the kerf-cutter, mechanism for connecting the cleaner to the mining machine in position for said sweeping blade to reach for the cuttings from the kerf-cutter, and means for operating the cleaner from the mining machine by rotating said device to effect reciprocation relatively thereto of said sweeping blade.

15. In mining apparatus, the combination with a mining machine having a chain kerf-cutter, of a cleaner including a rotary abutment with a plurality of blades associated therewith for reciprocation relatively thereto, said cleaner also including means for rotating said abutment and reciprocating said blades relatively thereto, and mechanism for connecting said cleaner to said mining machine in position for said blades to sweep the coal cuttings from the kerf-cutter by positive action without moving any cuttings back toward said kerf-cutter.

16. In a mining machine, the combination with a frame carrying a kerf-cutter, of a positive action cuttings cleaner adjacent said kerf-cutter for moving cuttings, said cleaner comprising a rotary flight, a rotary drum with the said flight associated therewith to reciprocate relatively thereto, and means for operating said drum and flight to vary the effective working area of the flight from a maximum to a minimum during each rotation of the drum.

17. In a mining machine, the combination with a frame carrying a kerf-cutter, of a positive action cuttings cleaner adjacent said kerf-cutter for removing cuttings, said cleaner comprising a rotary drum with a flight associated therewith to reciprocate outwardly and inwardly relatively to the periphery of the drum, and means for rotating said drum and effecting such reciprocation to vary the effective working area of the flight from a maximum to a minimum during each rotation of the drum.

ARTHUR Y. SAVILLE.

CERTIFICATE OF CORRECTION.

Patent No. 2,320,307. May 25, 1943.

ARTHUR Y. SAVILLE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 54, for "holdings" read --holings--; page 5, second column, line 9, claim 16, for "moving" read --removing--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of April, A. D. 1944.

Leslie Frazer

(Seal) Acting Commissioner of Patents.