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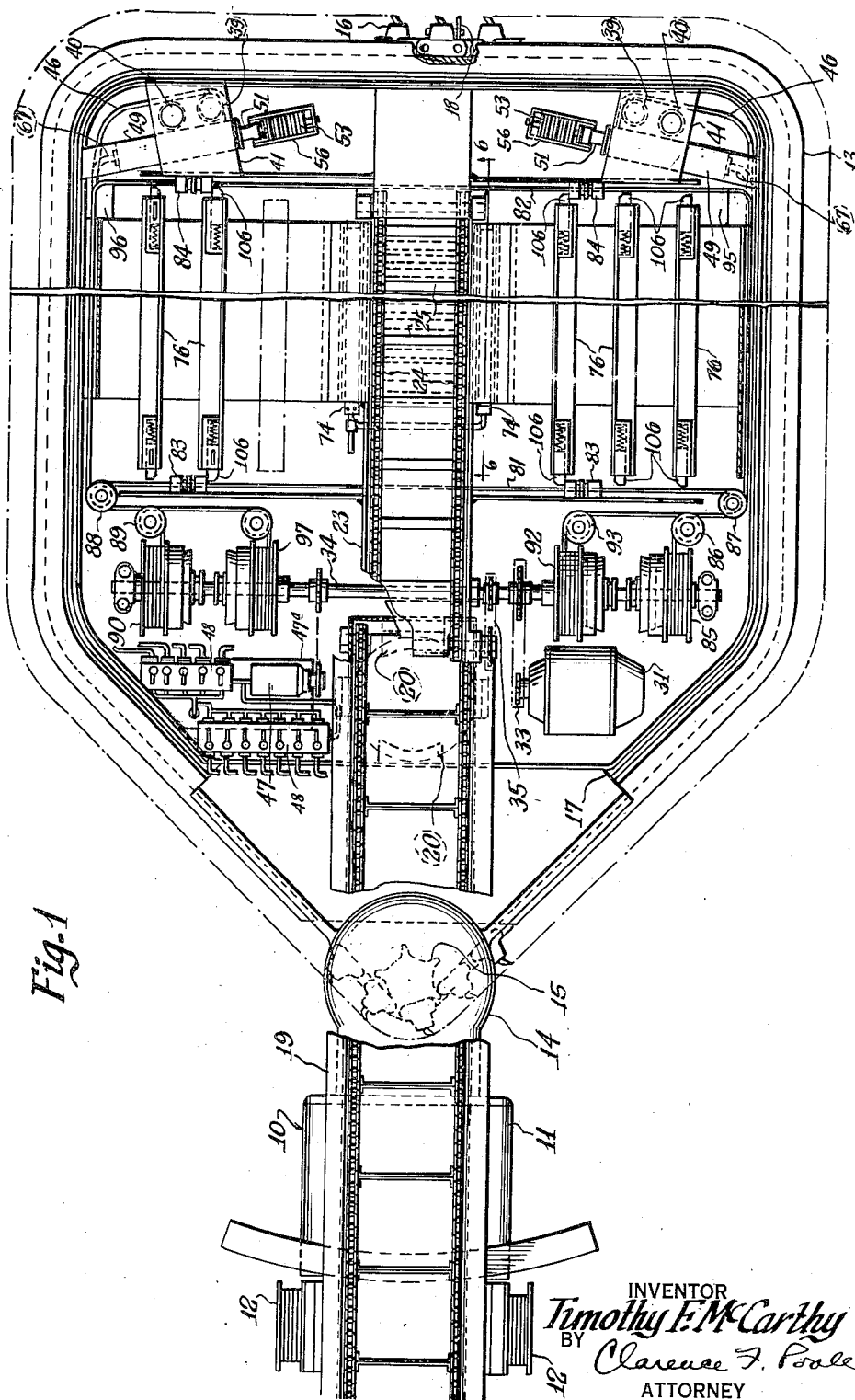
T. F. McCARTHY

2,257,181

COMBINED CUTTING AND LOADING MACHINE

Filed Nov. 24, 1939

3 Sheets-Sheet 1



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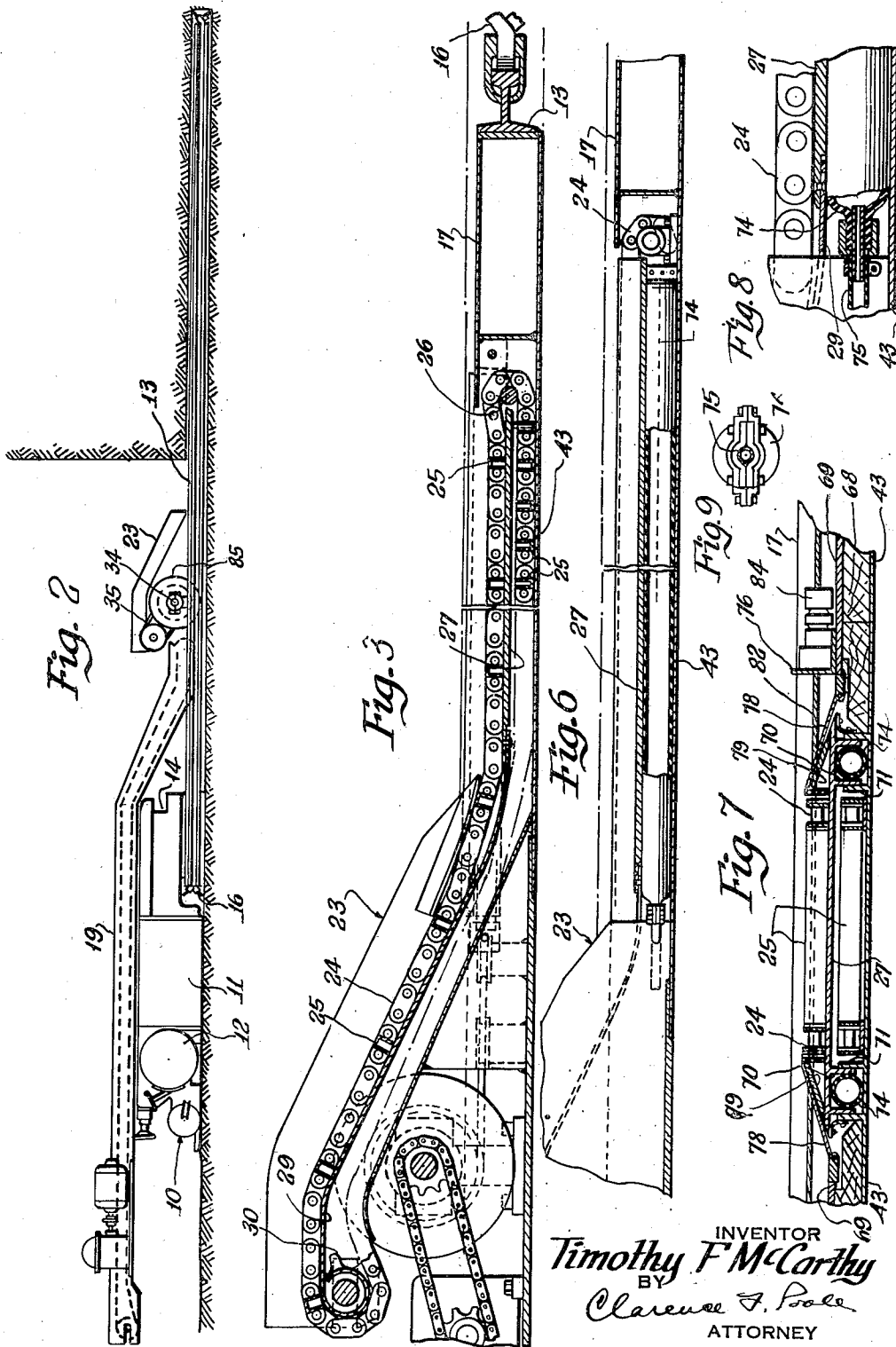
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3 Sheets-Sheet 2



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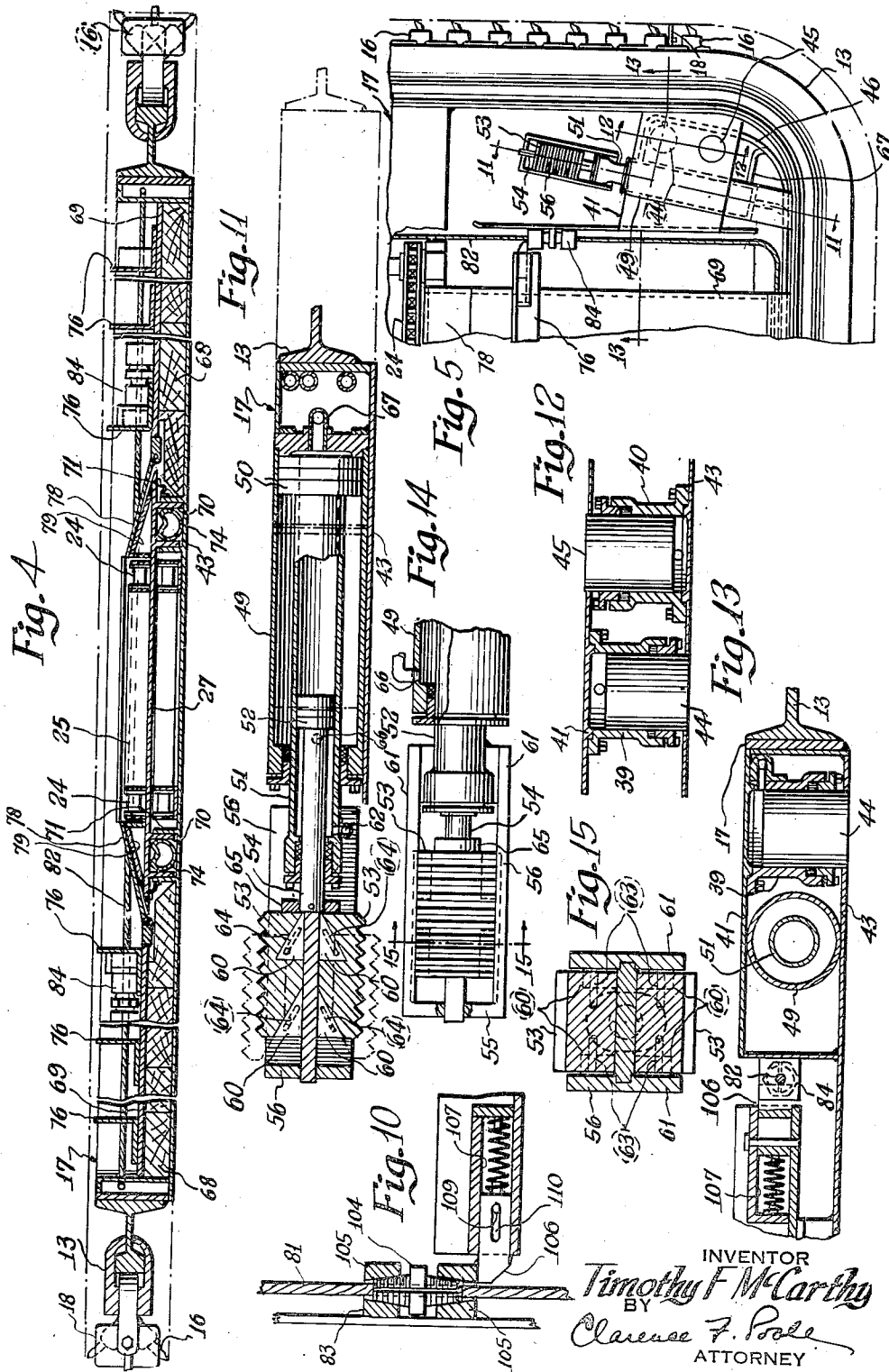
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COMBINED CUTTING AND LOADING MACHINE

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3 Sheets-Sheet 3



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COMBINED CUTTING AND LOADING
MACHINE

Timothy F. McCarthy, Indiana, Pa.

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18 Claims. (Cl. 262—29)

This invention relates to improvements in combined cutting and loading machines and has as its principal objects to provide a novel and simplified form of combined cutting and loading machine particularly adapted to drive entries or rooms in thin measures of coal, which will both undercut and remove the coal from the working face.

A more specific object of my invention is to provide such a machine having an undercutting cutter bar of a width sufficient to cut an entire mine entry or room in one cutting operation, which cutter bar has a novel form and arrangement of conveying apparatus mounted thereon, adapted to withstand the fall of the undercut coal, and so arranged that as the broken down undercut coal is conveyed away from the center of the machine, the coal on the sides of the machine may be progressed towards the center of the machine and then be conveyed away from the machine.

Other objects of my invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a plan view of a combined cutting and loading machine constructed in accordance with my invention, with certain parts broken away and certain other parts shown in horizontal section;

Figure 2 is a diagrammatic view in side elevation of the machine shown in Figure 1, with the cutter bar shown under a coal seam;

Figure 3 is an enlarged fragmentary view in side elevation of the forward part of the machine, with certain parts shown in longitudinal section, in order to more clearly show certain details of the central conveyor;

Figure 4 is an enlarged transverse sectional view taken through the cutter bar and frame therefor;

Figure 5 is an enlarged detail view showing a portion of the forward end of the cutter bar in plan;

Figure 6 is a fragmentary longitudinal sectional view taken substantially along line 6—6 of Figure 1;

Figure 7 is a fragmentary transverse sectional view taken through the cutter bar, showing the central conveyor in a vertically extended position;

Figure 8 is an enlarged partial fragmentary longitudinal sectional view taken through the machine, showing certain details of the means for vertically extending the central conveyor;

Figure 9 is an enlarged detail end view of the means for vertically extending the central conveyor;

Figure 10 is an enlarged detail view showing certain details of the connection to successive transversely movable flights, for progressively moving said flights towards the central conveyor;

Figure 11 is an enlarged sectional view taken substantially along line 11—11 of Figure 5;

Figure 12 is an enlarged sectional view taken substantially along line 12—12 of Figure 5;

Figure 13 is an enlarged sectional view taken substantially along line 13—13 of Figure 5;

Figure 14 is an enlarged fragmentary plan view showing certain details of the lateral swinging mechanism for the cutter bar; and

Figure 15 is an enlarged transverse sectional view taken substantially along line 15—15 of Figure 14.

Referring now in particular to the embodiment of my invention illustrated in the drawings, a machine feeding and cutter chain driving element 10 is provided, which may be similar to the cutter chain driving and feeding element of an ordinary room and pillar or longwall mining machine, and which includes a motor 11 resting directly on the ground on its bottom. The feeding mechanism is herein shown as being secured to the rear end of said motor and as including the usual winding drums 12, 12 on opposite sides of the apparatus. Said winding drums are each adapted to have a flexible cable wound thereon, for moving the machine about the mine and feeding and sumping a cutter bar 13 into the coal in a usual manner. Said feeding mechanism is driven from the motor 11 in a manner well known to those skilled in the art, and is no part of my present invention so is not herein shown or described in detail.

The cutter bar 13 extends around a frame 17, which is adapted to rest on the ground on its bottom. Said last mentioned frame has vertical pivotal connection with the forward end of a frame 14, which projects forwardly from the motor 11 and forms a housing and bearing support for the cutter chain drive mechanism, to permit pivotal movement of said frame and cutter bar about the axis of a sprocket 15. Said sprocket meshes with and drives a cutter chain 16 about said cutter bar. The drive to said sprocket and the pivotal mounting of the frame 17 on the frame 14 is not herein shown or described in detail, since it is no part of my present invention.

The kerf is cleared of cuttings to prevent their accumulation under the frame 17 as the machine

advances into the coal, by means of scrapers 18, 18, herein shown as being secured to certain blocks of the cutter chain (see Figure 1).

A conveyer 19 extends over the motor 11 and beyond the rear end of the feeding and cutter chain driving element 10, and has a receiving end which is mounted on the frame 17, for turning movement with respect thereto about a vertical axis. As herein shown, the receiving end of the frame for said conveyer is flanged and of a circular construction, and is adapted to be engaged by retaining flanges 20, 20 mounted on the frame 17, to permit swiveling of said conveyer, so material may be distributed to one side or the other of the machine (see Figure 1).

A conveyer 23 is mounted in the central portion of the frame 17 and extends rearwardly therealong. Said conveyer has an upwardly inclined discharge end, which is adapted to discharge material onto the receiving end of the conveyer 19. Said conveyer is herein shown as being a flight conveyer including a pair of parallel spaced endless chains 24, 24 connected together by spaced apart flights 25, 25. Said chains and flights are trained around a direction changing device 25, adjacent the forward end of said cutter bar, which direction changing device is herein shown as being of a relatively small diameter, to permit the conveyer to change its direction of travel within the vertical limits of the frame 17. From said direction changing device, said chains extend rearwardly along a bottom plate 27, which is vertically movable, so that said bottom plate may rest on the lower flights of the conveyer during the shooting operation. The details of said bottom plate and the means for raising or lowering it will hereinafter be more fully described as this specification proceeds.

It should here be noted that the flights 25, 25 are spaced more closely together for a portion of the length of the chains 24, 24 than for the remainder of the length of said chains (see Figure 1). The purpose of so spacing these flights is to permit the closely spaced flights to be positioned directly under the bottom plate 27 during the cutting operation, so they may form a more rigid support for said bottom plate.

The chains 24, 24 extend from said bottom plate along an upwardly inclined plate 29, which has a flexible forward end, which is slidably secured to the rear end of the plate 27, to permit vertical movement of said bottom plate with respect to said inclined plate. Drive sprockets 30, 30, disposed at the rear end of the frame for said conveyer, are provided to drive said conveyer. Said drive sprockets and conveyer are driven from a motor 31, mounted on the frame 17. The drive from said motor to said sprockets includes a chain and sprocket drive 33, a transversely extending shaft 34 driven therefrom, and a chain and sprocket drive 35, for driving said drive sprockets from said shaft.

Referring now in particular to the means for raising or lowering the forward end of the cutter bar 13, to position it for cutting, or to free it in case it becomes bound in the coal seam, and the means for moving said cutter bar laterally about the axis of the sprocket 15, a pair of hydraulic cylinders 39 and 40 is mounted adjacent the forward end of the frame 17, within the vertical boundaries thereof and adjacent each side thereof (see Figures 1 and 5). The cylinders 39, 39 are secured to and depend from upper plate members 41, 41 of said frame, while the

cylinders 40, 40 are secured to lower plate members 43, 43 of said frame.

Each cylinder 39 has a piston 44 mounted therein, which extends through a suitable aperture formed in the lower plate 43, and which is adapted to engage the ground and lift the forward end of said cutter bar, upon the admission of fluid under pressure to the head end of said cylinder.

Each cylinder 40 has a piston 45 mounted therein which is adapted to extend through the upper plate 41 and engage the top of the kerf and move the cutter bar 13 in a downward direction, upon the admission of fluid under pressure to the head end of said cylinder. The purpose of this piston is to lower the cutter bar where there is a tendency for it to climb in the kerf and to break up or loosen material which may be lodged on the forward end of the cutter bar after the shooting operation.

Fluid under pressure may be admitted to and released from the cylinders 39, 39 and 40, 40 by means of suitable fluid pressure valves generally indicated by reference character 48, and piping 46, 46 extending along the inner margins of the cutter bar. A fluid pressure pump 47, driven by the motor 31 through the shaft 34, is provided to effect pressure in the system. Said pump is herein shown as being mounted on a fluid storage tank 47a. Said valves may be of any desired type, but are preferably three-way valves so arranged as to permit fluid under pressure to be admitted into the respective cylinders, to which they are connected, when in one position, to hold pressure in said cylinders, when in another position, and to permit fluid to be exhausted from said cylinders, when in a third position. Said valves, piping, pump and tank may be of any ordinary construction and are not herein shown or described in detail since they form no part of my present invention.

The cutter bar 13 is moved laterally about the axis of the cutter chain drive sprocket 15 by means of a pair of fluid pressure cylinders 49, 49, one of which cylinders is mounted at one side of the cutter bar adjacent the cylinders 39 and 40, and the other of which cylinders is mounted at the opposite side of said cutter bar adjacent the other cylinders 39 and 40. Said side swinging cylinders are disposed within the vertical limits of the cutter bar, and are disposed at an angle which is substantially tangent to the arc about which said cutter bar swings. The construction and operation of each side swinging device is the same, so one only need herein be described in detail.

A piston 50 is mounted within the cylinder 49 (see Figure 11). Said piston is a double acting piston, and has a hollow piston rod or cylinder 51 projecting therefrom and extending beyond and slidably mounted in the end of the cylinder 49. Said hollow piston rod has a piston 52 slidably mounted therein, which is adapted to actuate a pair of gripping shoes 53, 53 through a piston rod 54 extending forwardly from said piston. Said piston rod, as herein shown, has a rectangularly formed end which is guided in an end 55 of a guide frame 55 and said piston rod has a widened portion slidably guided between the sides of said guide frame, on which the gripping shoes 53, 53 may rest when in an inoperative position. Said squared and widened portions may be separate parts, but are herein shown as being formed integral with said piston rod. Said guide frame 55 extends rearwardly along the cylinder 51, and is

secured thereto so that the piston 52 and rod 54 may move relative to said cylinder. The gripping shoes 53, 53 are mounted in the guide frame 56 and one of said shoes is adapted to engage the ground, while the other of said shoes is adapted to engage the top of the kerf. Said shoes have 5
triangularly formed recesses in the inner sides thereof, which are adapted to engage and fit over wedge shaped blocks 60, 60, projecting inwardly from sides 61, 61 of the guide frame member 56. 10
A pair of spaced pins 63, 63 are mounted in said blocks and project inwardly therefrom. Said pins are adapted to engage slots 64, 64 formed in said blocks and disposed at angles parallel to the inclined surfaces of said blocks.

A collar 65, herein shown as being of an oval formation so it will pass between the blocks 60, 60, is secured to the piston rod 54, adjacent the inner ends of the engaging shoes 53, 53 and is adapted to engage said shoes. Thus, when the 20
piston 52 moves outwardly with respect to the cylinder 51, the collar 65 engaging the shoes 53, 53 will simultaneously move said shoes in a forward and outward direction to engage the top and bottom of the kerf.

The hollow piston rod or cylinder 51 communicates with the head end of the cylinder 49, and when fluid under pressure is admitted to the head end of the cylinder 49, it will pass to said hollow piston rod 51 and engage the head end 30
of the piston 52. A port 67 leads to the head end of the cylinder 49. A port 66 leads to the piston rod end of said cylinder. When the port 66 is closed by its associated control valve to hold pressure in the piston rod end of said cylinder, 35
and fluid under pressure is admitted to the head end of said cylinder, the piston 52 will move outwardly with respect to said hollow piston rod or cylinder. Upon such movement of said piston, the collar 65 will engage the inner ends of the engaging shoes 53, 53, causing said shoes to move 40
in a forward and outward direction with respect to the guide frame 56 and to engage the top and bottom of the kerf cut by the cutter chain 16. When said shoes have been firmly engaged with the top and bottom of the kerf, the port 66 is 45
opened and fluid under pressure entering the port 67 will cause the cylinder 49 to move along the piston 50 in a direction away from said clamping shoes. This will move the entire cutter bar about the axis of the sprocket 15 in an obvious manner. The pistons 50 on each side of 50
the cutter bar are independently controlled so one piston can be used to swing the cutter bar in one direction, and the opposite piston can be used to swing it in an opposite direction. Fluid 55
under pressure is admitted to said pistons by means of suitable piping leading from the valve manifold 48 and controlled by suitable valves in said manifold in a usual manner which, as has been described before, are preferably three-way valves. Said clamping shoes are returned to a 60
normal disengaged position by the admission of fluid under pressure to the piston rod ends of the cylinders 49 and 51 through the port 66 and a port 62 in the piston rod end of the cylinder 51. If it is desired to swing the cutter bar 13 a greater distance than the length of stroke of the piston 50, the gripping and swinging operation may be repeated step by step until said cutter 70
bar is in the desired position.

Referring now in particular to the novel form of construction of the central conveyer 23 and the means for moving material transversely along the frame 17 and depositing it upon said con-

veyer, the bottom plate 43 of the frame 17 has wood planking generally indicated by reference character 68 mounted on the upper side thereof. Plates 69, 69 are mounted on the upper surface 5
of said planking on opposite sides of said central conveyer and form a platform upon which the coal is deposited and along which it may be moved onto the central conveyer 23. This construction provides a relatively solid frame, which 10
will carry the weight of the coal as it is broken down on the top of said platform.

The bottom plate 27 of the conveyer 23 is provided with two pairs of spaced apart depending channelled guides 70, 70, disposed outside of the 15
chains 24, 24. Each of said guides is slidably guided in a channelled guide 71 projecting upwardly from the bottom plate 43. The guides 70, 70 and the top of the plate 43 form a parallel spaced longitudinally extending receptacle for an 20
expandable tube 74, to hold said tube against lateral expandable movement. Said tube is closed at its forward end in a suitable manner and is provided with a port 75 at its rear end, to permit fluid under pressure to be admitted to said tube. 25
The tubes 74, 74, being guided against lateral displacement by the guides 70, 70, when expanded, will thus elevate the bottom plate 27 of the conveyer, and when fluid under pressure is released therefrom will permit said bottom plate 30
to be lowered and rest on the lower flights of the conveyer, to form a solid bottom for said conveyer during the shooting operation (see Figures 4 and 7). Suitable stops (not shown) are provided to limit vertical movement of said bot- 35
tom plate.

Material is moved in a sidewise direction onto the centrally disposed conveyer 23 by means of a plurality of scrapers or flights 76, 76, mounted for transverse slidable movement along the plat- 40
forms formed by the plates 69, 69, towards the central conveyer 23. Inclined plane surfaces are provided on opposite sides of said central conveyer to form approaches to said conveyer so that the coal may be moved over the chains 24, 45
24 onto said conveyer. Said inclined plane surfaces consist of inclined plates 78, 78, extending along opposite sides of the bottom plate 27 and herein shown as being hinged to the inner ends of the plates 69, 69. Said inclined plates slidably 50
rest on inclined support members 79, 79, mounted on the bottom plate 27. Said bottom plate may thus be elevated with respect to the plates 69, 69.

Each flight 76, as herein shown, is formed from an angle adapted to rest on the plate 69 55
on one leg thereof and have its vertical leg facing the central conveyer 23. Said flights are adapted to be placed on the plates 69, 69, before the cutting operation, and said flights are adapted to be removed from said plate after they have deposited their load onto the central conveyer 60
23, and enough material has been removed by said conveyer to permit access to said flights.

A pair of flexible cables 81 and 82 is provided to advance the flights 76 towards the conveyer 65
23 by means of grip blocks 83 and 84, mounted on respective of said cables, and adapted to engage the ends of said flights.

The cable 81 is wound, at one of its ends, on a winding drum 85 freely mounted on the trans- 70
versely extending shaft 34, adjacent the outer end thereof. Said cable extends from said winding drum around a sheave 86, to the outer side of the frame 17, and around a sheave 87, and transversely across said frame to and around 75
sheaves 88 and 89, and is wound on a winding

drum 90, disposed adjacent the end of said shaft opposite from the drum 85.

The cable 82 is wound on a winding drum 92, freely mounted on the shaft 34 inwardly of the winding drum 85. Said cable is trained to the outer side of the frame 17 by means of the sheave 87 which has a plurality of vertically spaced guide grooves formed therein, and forwardly along said frame to a shoe 95. From thence it is trained across said frame to a shoe 96 and thence rearwardly along said frame and inwardly to a winding drum 97, disposed inwardly of the winding drum 90, and is wound on said drum. Said winding drums, as herein shown, are selectively connected to the shaft 34 by means of suitable friction cone clutches, and said cables are oppositely wound on opposite winding drums so that cable will be payed off one drum as it is wound on the other, when power is applied to both winding drums. The clutches for operatively connecting said winding drums with the shaft 34 are operated by a suitable system of levers (note shown) which are so arranged that all of said winding drums may be simultaneously driven from the shaft 34, to move both cables uniformly across the frame 17.

The grip blocks 83 and 84 are of a similar construction so one only need herein be described in detail. The grip block 83 comprises a pair of cable clamping members 104, 104 having tapered threaded ends and clamped to the cable by tapered nuts 105, 105 threaded on opposite ends thereof. Said nuts are adapted to abut the ends of the flights 76, to successively move said flights across the frame 17 upon movement of said clamping members.

In order that the grip blocks 83 and 84 will pass by the flights 76 when moved in a direction away from the central conveyer 23, the ends of said flights are herein shown as being yieldable. The yieldable end of each of said flights includes a spring pressed member 106 slidably guided in a box-like guide 107 formed in the ends of each flight 76. Said spring pressed member is retained in said guide by a pin 109, extending through a slot 110 formed in said member. The forward face of said spring pressed member is tapered. Thus when the grip blocks 83 and 84 move towards the outer side of the frame 17, said grip blocks will press the members 106, 106 inwardly and pass by the respective flight 76, said flight being held from movement by the weight of the coal thereon. When said grip blocks move in an opposite direction, they will abut the rear faces of said members and move the flights 76 therewith. As said flights are moved upwardly along the inclined approach 78 by said grip blocks, they will lift out of engagement with said grip blocks due to the diverging angle of travel of said flights and grip blocks.

The flights 76, 76 may thus be successively moved towards the central conveyer 23 by the flexible cables 81 and 82. When each flight is disposed adjacent said conveyer, it is automatically released from the grip blocks 83 and 84, and after said conveyer has loaded enough material which has been deposited on it by said flight, to permit access to said flight, said flight may be removed from the platform 69 either by hand, or by any other suitable means.

Referring now in particular to the use and operation of the device of my invention, the machine is positioned for cutting in a mine entry with the forward end of the cutter bar disposed adjacent the coal face by means of the winding

drums 12, 12 and the flexible cables thereon, in the usual manner. The conveyer 23 is moved to position the closely spaced flights 25, 25 directly under the bottom plate 27 and pressure is released from the expansible tubes 74, 74 to permit said bottom plate to rest on said flights. The flights 76 are then placed on the platforms 69, 69 in the proper position and the cutter chain 16 is connected with the motor 11 and driven about the cutter bar 13. The cutter bar and chain are advanced under the coal face to cut a kerf thereunder by means of the cables on the winding drums 12, 12, in the usual manner. When said cutter bar has advanced into the kerf the required distance, the coal is broken down on said platforms and conveyer by powder, or by any other coal breaking arrangement.

After the breaking down operation, the bottom plate 27 of the conveyer 23 is elevated to a normal position by the expansible tubes 74, 74 and held in such a position by said tubes. Said central conveyer is then put in operation and the coal thereon is discharged onto the conveyer 19, and discharged from said last mentioned conveyer into suitable material carrying receptacles, such as mine cars or a conveyer of any well known form. After the conveyer 23 has conveyed away the coal resting on its upper surface, the flights 76, 76 are progressively moved towards said conveyer, for moving the coal resting on the plates 43, 43 onto said central conveyer.

One flight 76 is then moved towards said central conveyer by the grip blocks 83 and 84, for advancing the coal in front of it towards said central conveyer. As said flight approaches said central conveyer it is advanced upwardly along the inclined approach 78 and lifts out of engagement with said grip blocks, which continue to move in a horizontal plane. When the coal, deposited on said central conveyer by said flight, is conveyed away from the face to a point where access to said flight may be attained, said flight is then removed, preferably by hand. After said flight has been removed the flight on the opposite side of the conveyer is moved towards said central conveyer by the opposite grip blocks 83 and 84. This operation is repeated until all of the coal has been loaded out of the working place.

It may thus be seen that a simplified form of cutting and loading machine has been provided which is so constructed that the coal may be shot down on and conveyed away from the cutter bar by means of a central conveyer extending therealong, which is fed by transversely moving flights, and that the machine is of a simple, rugged and compact construction, so arranged that the machine frame and conveyers may withstand the weight of the fall of the undercut coal thereon.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, the thickness of said frame being such as to permit it to advance into the kerf cut by

said cutter chain during the cutting operation, a conveyer extending rearwardly along the central portion of said frame, said conveyer being so constructed as to withstand the fall of a body of coal thereon and the upper and lower runs thereof being of less vertical height than said frame, and longitudinally extending flights on said frame on opposite sides of said conveyer, movable transversely of said frame towards said conveyer, for loading the fallen coal onto said conveyer.

2. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, the thickness of said frame being such as to permit it to fit in the kerf cut by said cutter chain, a conveyer extending rearwardly along the central portion of said frame, said conveyer being so constructed as to withstand the fall of a body of coal thereon and the upper and lower runs thereof being of less vertical height than said frame, a plurality of longitudinally extending removable flights mounted on said frame on opposite sides of said conveyer and adapted to move material transversely of said frame onto said conveyer, and means for progressively moving said flights toward said conveyer.

3. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, the thickness of said frame being such as to permit it to fit in the kerf cut by said cutter chain, a conveyer extending rearwardly along the central portion of said frame, said conveyer being so constructed as to withstand the fall of a body of coal thereon and the upper and lower runs thereof being of less vertical height than said frame, a plurality of longitudinally extending removable flights mounted on said frame on opposite sides of said conveyer and adapted to move material transversely of said frame onto said conveyer, and means for progressively moving said flights towards said conveyer including a plurality of parallel spaced flexible members movable transversely of the conveyer, and adapted to engage said flights adjacent opposite ends thereof.

4. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, the thickness of said frame being such as to permit it to fit in the kerf cut by said cutter chain, a conveyer extending rearwardly along the central portion of said frame, said conveyer being so constructed as to withstand the fall of a body of coal thereon and the upper and lower runs thereof being of less vertical height than said frame, a plurality of longitudinally extending flights mounted on said frame on opposite sides of said conveyer and adapted to move material transversely of said frame onto said conveyer, and means for progressively moving said flights towards said conveyer including a plurality of parallel spaced flexible members movable transversely of the conveyer and adapted to engage opposite ends of said flights, for moving said flights therewith, the ends of said flights being yieldable to permit said members to pass thereby when said members are moving in one direction and to be engaged by said members and move therewith when said members are moving in an opposite direction.

5. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, the thickness of said frame being such as to permit it to fit in the kerf cut by said

cutter chain, a conveyer extending rearwardly along the central portion of said frame, said conveyer being so constructed as to withstand the fall of a body of coal thereon and the upper and lower runs thereof being of less vertical height than said frame, a plurality of longitudinally extending flights mounted on said frame on opposite sides of said conveyer and adapted to move material transversely of said frame onto said conveyer, and means for progressively moving said flights towards said conveyer including a plurality of parallel spaced flexible members movable transversely of the conveyer, and having means thereon adapted to engage opposite ends of said flights, for moving said flights therewith, the ends of said flights being yieldable to permit said members to pass thereby when said members are moving in one direction and to be engaged by said members and move therewith when said members are moving in an opposite direction, and including spring pressed members projecting from the ends of said flights having an advance plane surface and a retracting beveled surface.

6. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, said frame being of such a thickness as to fit in the kerf cut by said cutter chain, a conveyer extending along the central portion of said frame, so constructed as to withstand the fall of a body of coal thereon, and flights on opposite sides of said conveyer, movable transversely of said frame, for loading the fallen coal onto said conveyer, said conveyer including a bottom plate interposed between the upper and lower runs thereof, and said bottom plate being vertically movable to rest on the lower run of the conveyer when the body of coal falls thereon.

7. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, said frame being of such a thickness as to fit in the kerf cut by said cutter chain, a conveyer extending along the central portion of said frame, so constructed as to withstand the fall of a body of coal thereon, and flights on opposite sides of said conveyer, movable transversely of said frame, for loading the fallen coal onto said conveyer, said conveyer including a bottom plate interposed between the upper and lower runs thereof, means for lowering said bottom plate to rest on the lower run of the conveyer when the body of coal is broken down on said conveyer, said means serving to raise said bottom plate above the lower run of the conveyer, when it is desired to load out the broken down coal by said conveyer.

8. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, said frame being of such a thickness as to fit in the kerf cut by said cutter chain, a conveyer extending along the central portion of said frame, so constructed as to withstand the fall of a body of coal thereon, and flights on opposite sides of said conveyer, movable transversely of said frame, for loading the fallen coal onto said conveyer, said conveyer including a bottom plate interposed between the upper and lower runs thereof, means for lowering said bottom plate to rest on the lower run of the conveyer when the body of coal is broken down on said conveyer, said means serving to raise said bottom plate when it is desired to load out the broken down coal by said conveyer and including an expansible tube extending along each side of the conveyer and engaging the underside of said bottom plate.

9. In a combined cutting and loading machine, a frame, a cutter chain movable about said frame, said frame being of such a thickness as to fit in the kerf cut by said cutter chain, a conveyer extending along the central portion of said frame, so constructed as to withstand the fall of a body of coal thereon, and flights on opposite sides of said conveyer, movable transversely of said frame, for loading the fallen coal onto said conveyer, said conveyer including a bottom plate interposed between the upper and lower runs thereof, means for lowering said bottom plate to rest on the lower run of the conveyer when the body of coal is broken down on said conveyer, said means serving to raise said bottom plate when it is desired to load out the broken down coal by said conveyer and including an expansible tube engaging the underside of said bottom plate and extending along each side of the conveyer, and means for confining said tubes against expansion in a lateral direction.

10. In a combined cutting and loading machine, a motor, a frame disposed forwardly of said motor, a widened cutter bar projecting forwardly from said frame and mounted for adjustable movement with respect thereto in a horizontal plane about a fixed axis, a cutter chain movable about said cutter bar and driven from said motor, means at the forward end of said cutter bar for raising or lowering said cutter bar, other means at the forward end of said cutter bar for swinging said cutter bar about its axis of pivotal connection to said frame, means for moving the undercut and broken down coal towards the center of said cutter bar, and a conveyer extending rearwardly along the central portion of said cutter bar, for conveying the coal away from the working face.

11. In a combined cutting and loading machine, a motor, a frame disposed forwardly of said motor, a widened cutter bar projecting forwardly from said frame and mounted for adjustable movement with respect thereto in a horizontal plane about a fixed axis, a cutter chain movable about said cutter bar and driven from said motor, means at the forward end of said cutter bar for raising or lowering said cutter bar, other means for swinging said cutter bar about its axis of pivotal connection to said frame, means for moving the undercut and broken down coal towards the center of said cutter bar, and a conveyer extending along said cutter bar for conveying the coal rearwardly of said cutter bar away from the working face, said conveyer including a vertically movable bottom plate adapted to rest on the lower run thereof during the shooting operation.

12. In a combined cutting and loading machine, a motor, a frame disposed forwardly of said motor, a widened cutter bar projecting forwardly from said frame and mounted for adjustable movement with respect thereto in a horizontal plane about a fixed axis, a cutter chain movable about said cutter bar and driven from said motor, flexible feeding means driven by said motor for feeding said cutter bar and chain into the coal face, means at the forward end of said cutter bar for elevating or lowering the forward end thereof, other means at the forward end of said cutter bar for swinging said cutter bar laterally, a flight conveyer extending rearwardly along the central part of said cutter bar and being adapted to withstand the fall of a body of coal thereon, a plurality of flights on opposite sides of said conveyer progressively movable to

deposit material onto said conveyer, and flexible power transmission means for successively moving said flights towards said conveyer, to a point where they can be removed from said cutter bar, to permit the next succeeding flight to move material onto said conveyer.

13. In a loading apparatus of the class described, a frame adapted to be inserted in a kerf cut in a coal face, a conveyer extending rearwardly along said frame and being of less vertical dimensions than the height of said kerf, said conveyer having a vertically movable bottom plate adapted to be lowered to rest on the lower run thereof during shooting, to permit said conveyer to withstand a fall of coal thereon, and adapted to be elevated during the loading operation, to permit free operation of said conveyer.

14. In a loading apparatus of the class described, a frame adapted to be inserted in a kerf cut in a coal face, a conveyer extending rearwardly along said frame and being of less vertical dimensions than the height of said kerf, said conveyer having a vertically movable bottom plate adapted to be lowered to rest on the lower run thereof during shooting, to permit said conveyer to withstand a fall of coal thereon, and adapted to be elevated during the loading operation, to permit free operation of said conveyer, and an expansible tube extending along each side of said conveyer and adapted to engage said bottom plate to elevate said bottom plate for normal operation of the conveyer, or to permit it to rest upon the lower run of said conveyer during the shooting operation.

15. In a loading apparatus of the class described, a frame adapted to be inserted in a kerf cut in a coal face, a conveyer extending rearwardly along said frame and being of less vertical dimensions than the height of said kerf, said conveyer having a vertically movable bottom plate adapted to be lowered to rest on the lower run thereof during shooting, to permit said conveyer to withstand a fall of coal thereon, and adapted to be elevated during the loading operation, to permit free operation of said conveyer, and a plurality of flights mounted on said frame on opposite sides of said conveyer adapted to be progressively moved towards said conveyer for depositing material thereon.

16. In a loading apparatus of the class described, a frame adapted to be inserted in a kerf cut in a coal face, a conveyer extending rearwardly along said frame and being of less vertical dimensions than the height of said kerf, said conveyer having a vertically movable bottom plate adapted to be lowered to rest on the lower run thereof during shooting, to permit said conveyer to withstand a fall of coal thereon, and adapted to be elevated during the loading operation, to permit free operation of said conveyer, a plurality of flights mounted on said frame on opposite sides of said conveyer adapted to be progressively moved towards said conveyer for depositing material thereon, and a pair of spaced apart flexible power transmission members adapted to have engagement with the ends of said flights when moving in one direction, for successively moving said flights towards said conveyer.

17. In a loading apparatus of the class described, a frame adapted to be inserted in a kerf cut in a coal face, a conveyer extending rearwardly along said frame and being of less vertical dimensions than the height of said kerf, said conveyer having a vertically movable bot-

tom plate adapted to be lowered to rest on the lower run thereof during shooting, to permit said conveyer to withstand a fall of coal thereon, and adapted to be elevated during the loading operation, to permit free operation of said conveyer, a plurality of flights on said frame on opposite sides of said conveyer, a pair of spaced apart flexible power transmission members having means thereon adapted to operatively engage the ends of said flights when moving in one direction, for successively moving said flights towards said conveyer to deposit material thereon, and be released from said respective flight when moving in an opposite direction, to permit said flight to be removed from said frame.

18. In a loading apparatus of the class described, a frame adapted to be inserted in a kerf cut in a coal face, a conveyer extending rearwardly along said frame and being of less vertical dimensions than the height of said kerf, said

5 conveyer having a vertically movable bottom plate adapted to be lowered to rest on the lower run thereof during shooting, to permit said conveyer to withstand a fall of coal thereon, and adapted to be elevated during the loading operation, to permit free operation of said conveyer, a plurality of flights on said frame on opposite sides of said conveyer, a pair of spaced apart flexible power transmission members having means thereon adapted to operatively engage said flights adjacent their ends, the ends of said flights being yieldable to permit said means on said power transmission members to pass thereby when traveling away from the conveyer, and to permit said means to engage said flights and move them with said power transmission members when said members are moving towards said conveyer.

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