April 8, 1952 T. W. TUTWILER II 2,592,358

COAL MINING MACHINE

Filed July 5, 1947 3 Sheets-Sheet 1

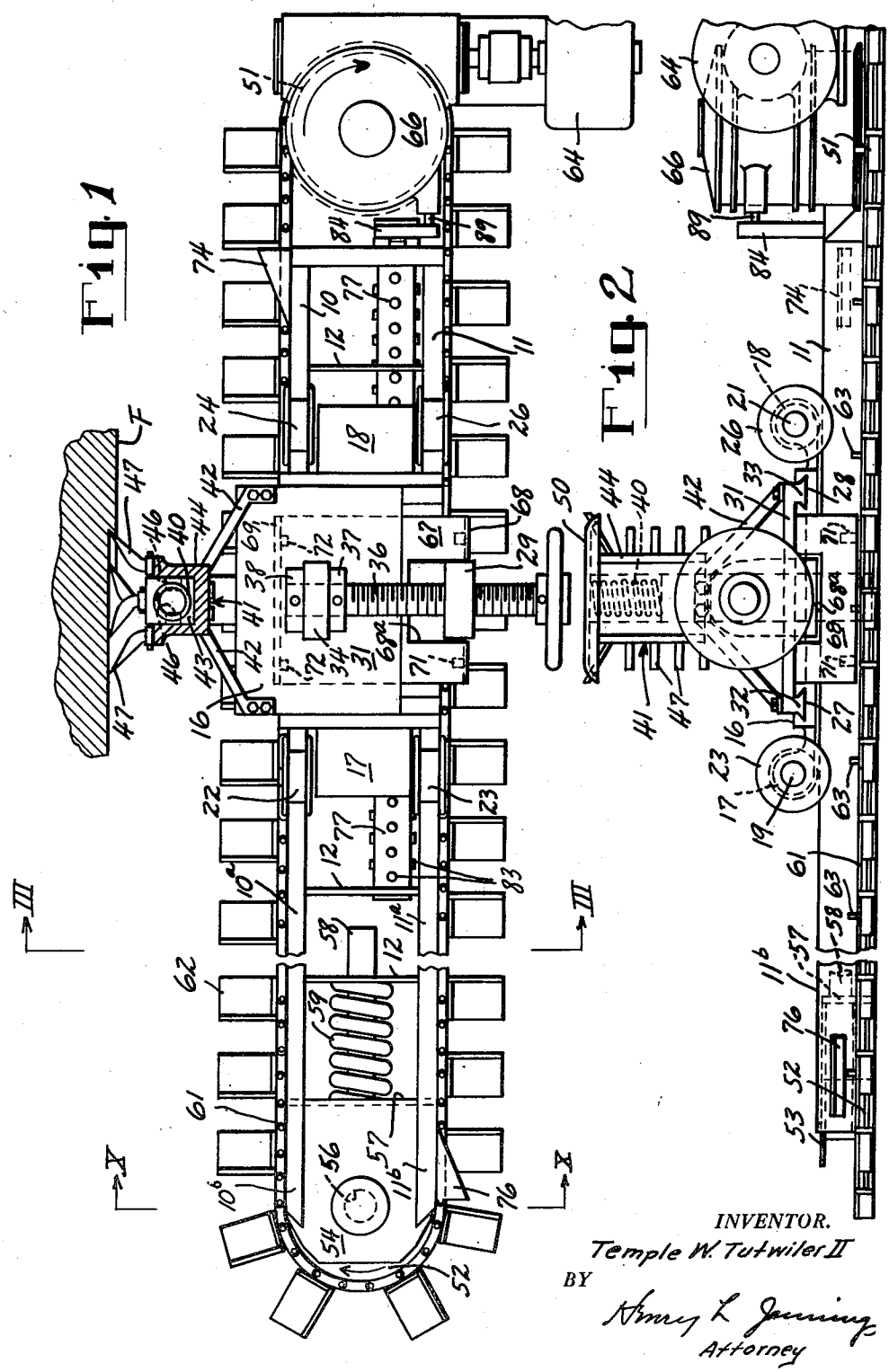


Fig. 1



Fig. 2

INVENTOR.
Temple W. Tutwiler II
BY
Henry L. Jenning
Attorney

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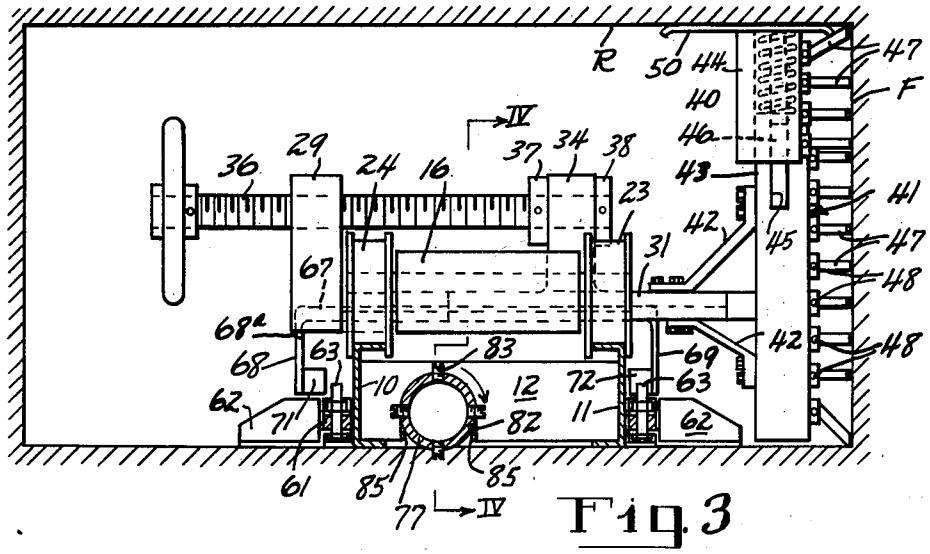
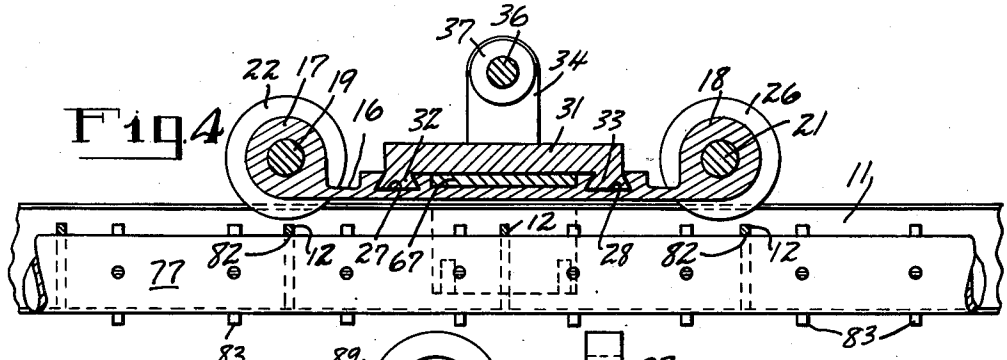
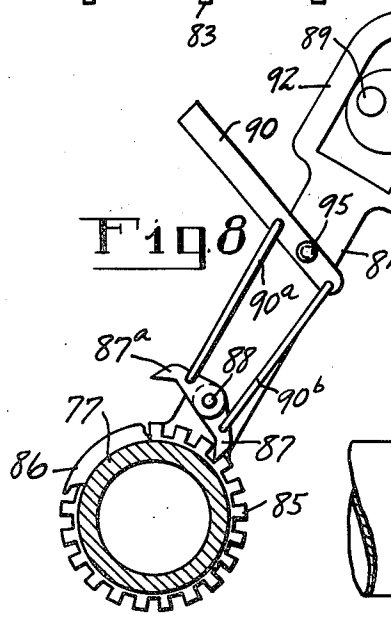
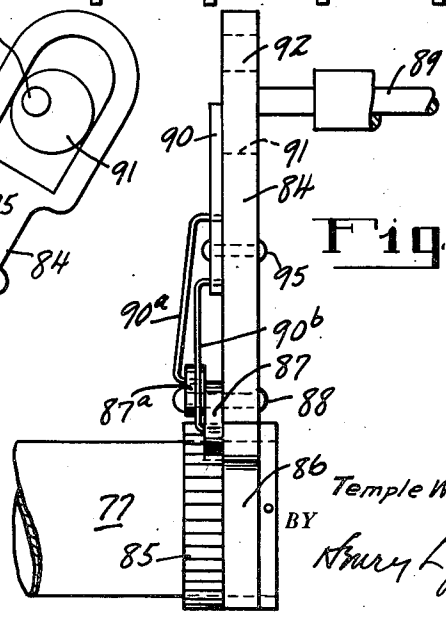



Fig. 3




INVENTOR.
Temple W. Tutwiler II
BY
Henry L. Jennings
Attorney

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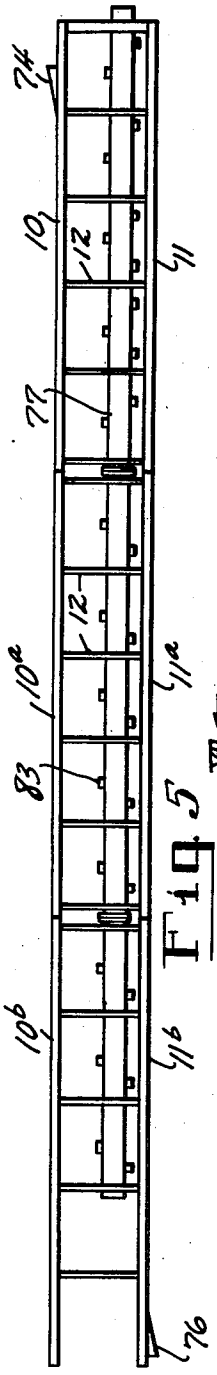


Fig. 5

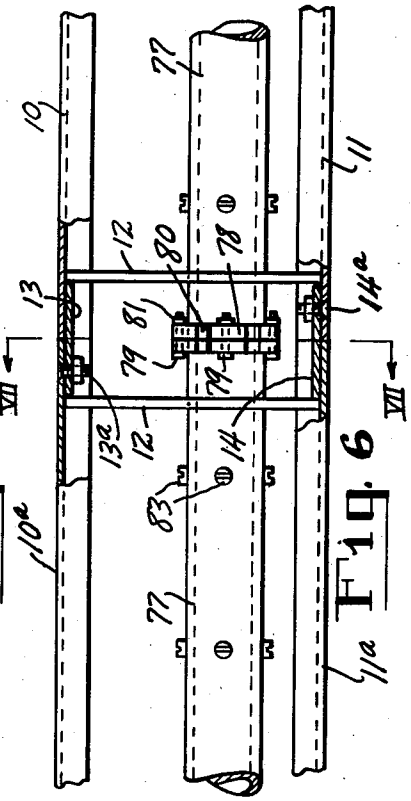


Fig. 6

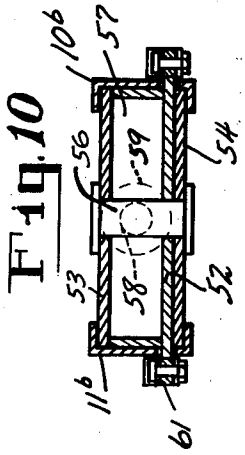


Fig. 10

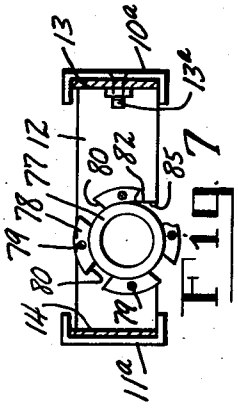


Fig. 7

INVENTOR.
Temple W. Tutwiler II
BY
Henry L. Jennings
Attorney

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# UNITED STATES PATENT OFFICE

2,592,358

## COAL MINING MACHINE

Temple W. Tutwiler II, Birmingham, Ala.

Application July 5, 1947, Serial No. 759,172

10 Claims. (Cl. 262—31)

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This invention relates to a mining machine, and particularly to a machine for mining coal, and has for an object the provision of an apparatus of the character designated which shall be especially adapted to operate along a relatively wide face and which shall be effective to cut down the coal and convey it continuously in one direction to a point of final removal.

A further object of my invention is to provide a mining machine which shall embody an elongated frame adapted to be disposed parallel to the face and having a cutter head mounted to reciprocate longitudinally of the frame and parallel to the face of the coal, together with conveyor means disposed beneath the cutter head in position to remove the coal as it is cut down.

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a plan view of the machine;

Fig. 2 is a side elevational view thereof;

Fig. 3 is a sectional view taken along the line III—III of Fig. 1;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3;

Fig. 5 is a plan view of the frame with the cutting mechanism and conveyor removed;

Fig. 6 is a detail plan view showing the method of connecting the frame sections and drive tube together;

Fig. 7 is a sectional view taken along the line VII—VII of Fig. 6;

Fig. 8 is a detail sectional view of the drive for the drive tube;

Fig. 9 is a view at right angles to Fig. 8; and

Fig. 10 is a detail sectional view taken along the line X—X of Fig. 1.

Referring now to the drawings for a better understanding of my invention, and particularly to Figs. 1 and 5 thereof, my improved machine embodies a frame comprised of elongated parallel structural frame members 10 and 11 which are preferably in the form of channels with their flanges turned inward and spaced apart. The channels 10 and 11 are joined together by means of cross plates 12 spaced at suitable intervals, and welded to the channels. As shown in Fig. 5, the frame may be made in sections each ten feet or more in length and be comprised of the channels 10 and 11 and other similar channels 10*a*, 11*a*, and 10*b*, 11*b* so as to provide a frame of the required length. The sections are joined together as by means of a plate 13 welded to the inner side of the channel 10 and secured to

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the adjacent meeting end of the channel 10*a* by a bolt 13*a*. A similar plate 14 is welded to the inner side of the channel 11*a* and is secured to the channel 11 by means of a bolt 14*a*.

Mounted on the elongated frame just described, for longitudinal movement thereon, is a cutter head carriage comprising a casting 16 having axle housings 17 and 18 in the ends thereof in which are journaled respectively axles 19 and 21. Flanged wheels 22, 23, 24 and 25 are mounted on the axles to run on the track formed by the frame members 10, 11, 10*a*, 11*a*, etc. The casting 16 is provided with dove tailed ways 27, 28, and in one side thereof is provided a stationary adjusting screw post 29. A cutter head support 31 is mounted on the casting 16 and is provided with dove tailed gibs 32 and 33 which fit in the ways 27 and 28. On one side of the cutter head support is a movable adjusting screw post 34. An adjusting screw 36 passes through the stationary post 29 in threaded engagement therewith and through the post 34. Collars 37 and 38 on opposite sides of the post 34 provide means whereby the cutter head support 31 may be adjusted transversely of the frame.

Mounted on the cutter head support 31 is a cutter head 41, being secured thereto by means of braces 42, a suitable number being provided. As may be seen in Figs. 1, 2, and 3 of the drawing, the cutter head is made in two sections 43 and 44, the latter fitting slidingly over the former. The section 43 is provided with guide ways 45 in the side in which fit ribs 46 provided on the section 44. At the top of the section 44 is provided a shoe 50 which bears against the roof R of the mine. A light spring 40 is disposed to bear against the top of the section 43 and the shoe 50 to hold the shoe against the roof R. The cutter head is thus automatically adjustable to the varying thickness of the seam being worked. Mounted in both sections of the cutter head 41 are a suitable number of cutters 47 which fit in suitable recesses provided in the cutter head and which are held in place by means of set screws 48. Any desired form of cutters may be employed.

Mounted between the ends of the frame members 10 and 11, adjacent the lower sides thereof, where they rest on the floor, is a sprocket 51. At the opposite end, between the frame members 10*b*, and 11*b* is a sprocket 52, which is journalled between plates 53 and 54 by means of a pin 56. The plates 53 and 54 are joined at their inner ends by means of a plate 57 from which a guide pin 58 extends through the adjacent cross plate

12. A coil spring 59 surrounds the guide pin 58 and bears against the plate 12 to bias the sprocket 52 outwardly. Mounted on the sprockets 51 and 52 is a conveyor chain 61 having flights 62 mounted thereon, extending outwardly of the frame and below the level of the cutter head 41 as shown in Fig. 3 of the drawing. The chain 61 is also provided with spaced vertically extending pins 63, the purpose of which will later be explained. The chain 61 is driven by means of a motor 64 and gear reduction train indicated generally by the numeral 66.

The cutter head carriage is reciprocated longitudinally of the frame and along the working face F of the mine from the chain 61 in the manner now to be described. Mounted on the carriage 16 beneath the cutter head support 31 is a shifting plate 67 having depending arms 68 and 69 which extend downwardly alongside the frame and which are provided with lugs 71 and 72 adapted to engage alternately, the pins 63 on the conveyor chain 61. The length of the plate 67 is such that only one of the lugs 71 or 72 can be engaged at a time with one of the pins 63, and the depending arm 68 is cut out as indicated at 68*a* to pass the screw post 29. As may be seen in Figs. 1 and 5, I provide at one end of the frame, on one side thereof, an inclined shifting cam 74, and at the other end of the frame, on the opposite side thereof, an inclined shifting cam 76. These shifting cams are so disposed as to engage the depending arms 68 and 69 and thus shift the shifting plate 67 with its depending arms transversely of the frame. In this manner, the lugs 72 will engage with the pins 63 on one side of the frame as the carriage 16 is nearing the end of the frame, and cause the carriage 16 with its cutter head 31 to move along the face F of the mine in the other direction. When it reaches the shifting cam 74, the arm 69 is engaged by the cam and moves the plate 67 laterally until the lugs 72 are out of engagement with the pins 63, and the lugs 71, on the opposite side of the frame, are engaged with pins 63 on that side of the frame to move the carriage with its cutter head in the opposite direction. The carriage is thus reciprocated along the face by the conveyor chain, while the latter moves in one direction only.

Mounted between the frame members 10, 11, 10*a*, 11*a*, and 10*b*, 11*b*, and extending substantially the full length of the frame is a drive tube 77 made up of sections, corresponding substantially to the lengths of the frame sections 10, 11, 10*a*, 11*a*, and which are joined together at their ends by means of flange couplings 78, and by bolts 79 and nuts 81. The flanges are provided with teeth 80 to engage with the earth. The tube 77 bears in slots 82, as shown in Fig. 7, provided in the cross plates 12. Protuberances 85 are provided in the sides of the slots by welding or otherwise to prevent the tube from falling out of the slots when the apparatus is being moved. Suitable cleats 83 are provided at intervals on the drive tube 77 for engagement with the ground. The drive tube 77 is driven by means of a ratchet arm 84 which terminates at its lower end in a collar 86 surrounding the drive tube 77 and which has two pawls 87 and 87*a* pivotally mounted thereon at 88. Extending from the gear reduction housing 66 is a shaft 89 having a cam 91 thereon which fits into a yoke 92 formed on the upper end of the ratchet arm 84. By this means, the arm 84 is oscillated to engage the pawl 87 or 87*a*, a notch at a time, in the ratchet 85 and rotate the tube to drive the machine, with the cutter head 41, toward the face F of the working. The pawls 87 and 87*a* may be placed in operation selectively by means of a lever 90 pivoted at 95 to the ratchet arm 84, and by links 90*a* and 90*b*. The pawls 87 and 87*a* may thus be placed in operation selectively, and the frame moved forwardly toward the face F or rearwardly away from the face as required, or they may both be disengaged to allow the frame to remain stationary.

From the foregoing, the operation of my improved apparatus will be readily understood. The apparatus is especially adapted for operating along a relatively wide face and with thin seams of coal. The frame is disposed, as shown in Fig. 1, parallel to the face, and the conveyor chain 61 is driven by the motor 64, through the gear reduction 66 to cause the cutter head 41 to reciprocate along the face, with the cutters 47 engaging with the coal and breaking it down. Variations in thickness of the seam are compensated by the spring 40 acting on the sections 43 and 44 of the cutter head. As the coal is broken down, it falls into the path of the conveyor flights 62 which move in one direction only beneath the cutter head to carry the coal to the end of the frame where it may be removed by any suitable means, not shown. The machine is moved laterally toward the face by means of the drive tube 77 with its cleats 83 engaging with the ground, so that the cutter head with the cutters is maintained in engagement with the face of the working at all times. The frame may be made in as many sections as may be required to adapt the apparatus to the work required.

From the foregoing, it will be apparent that I have developed a mining machine which is simple of design and operation and which is effective to remove coal along a relatively wide face.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In a mining machine for removing material from the face of a mine, an elongated frame, a conveyor chain having outwardly projecting flights thereon mounted to move in one direction along one side thereof, a cutter head mounted to reciprocate on the frame above the conveyor chain parallel to the mine face and having cutter elements fixedly mounted thereon projecting outwardly over the conveyor flights to engage the mine face, and a rotary member extending longitudinally of the frame and having ground engaging cleats thereon for moving the frame laterally in the direction of projection of the cutter elements.

2. In a mining machine, a frame comprising a pair of spaced parallel structural members forming a track, a carriage mounted for reciprocatory movement longitudinally on the track, means to reciprocate the carriage, a cutter head comprised of upper and lower sections mounted on the carriage and having cutter elements thereon projecting laterally of the track, a spring interposed between the sections to bias the upper section upwardly, sprockets in the ends of the frame, a conveyor chain mounted on the sprockets to travel along the outside of the frame, and flights

on the conveyor chain projecting outwardly below the cutter elements.

3. In a mining machine for removing material from the face of a mine, an elongated frame, a conveyor chain having outwardly projecting flights thereon mounted to move in one direction along one side thereof generally parallel to the mine face, a cutter head mounted to reciprocate on the frame above the conveyor chain and parallel therewith, said cutter head carrying cutter elements projecting over the conveyor flights to engage the mine face, and ground engaging drive means mounted on the frame and disposed to move the entire machine laterally in the direction of projection of the cutter elements toward the mine face.

4. Apparatus as defined in claim 2 in which the upper section of the cutter head is provided with a roof bearing shoe and a spring is provided to bias the shoe upwardly.

5. In a mining machine, a frame comprising a pair of spaced parallel structural members forming a track, a carriage mounted for reciprocatory movement longitudinally on the track, a cutter head mounted on the carriage and having cutter elements thereon projecting laterally of the track, sprockets in the ends of the frame, a conveyor chain mounted on the sprockets to travel along the outside of the frame, flights on the conveyor chain projecting outwardly below the level of the cutter elements, a rotary member extending longitudinally of the frame and journalled between the structural members, and ground engaging cleats on the rotary member for moving the frame laterally in the direction of projection of the cutter elements.

6. In a mining machine, an elongated frame comprising a pair of spaced structural members adapted to lie parallel to the face of a mine working, sprockets in the ends of the frame, a conveyor chain mounted on the sprockets for movement around the sides of the frame, conveyor elements on the chain extending outwardly therefrom, a carriage mounted on the frame for reciprocatory movement longitudinally thereof parallel to the face, cutter elements mounted on the carriage and extending toward the face beyond the conveyor elements for engagement with the face, a rotary tube extending the length of the frame and journalled between the structural members, and cleats on the tube for engagement with the earth to move the frame laterally toward the face.

7. Apparatus as defined in claim 6 in which the frame is formed of structural members joined at spaced intervals by cross plates and the rotary tube is journalled in the cross plates.

8. Apparatus as defined in claim 7 in which the frame is comprised of a plurality of pairs of structural members joined together in end to end relation and in which the rotary tube is made in sections corresponding in length to the length of the structural members, and in which the sections of the tube are joined together by flanged coupling members having notches therein for engagement with the earth in propelling the machine.



9. In a mining machine, an elongated frame comprised of a pair of spaced structural members adapted to lie parallel to the face of a mine working, sprockets in the ends of the frame, a conveyor chain mounted on the sprockets for movement around the sides of the frame, conveyor elements on the chain extending outwardly therefrom, a carriage mounted on the frame for movement longitudinally thereof parallel to the face, cutter elements mounted on the carriage and extending toward the face beyond the conveyor elements for engagement with the face, a pair of laterally shiftable depending arms on the carriage, lugs on the conveyor chain for alternate engagement with the laterally shiftable arms, and means at opposite ends of the frame for shifting the arms.

10. In a mining machine, an elongated frame comprising a pair of spaced structural members adapted to lie parallel to the face of a mine working, sprockets at the ends of the frame, a conveyor chain mounted on the sprockets for movement around the sides of the frame, conveyor elements on the chain extending outwardly therefrom, a carriage mounted on the frame for reciprocatory movement longitudinally thereof parallel to the face, cutter elements mounted on the carriage and extending toward the face beyond the conveyor elements for engagement with the face, a rotary tube extending the length of the frame and journalled between the structural members, cleats on the tube for engagement with the earth to move the frame laterally toward the face, and means to adjust the position of the cutter elements laterally of the frame, a ratchet on the tube, an oscillating arm associated with the ratchet, pawls mounted on the oscillating arm and adjustable whereby they may be selectively engaged with the ratchet to rotate the tube in either direction.

TEMPLE W. TUTWILER II.

## REFERENCES CITED

The following references are of record in the file of this patent:


UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 419,199 | Ingold | Jan. 14, 1890 |
| 502,426 | Wilson | Aug. 1, 1893 |
| 574,790 | Doris et al. | Jan. 5, 1897 |
| 588,051 | Bliss | Aug. 10, 1897 |
| 1,127,395 | Bemies et al. | Feb. 9, 1915 |
| 1,190,300 | Kuhn | July 11, 1916 |
| 1,273,504 | Kuhn | July 23, 1918 |
| 1,327,052 | London | Jan. 6, 1920 |
| 1,522,693 | Morgan | Jan. 13, 1925 |
| 1,588,987 | O'Toole | June 15, 1926 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 574,268 | Germany | Apr. 11, 1933 |
| 642,686 | Germany | Mar. 12, 1937 |