Aug. 26, 1941. J. F. JOY 2,254,181

MATERIAL MOVING APPARATUS

Original Filed Feb. 23, 1937 5 Sheets-Sheet 1

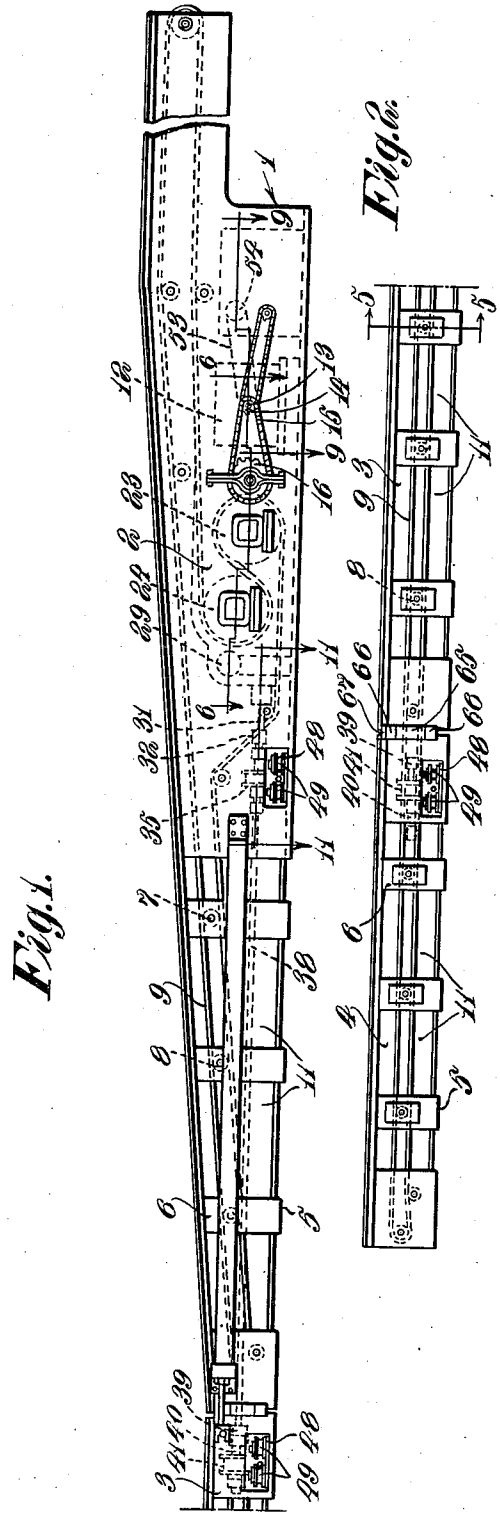

Fig. 1.

Fig. 2.

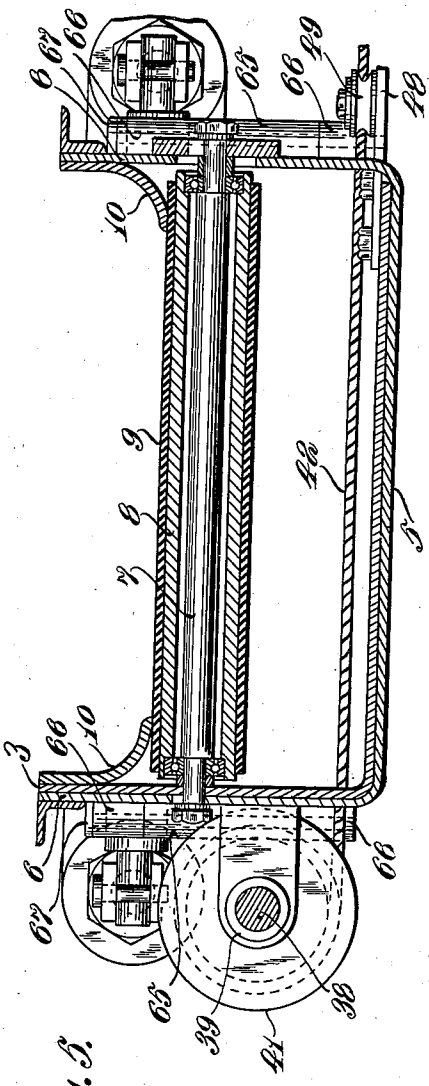

Fig. 3.

Inventor:
Joseph F. Joy.
By Louis A. Maxson.
Atty.

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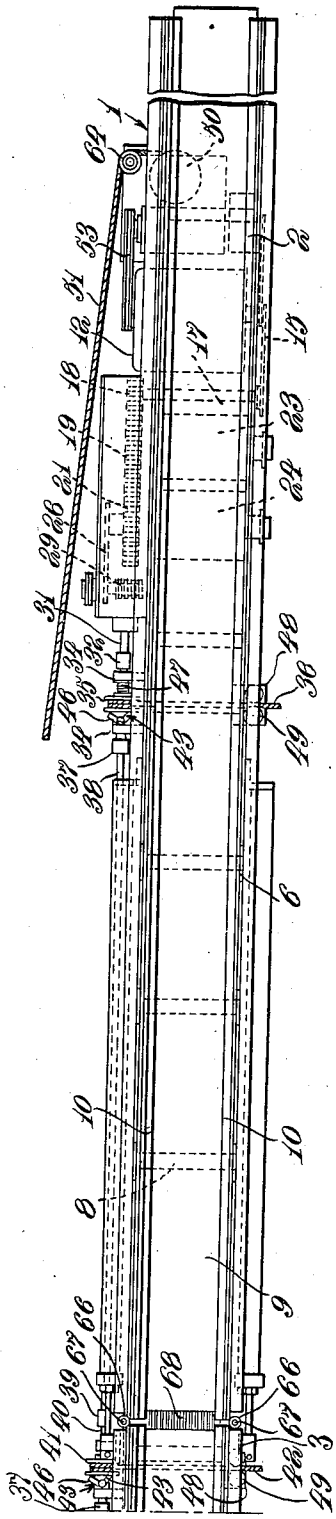

Fig. 3.

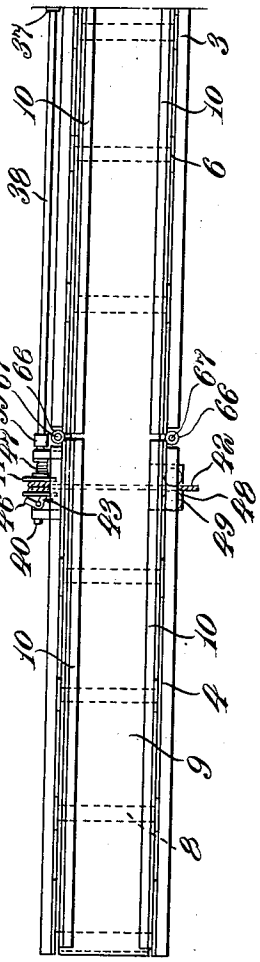

Fig. 4.

Inventor:
Joseph F. Joy.
By Louis A. Maxson.
Atty.

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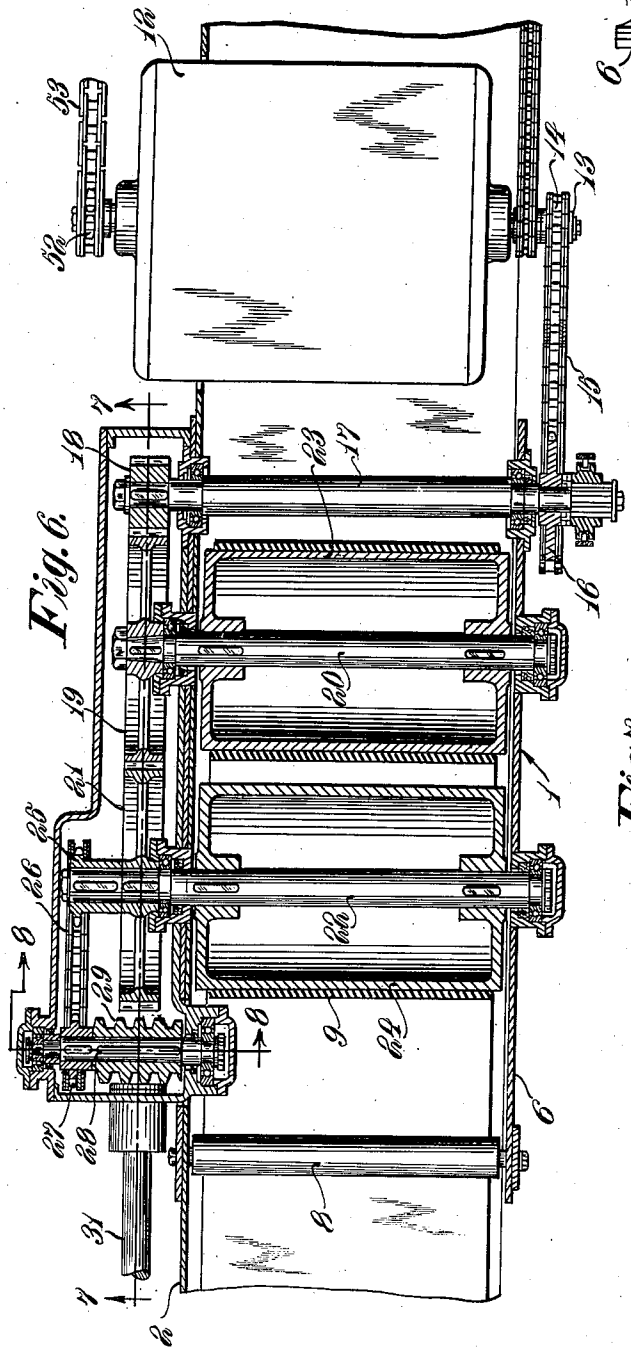

Fig. 6.

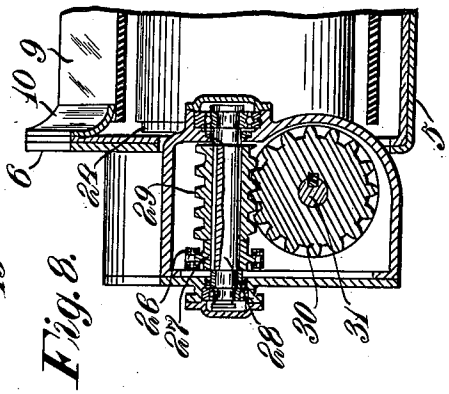

Fig. 8.

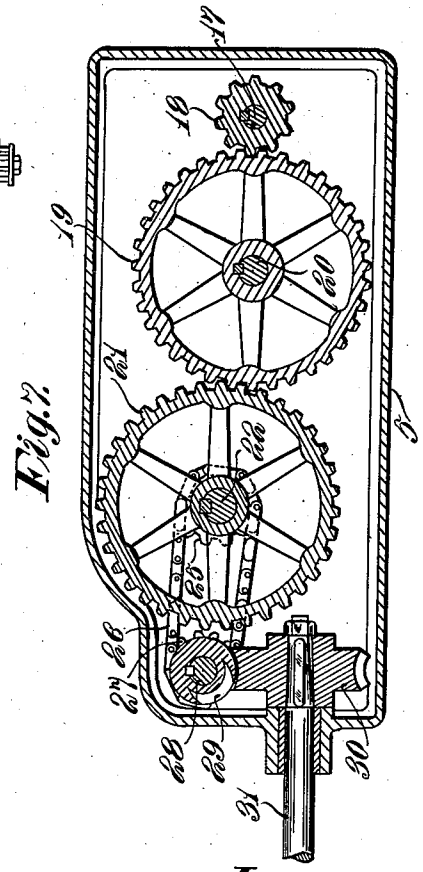

Fig. 7.

Inventor:
Joseph F. Joy.
by Louis S. Maxson.
Atty.

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Fig. 9.

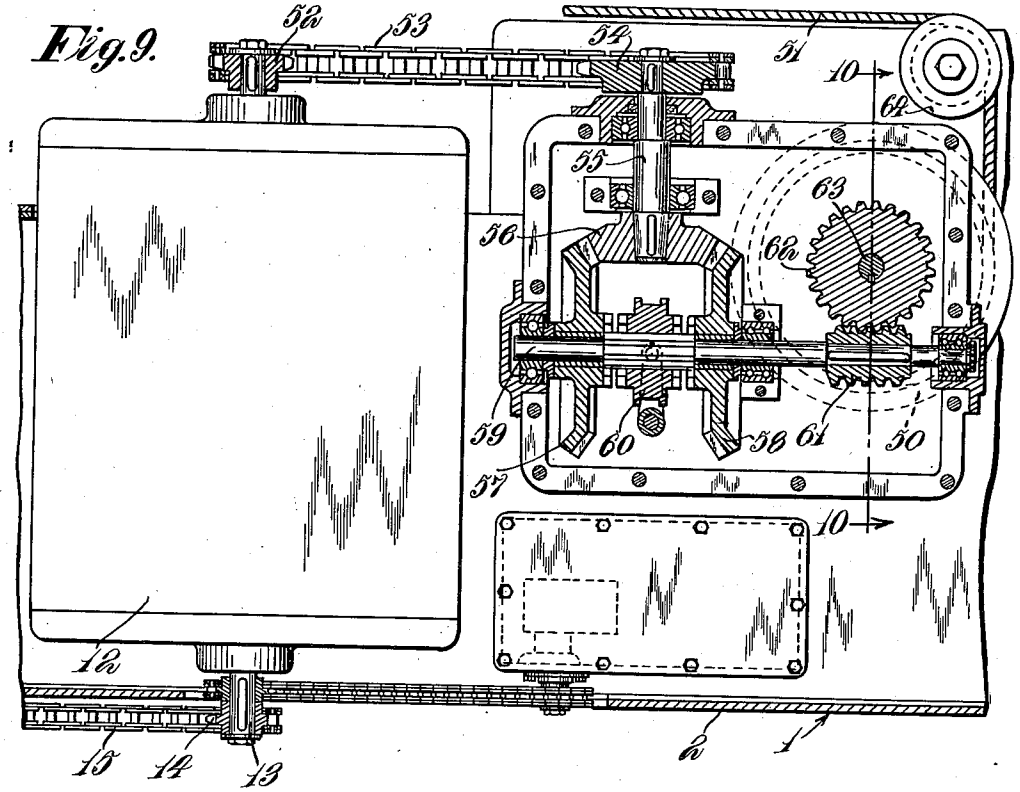
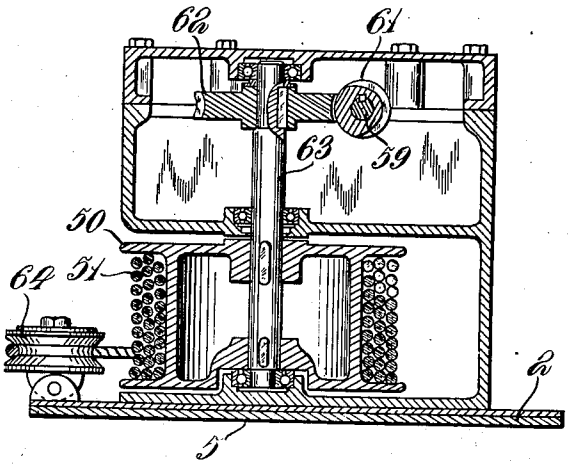


Fig. 10.



Inventor:
Joseph F. Joy.
By Louis A. Maxson
Atty.

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Fig. 11.

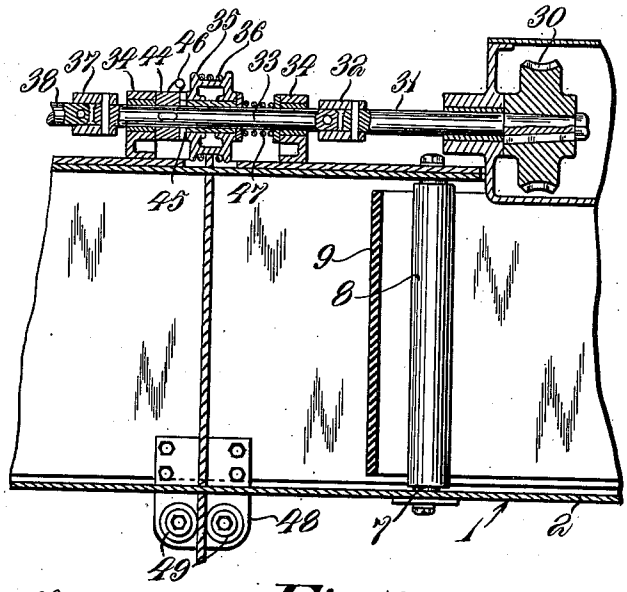


Fig. 12.

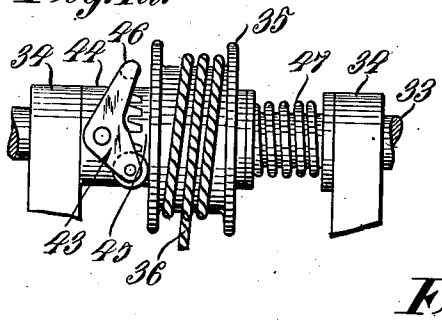


Fig. 13.

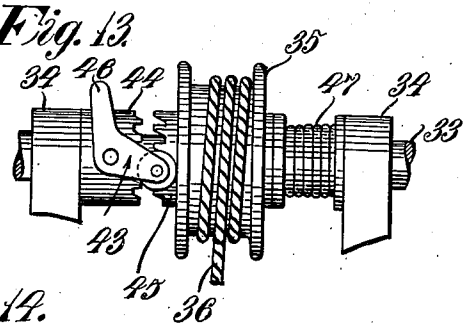
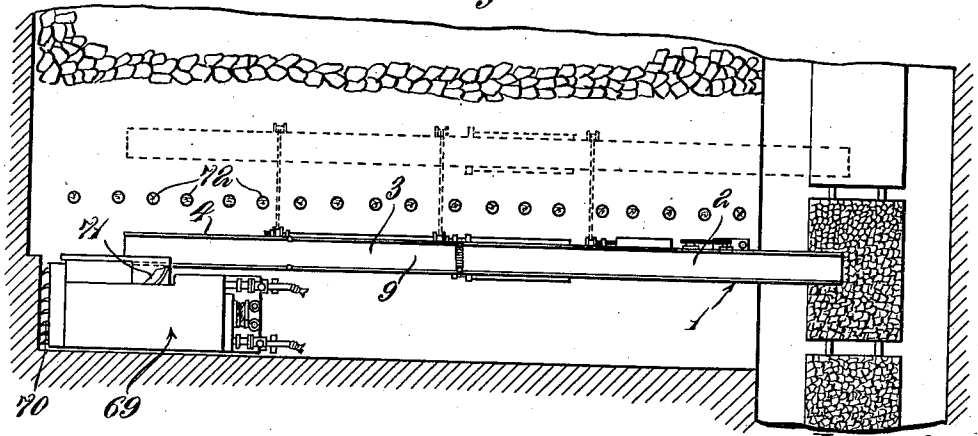


Fig. 14.



Inventor:
Joseph F. Joy.
By Louis A. Maxmen
Atty.

Patented Aug. 26, 1941 2,254,181

UNITED STATES PATENT OFFICE

2,254,181

MATERIAL MOVING APPARATUS

Joseph F. Joy, Pittsburgh, Pa., assignor to Sullivan Machinery Company, a corporation of Massachusetts

Original application February 23, 1937, Serial No. 127,019, now Patent No. 2,205,013, dated June 18, 1940. Divided and this application May 8, 1939, Serial No. 272,318

3 Claims. (Cl. 198—126)

This invention relates to material moving apparatus, and more particularly, but not exclusively, to improvements in conveyors of the portable type especially designed for use in mines.

An object of this invention is to provide an improved material moving apparatus. Another object is to provide an improved face conveyor of the self-moving type especially designed for use in mines and having improved means embodied therein for moving the same laterally into different operating positions. Yet another object is to provide an improved mine conveyor of the sectional type. A further object is to provide an improved conveyor driving means. Still another object is to provide an improved sectional conveyor having improved driving connections comprising transmission elements on each of the conveyor sections and detachable driving connections between the transmission elements of the conveyor sections. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

This application is a division of my copending application Serial No. 127,019, filed February 23, 1937, patented June 18, 1940, No. 2,205,013.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Figs. 1 and 2, when taken together, show in side elevation the illustrative form of the improved conveying means.

Figs. 3 and 4, when taken together, comprise a plan view of the improved conveying means.

Fig. 5 is an enlarged cross sectional view taken substantially on line 5—5 of Fig. 2.

Fig. 6 is an enlarged horizontal sectional view taken substantially on line 6—6 of Fig. 1.

Fig. 7 is a view in longitudinal vertical section taken substantially on line 7—7 of Fig. 6.

Fig. 8 is a detail vertical sectional view taken on line 8—8 of Fig. 6.

Fig. 9 is an enlarged horizontal sectional view taken substantially on line 9—9 of Fig. 1.

Fig. 10 is a cross sectional view taken substantially on line 10—10 of Fig. 9.

Fig. 11 is an enlarged horizontal sectional view taken substantially on line 11—11 of Fig. 1.

Figs. 12 and 13 are detail views showing one of the conveyor moving drums and its associated control clutch, the views respectively showing the clutch connected and released.

Fig. 14 is a diagrammatic view showing the conveyor in a mine and operating in conjunction with a core cutting, dislodging and loading apparatus.

In this illustrative embodiment of the invention there is shown a material moving apparatus in the form of a face conveyor especially designed for use in mines, although it will be evident that various features of the invention may be embodied in material moving apparatus of various other types. In this construction, 1 designates a conveyor frame of a vertically compact, elongated form comprising a prime-mover-carrying section 2 and two alined detachable frame sections 3 and 4, although it is intended that any number of detachable sections may be utilized in accordance with the particular conditions encountered. The conveyor sections have smooth bottom surfaces adapted to rest upon and slide over the mine floor. Each conveyor section has its frame formed with a bottom skid 5 provided with curved sides to facilitate lateral sliding movement of the conveyor over the mine floor and provided with vertical sides 6, 6. Supported by the sides of the conveyor frame sections are transversely extending horizontal shafts 7 having journaled thereon horizontal guiding rolls 8 for guiding an endless conveyor belt 9. Secured to the upper portions at the inner sides of the vertical sides of the conveyor frame sections are curved plates 10 for directing and maintaining the material to be moved on the top run of the endless conveyor, in the manner clearly shown in Fig. 5. The vertical side portions 6 are spaced apart longitudinally of the frame sections to provide openings 11 therebetween so that the frames of the conveyor sections are materially lightened, and any material brought back within the conveyor frame by the bottom run of the conveyor belt will be freely discharged from the conveyor frame.

The prime-mover-carrying section 2 of the conveyor frame has supported thereon a motor 12 (see Fig. 6) having its power shaft 13 horizontally disposed and extending transversely of the conveyor frame section. Keyed to one end of the motor power shaft is a chain sprocket 14 connected by an endless drive chain 15 to a sprocket 16 fixed to a horizontal, transversely extending drive shaft 17 located at the left of the motor, as viewed in Fig. 6, and suitably journaled within the sides of the conveyor frame section. The shaft 17 in turn has keyed thereto a spur gear 18 meshing with a spur gear 19 keyed to a parallel shaft 20, likewise suitably journaled within the sides of the conveyor frame section. The gear 19 meshes with and drives a spur gear

21 keyed to a parallel shaft 22 similarly journaled within the sides of the conveyor frame section, and these shafts 20 and 22 have keyed thereto drive rolls 23 and 24 respectively, and these rolls cooperate in the driving of the conveyor belt 9.

Now referring to the improved means for moving the conveyor bodily laterally into different operating positions, it will be noted that keyed to and driven by the shaft 22 (see Fig. 6) is a chain sprocket 25 connected by an endless drive chain 26 to a chain sprocket 27 keyed to a parallel shaft 28 likewise journaled on the conveyor frame. Keyed to the shaft 28 is a worm 29 meshing with a worm wheel 30 (see Figs. 7 and 8) in turn keyed to a horizontal shaft 31 extending longitudinally of the conveyor frame section and suitably journaled thereon at one side thereof. Alined with the shaft 31 and connected thereto by a detachable coupling 32 (see Fig. 11) is a shaft 33 likewise journaled on the side of the conveyor frame. The shaft 33 is journaled in bearings supported within bearing brackets 34, 34 attached to the side of the conveyor frame, and suitably journaled on this shaft between the bearing brackets is a drum 35 having wound thereon a cable 36. The shaft 33 is connectible by detachable couplings 37 to alined shafts 38, 38, and these shafts are respectively journaled on the sides of the conveyor frame sections 2 and 3. The shafts 38 are connected by detachable couplings 39 to alined shafts 40, journaled in the same manner as the shaft 33 shown in Fig. 11, on the detachable conveyor frame sections 3 and 4. The shafts 40 have respectively journaled thereon winding drums 41 similar to the drum 35, and similarly having wound thereon cables 42. As shown in Figs. 11, 12 and 13, the three drums are connectible to their respective drive shafts by jaw clutches 43, each comprising a clutch member 44 keyed to the shaft and a cooperating clutch member 45 formed on the drum. Pivoted on the member 44 is an operating lever 46 carrying a roller engaging the adjacent end face of the drum, and when the lever is swung into the position shown in Fig. 13, the drum is shoved axially along the shaft against the tension of a coil spring 47. When the lever is moved into the position shown in Fig. 12, the coil spring 47 moves the clutch members 44, 45 into engaged position, and the drums may, at that time, be rotated in a direction to wind in their respective cables. Mounted on brackets 48 supported on the sides of the conveyor frame sections opposite from the drums 35 and 41, are horizontal guide rolls 49 for guiding the cables on the drums, the cables being extendible from the drums transversely across the conveyor frame beneath the conveyor and around the guide rolls in the manner shown in Fig. 5.

Mounted on the prime-mover-carrying section 2 of the conveyor frame is a haulage drum 50 arranged in a horizontal position on a vertical axis (see Figs. 9 and 10) and having wound thereon a haulage cable 51. This drum is driven from the motor 12 by a chain sprocket 52 keyed to the motor power shaft 13 and connected by an endless drive chain 53 to a sprocket 54 keyed to a horizontal shaft 55, herein arranged parallel with the motor power shaft, at the right of the motor as viewed in Fig. 9. This shaft is suitably journaled within the conveyor frame section 2 and has keyed thereto and drives a bevel gear 56 meshing with reverse bevels 57 and 58, herein journaled on a horizontal shaft 59. The shaft 59 extends longitudinally of the conveyor frame and is suitably journaled within the conveyor frame section 2 in the manner shown in Fig. 9. The reverse bevels 57, 58 are selectively connectible to the shaft 59 by means of a conventional jaw clutch 60. Keyed to and driven by the shaft 59 is a worm 61 meshing with a worm wheel 62 keyed to a vertical shaft 63 suitably journaled within the conveyor frame section and to which the haulage drum 50 is keyed, as shown in Fig. 10. It will thus be seen that the haulage drum may be rotated in either winding or unwinding direction under the control of the reversing clutch 60, while the motor 12 operates continuously in a single direction. Journaled on the conveyor frame and arranged on a vertical axis is a guide sheave 64 for guiding the haulage cable 51.

As aforementioned, the conveyor frame sections are detachably connected together. The detachable connections between the conveyor sections comprise lugs 65 on the opposite sides of the rear ends of the conveyor sections 3 and 4, and the opposite sides of the forward ends of the conveyor section 3 and the prime-mover-carrying section 2 have formed thereon lugs 66 adapted to cooperate with the lugs 65, in the manner shown in Fig. 5, and these lugs have registering openings for receiving locking pins 67. By removing the locking pins and detaching the couplings between the alined drum drive shafts, the conveyor sections may be readily separated. To enable an insertion of additional conveyor frame sections to increase the length of the conveyor, the endless conveyor belt 9 has a detachable connection at 68 of a conventional form so that an additional length of belt may readily be placed between the end connections of the belt when an additional frame section is inserted in the conveyor frame. The connection between the belt ends is, of course, released when it is desired to separate the frame sections.

The general mode of operation of the improved conveying means is as follows: In Fig. 14 the conveyor is shown operating in conjunction with a core cutting, dislodging and loading apparatus, generally designated 69, of the same general character as that disclosed in my copending application, Ser. No. 23,087, filed May 23, 1935, now matured into Patent No. 2,093,448, patented September 21, 1937. This core cutting apparatus has core cutting means 70, and is movable rectilinearly along the coal face, and as cutting progresses the core cut by the cutting means is dislodged from the mine wall and the broken down coal discharged by discharge means 71 laterally from the apparatus onto the conveyor in the manner illustrated; the conveyor arranged adjacent the coal face in parallelism therewith between the coal face and the roof props 72. As cutting progresses and it is desired to add a section to the conveyor to lengthen the latter, this may be accomplished in the manner described in my copending application Serial No. 127,019, above referred to, by moving the conveyor sections 3 and 4 rectilinearly in an endwise direction forwardly with respect to the prime-mover-carrying conveyor section 2. Prior to such forward rectilinear endwise movement of the conveyor sections 3 and 4, the connection between the ends of the belt is, of course, released, as also are the detachable couplings for the drum drive shafts and the frame section locks. When the parts are in their separated position, the haulage cable 51 is extended from the haulage

drum 50 around the guide sheave 64 forwardly along the side of the conveyor frame in the manner indicated in Fig. 3, the free end of the cable passing around a guide sheave secured by an anchor jack and then rearwardly into connection with the additional conveyor frame section. As the haulage drum is rotated to wind in the cable, the conveyor section is moved bodily from a point near the main entry inwardly through the mine passage into a position substantially in parallelism with and at one side of the conveyor frame. When the conveyor frame sections are separated, the additional conveyor section is then moved laterally in any suitable manner, as by bars or jacks, into position between the forward end of the prime-mover-carrying section 2 and the rear end of the conveyor section 3 and suitably connected in position therebetween by the locking lugs 65, 66 and locking pins 67. The drum drive shaft on the additional conveyor section is then interposed between and alined with the shafts 38 and suitably connected thereto by suitable detachable couplings, and a belt section is added between the ends of the conveyor belt. When it is desired to add another section to further lengthen the conveyor, the operation above described is repeated and another conveyor section inserted in the conveyor frame. When it is desired to move the conveyor bodily laterally into different material moving positions, for instance from the dotted line position shown in Fig. 14 to the full line position shown in that figure, this can be accomplished by connecting the free ends of the cables of the drums 35 and 41 to anchor jacks located near the coal face, and when the clutches 43 are connected, the drums may be rotated in the direction to wind in their respective cables, thereby to move the conveyor bodily laterally toward the coal face. The conveyor, as shown in Fig. 14, has its rear elevated end projecting into the mine entry above an empty mine car, so that as the material to be moved is conveyed rearwardly by the conveyor, it is discharged into the waiting mine car.

As a result of this invention, it will be noted that an improved sectional conveyor is provided especially designed for use in mines and having improved means for driving the conveyor element thereof. It will further be noted that an improved conveyor means is provided having an improved self-moving means whereby the conveyor may be moved bodily into different operating positions with comparative facility. It will still further be evident that an improved sectional conveyor is provided having novel means whereby additional conveyor sections may be provided therein to increase the length of the conveyor as desired. These and other uses and advantages of the improved material moving apparatus will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a material moving apparatus, a frame composed of a series of alined frame sections detachably connected together to form an elongated unit, said frame sections including end frame sections and one or more intermediate frame sections, detachable means for connecting said frame sections together, conveying means on said frame sections, a motor on one frame section for driving said conveying means, and means driven by said motor independently of any drive by said conveying means for bodily moving said frame into different material moving positions including a feeding device individual to each frame section, said devices all driven by said motor.

2. In a material moving apparatus, a frame movable over the mine floor and comprising a series of alined frame sections detachably joined together to form an elongated unit, conveying means guided on the frame sections of said frame unit, a motor carried by one of said frame sections for moving said conveying means along its guide relative to said frame unit, and means distinct from said conveying means and driven by said motor independently of any drive by said conveying means for moving said frame unit laterally over the mine floor into different material moving positions including a feeding device and driving means therefor individual to each frame section.

3. In a material moving apparatus, a frame movable over the mine floor and comprising a series of alined frame sections detachably joined together to form an elongated unit, conveying means guided on the frame sections of said frame unit, a motor carried by one of said frame sections for moving said conveying means along its guide relative to said frame unit, and means distinct from said conveying means and driven by said motor independently of any drive by said conveying means for moving said frame unit laterally over the mine floor into different material moving positions including a feeding device and driving means therefor individual to each frame section, each feeding device including a feed drum and a cooperating feed cable connectible to an extraneous abutment in advance of said slidable frame unit, and each of said driving means including a transmission element journaled on each frame section and operatively connected to the adjacent element on the next adjacent frame section.

JOSEPH F. JOY.