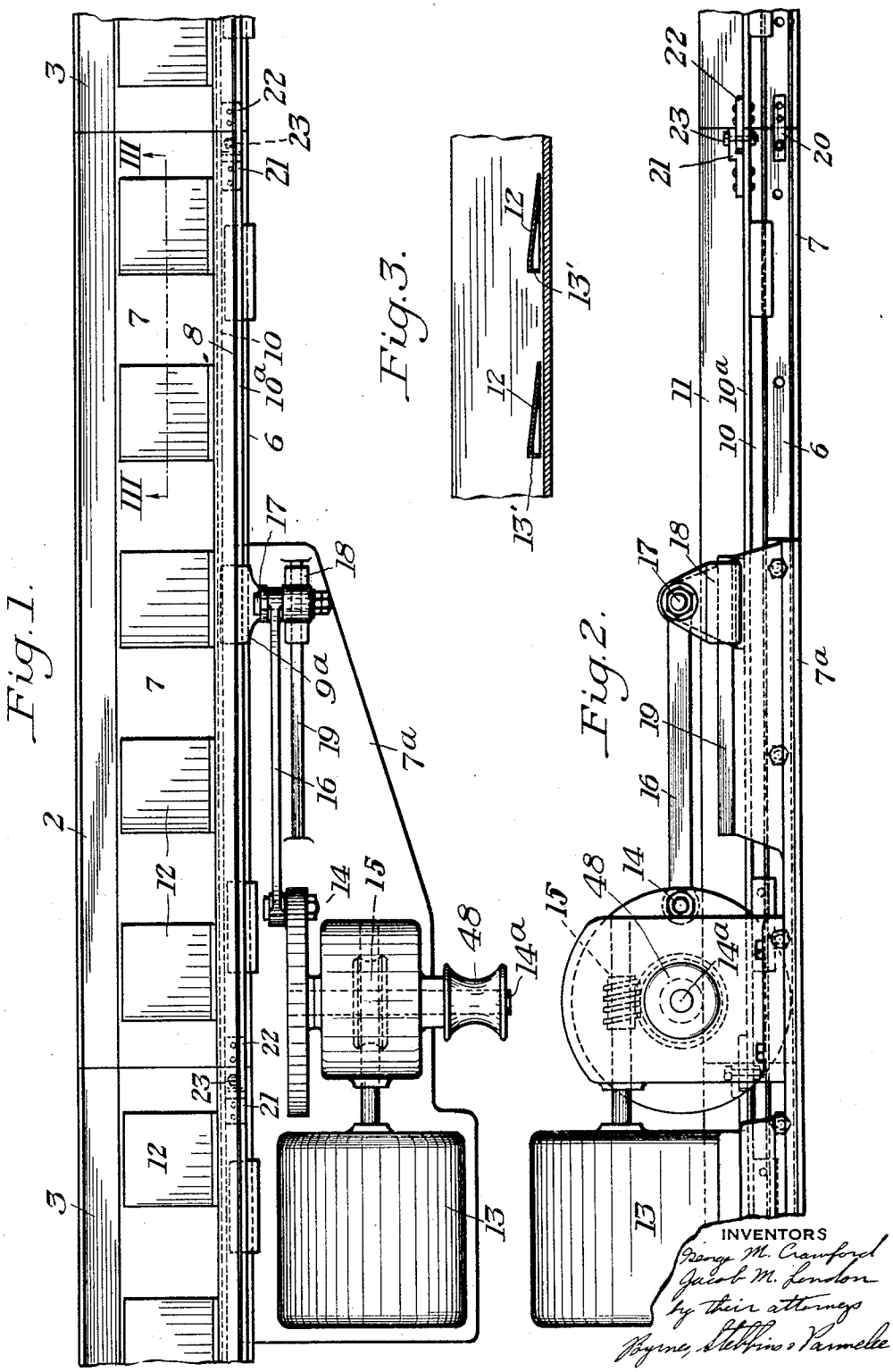
June 14, 1932. G. M. CRAWFORD ET AL 1,863,085

CONVEYER

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CONVEYER

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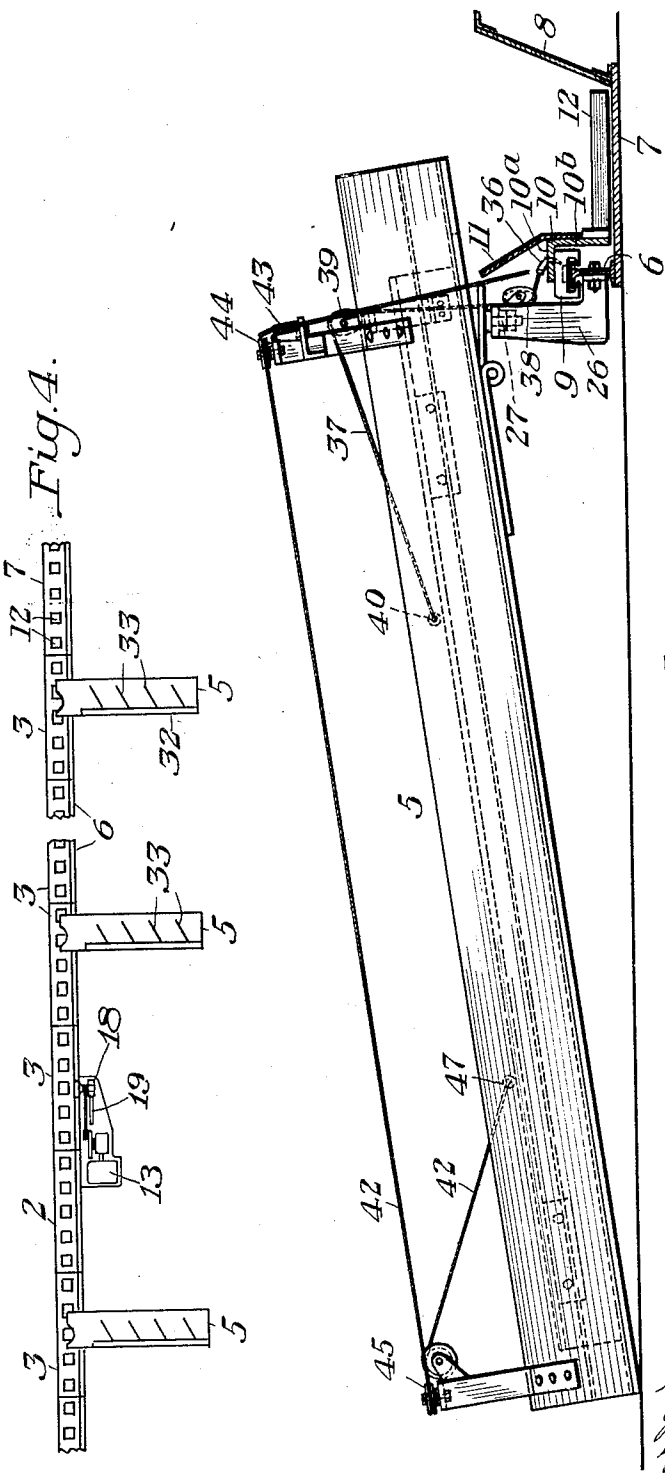


Fig. 5.

Fig. 4.

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June 14, 1932. G. M. CRAWFORD ET AL 1,863,085

CONVEYER

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Fig. 6.

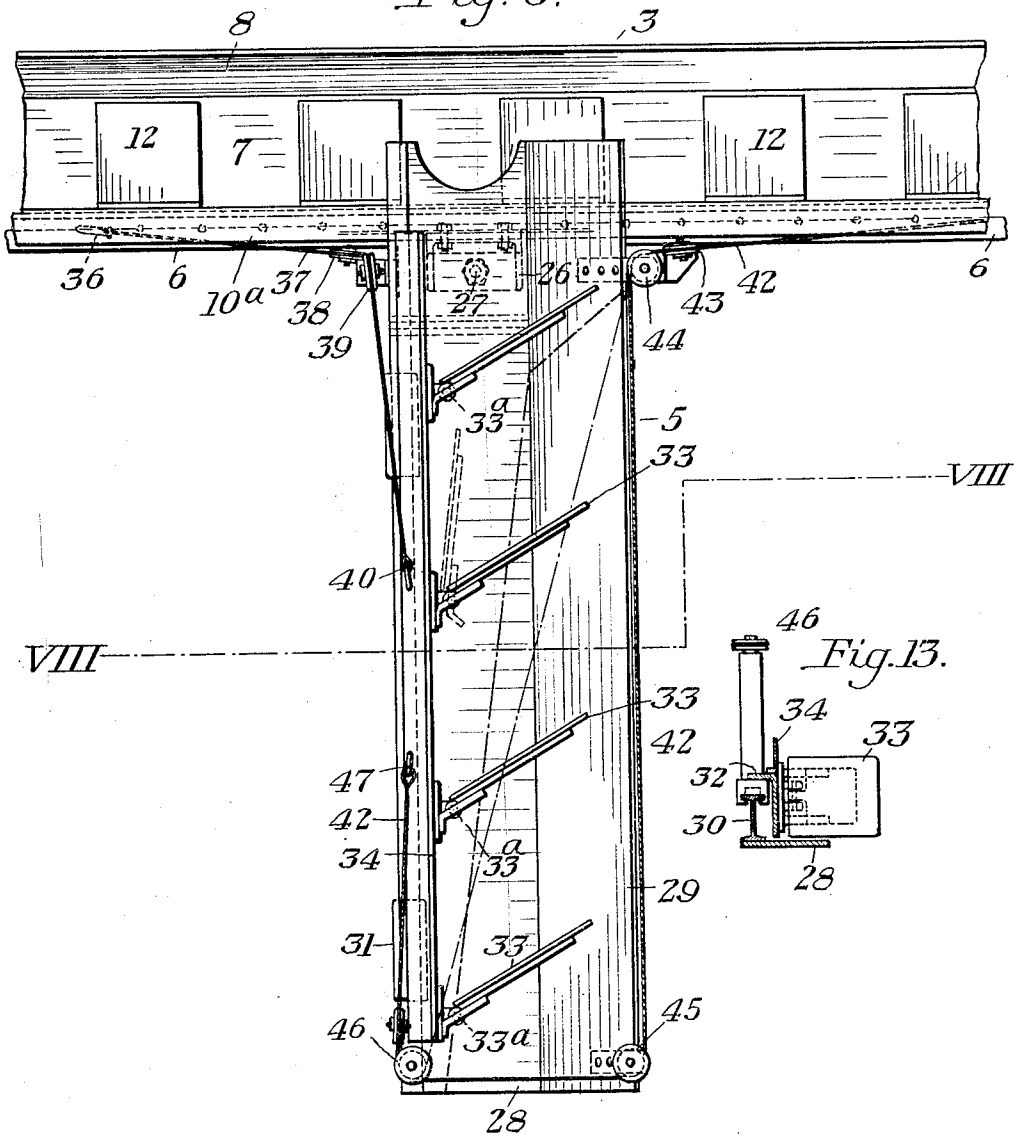
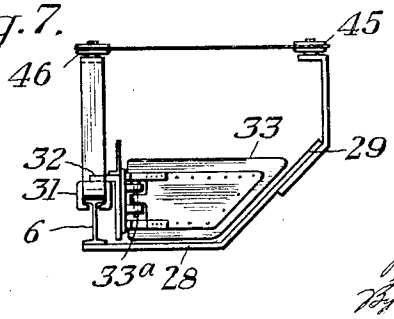


Fig. 13.

Fig. 7.



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CONVEYER

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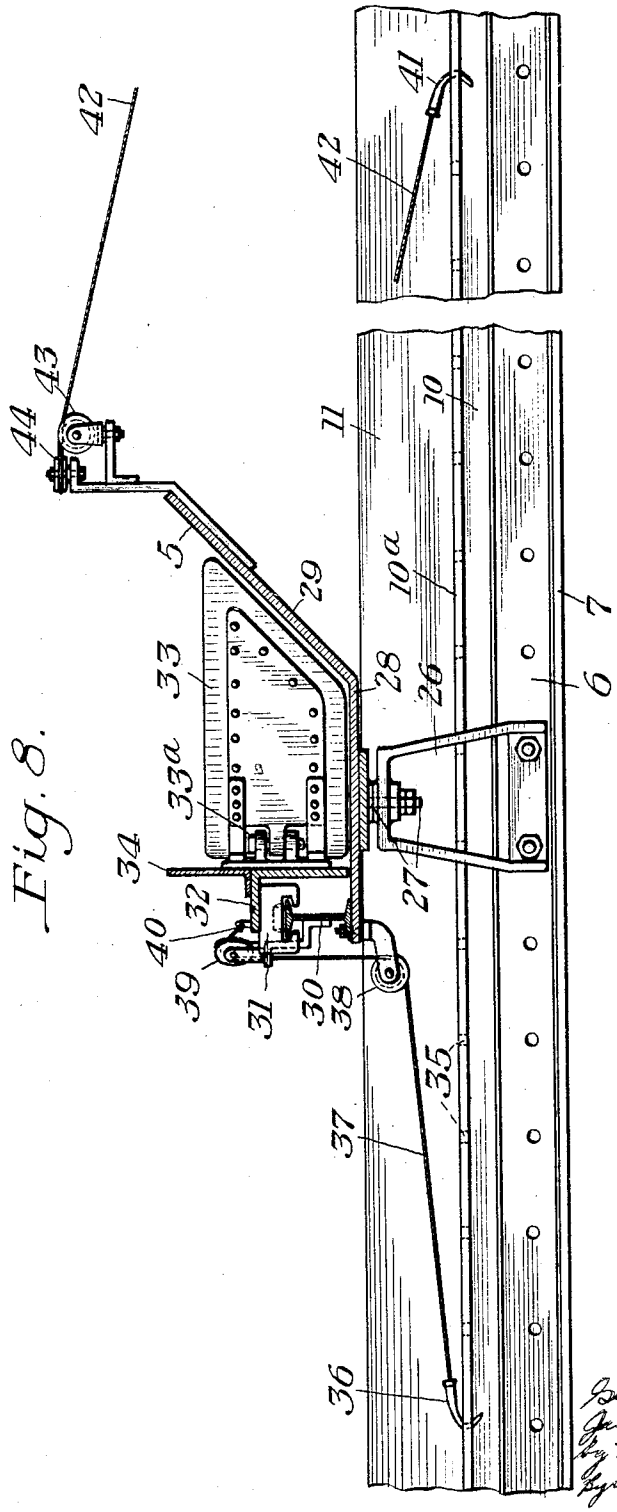


Fig. 8.

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CONVEYER

Filed June 21, 1926 5 Sheets-Sheet 5

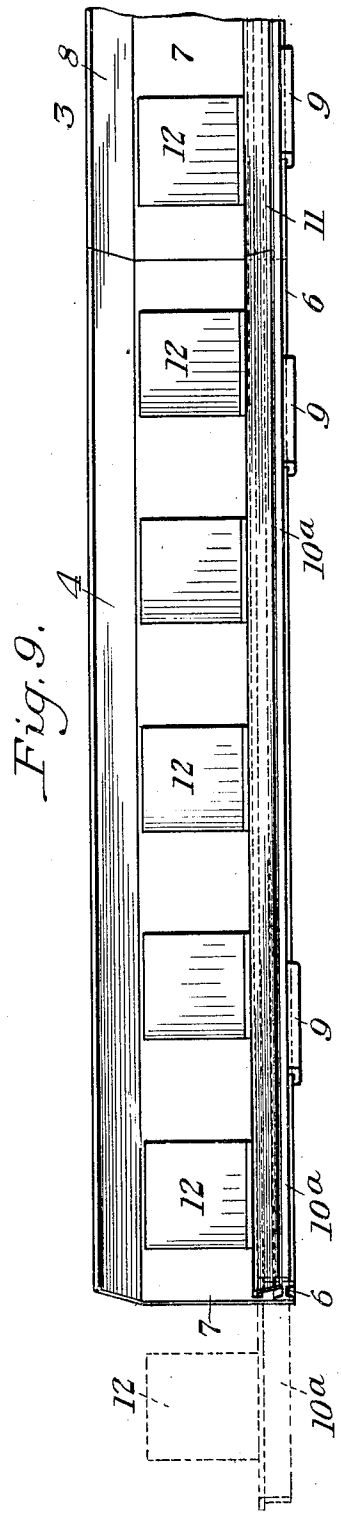


Fig. 9.

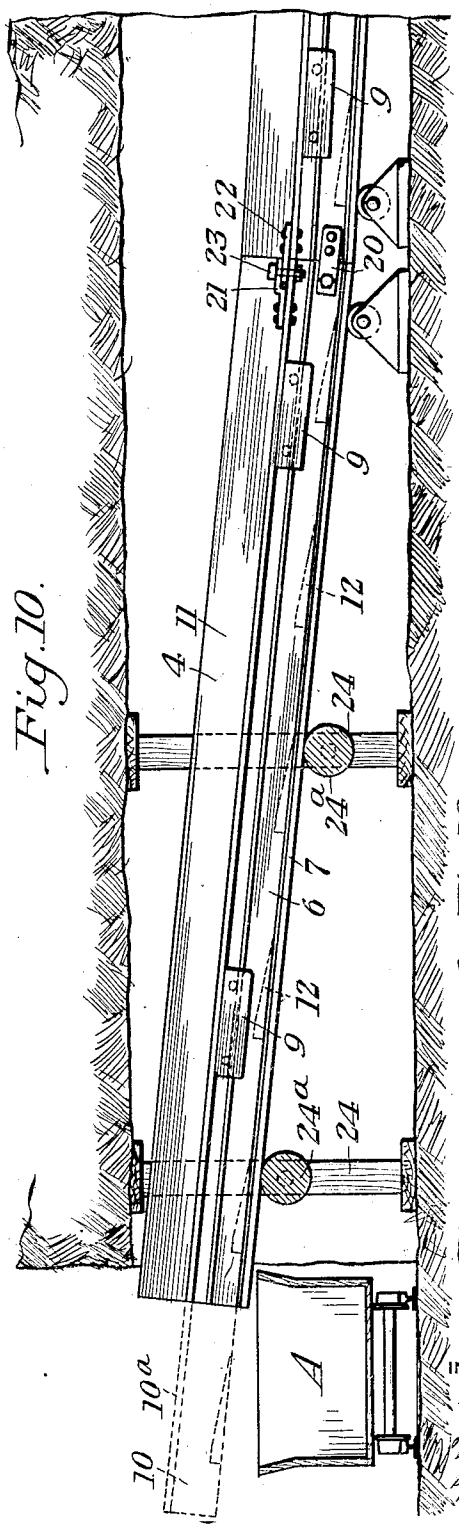


Fig. 10.

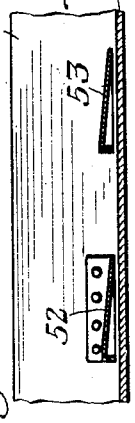


Fig. 11.

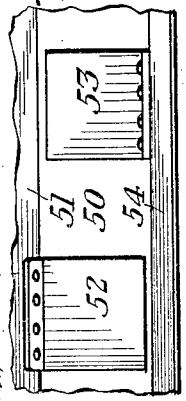


Fig. 12.

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1,863,085

UNITED STATES PATENT OFFICE

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CONVEYER

Application filed June 21, 1926. Serial No. 117,247.

This invention relates to conveyers and more particularly to sectional conveyers specially designed for use in mines and other places where the conveyer must be capable of operating in a restricted space and where it must be capable of being extended and contracted.

The invention relates more particularly to a conveyer more especially adapted for use in connection with a loading machine of the type disclosed in our co-pending application Serial No. 117,246 filed June 21, 1926, but its use is not confined to employment in connection with such a machine.

According to the present invention, we provide a conveyer which is made up in sections, each section including a trough and a reciprocable member in the trough which member is provided with flights so shaped as to slip by the material in the trough on movement of the reciprocable element in one direction, but which serves to push the material in the trough forward when the reciprocable element moves in the opposite direction. These sections are so constructed that they can be readily connected so that they can be made of any length necessary to meet practical requirements and the sections can be added and removed with ease, so that the length of the conveyer can be varied to suit particular conditions.

We also provide a conveyer having feeding troughs or conveyers associated therewith whereby material may be delivered from the feeders to the main conveyer at one or more points along its length.

The invention may be readily understood by reference to the accompanying drawings which illustrate a preferred embodiment of the invention and in which:

Figure 1 represents a plan view of a portion of the conveyer, this view showing that section of the conveyer to which the driving mechanism is attached;

Figure 2 is a side elevation of a portion of the conveyer shown in Figure 1;

Figure 3 is a longitudinal section through a small portion of the conveyer in the plane of line III—III of Figure 1;

Figure 4 is a plan view showing an entire conveyer system with several feeders branching out therefrom;

Figure 5 is a transverse section through the main conveyer at a point in advance of one of the feeder conveyers;

Figure 6 is a plan view of a portion of the main conveyer and one of the feeders;

Figure 7 is an end view of the feeder shown in Figure 6;

Figure 8 is a transverse section in the plane of line VIII—VIII of Figure 6;

Figure 9 is a plan view of a terminal section of the conveyer showing the manner in which they can be made to deliver to a car;

Figure 10 is a side elevation of the discharge terminal of the conveyer showing how the same may be located in a mine where the available space is relatively limited;

Figure 11 is a view similar to Figure 3 of a slightly modified form of conveyer;

Figure 12 is a plan view of the conveyer structure shown in Figure 11, part of the sides of the conveyer trough being broken away;

Figure 13 is a section similar to Figure 7 showing a modified form of feeder, wherein the side plate of the feeder is cut away.

In the drawings, 2 designates the section of the conveyer to which the operating mechanism is attached, 3 designates the ordinary sections of the conveyer, 4 is the discharge terminal and 5 is any one of the transverse conveyers or feeders.

When the conveyer is used in combination with a loading machine of the type disclosed in our above mentioned co-pending application, the section of the conveyer having the driving mechanism may be omitted, the conveyer in such case being operated directly by driving means on the loading machine.

Each section of the main conveyer, including that section which has the driving mechanism associated therewith, as well as the terminal section, is comprised of an I-beam 6 set vertically with a plate 7 secured to the bottom thereof. At the edge of the plate 7 opposite the I-beam 6 is a retaining wall or flange 8. Slidably on the I-beam of each section, are one or more shoes, preferably two, designated 9, and these shoes are so shaped

that they may slide back and forth on the top of the I-beam and be retained from lifting off the I-beam. Secured to the shoes of the respective sections, is an angle bar 10. The angle bar 10 is preferably substantially co-extensive with the I-beam section 6. This angle bar 10 has one of its legs 10^a disposed over the top of the I-beam 6 and has its other leg 10^b depending into the space between the I-beam 6 and the flange 8 and is closely adjacent the I-beam. Secured to the angle bar 10 is a side plate 11. This side plate 11, is preferably of substantially the same height as the fiange 8 and its lower edge is close to the bottom plate 7. Secured to the side plate 11 in any suitable fashion is a series of flights by means of which movement of material along the bottom plate 7 is effected. These flights comprise gradually inclined plates 12 with a vertical shoulder 13′ at the front thereof.

It will be seen that a trough is formed by the bottom plate 7 and the side plates 8 and 11. By reason of the angle bar 10 being carried on shoes 9, it can be reciprocated with respect to the I-beam and when it reciprocates the side plate 11 and the flights 12 are reciprocated therewith. The flights 12 are spaced at regular intervals and the distance between them is preferably substantially equal to the reciprocating movement of the conveyer.

One of the conveyer sections, such as the section 2 has the bottom plate 7 laterally extended to provide the platform 7^a at one side thereof. On this platform is set a motor 13 which drives an eccentric pin 14 through a reducing gear 15. The eccentric pin 14 has a connecting rod 16 attached thereto and the other end of the connecting rod is coupled to a pin 17 on a specially constructed shoe 9^a generally similar to the shoes 9, but having an extension thereon for carrying the pin 17. The pin 17 is also atttached to a slide block 18 reciprocably along the guide 19. The guide 19 and the block 18 serves to properly guide the connecting rod 16 in order to effectively transmit a reciprocating movement to the shoe 9^a.

From the foregoing, it will be seen that when the motor 13 is driven, the shoe 9^a will be reciprocated, and with the reciprocation of this shoe, the series of flights associated with this section of the conveyer will also be reciprocated.

Other conveyer sections may be connected to one or both ends of the section 2. For effecting such connection, the I-beam sections of the respective conveyer lengths are brought into alignment and the abutting ends are secured together by suitable connections, such for instance as fish plates 20 attached to the webs of the respective I-beam sections. For the purpose of connecting the angle bars of the respective sections together, each bar is provided at one end with a clip 21 into which an extension 22, secured to the abutting end of the next adjacent section, is fitted, the clip and the extension being detachably secured by a bolt and nut 23.

In this manner, the conveyer can be extended to any practical length which may be necessary in the particular work which it is primarily designed to do, and sections can be removed when necessary with little difficulty. The conveyer is, therefore, particularly useful in mining operations where the conveyer is laid down in the room as the room is advanced and where the conveyer must be gradually taken up as the supporting block in the room is removed and the retreat from the room effected. In its operation, the flights are continuously reciprocated a distance substantially equal to the distance between flights, and the flights are so shaped that they will ride under the material in the trough on their receding movement but will push the material forward by means of their vertical shoulders 13′ on their forward movement.

The discharge terminal of the conveyer may be inclined, and such an arrangement is particularly desirable in a coal mine where the material is being conveyed by the conveyer from the working face in a room down to a car in the main heading. This arrangement is shown in Figures 9 and 10. The end sections of the conveyer are gradually inclined and this part of the conveyer is supported in the inclined position by the framework 24. The end of the conveyer terminates substantially flush with the end of the room, projecting beyond the room just sufficiently far to overhang a car such as that indicated at A in Figure 10. In the operation of the conveyer, the last flight in the terminal section will project, upon reciprocation of the conveyer, out beyond the end of the conveyer to the dotted line position shown in Figures 9 and 10. Inasmuch as there will be no supporting bottom for the material in the conveyer where the flights are thus projected, the material in the conveyer will fall into the car.

The conveyer may be supplied with material at any point in its length and may cooperate with a loading machine at its forward terminal. In certain systems of mining, it is desirable that provision be made for loading material into the conveyer from feeders at one or more points along its length. According to the present invention, the feeders 5 may be employed at any suitable intervals. The feeders 5 include a bracket 26 which is removably bolted to the web of one of the I-beams 6 of the main conveyer, and for this purpose, the webs of the I-beams are perforated at intervals so that bolts passing through the bracket may also pass through the web of the I-beam to thereby secure the bracket in place. Carried on this bracket,

preferably by a pivot 27, is a plate 28 which has an inclined or outwardly flared flange 29 along one edge thereof and which has an I-beam section 30 along its other edge. Slidably guided on the I-beam section 30 are shoes 31 to which is secured an angle bar 32. This angle bar carries a plurality of hinged flights 33 pivotally secured thereto at 33ª. The flights are so hinged that they will push material along the plate 28 in one direction, but will fold in toward the angle bar and ride past the material on the plate when the angle bar is moved in the reverse direction. In order to increase the capacity of the feeder, a flange 34 is provided on the angle bar 32. The feeder is preferably inclined, one end projecting over the main conveyer while the other end rests on the ground. The angle bar 32 can be reciprocated in any preferred manner, but we prefer to operate the feeder from the main conveyer and thereby eliminate any necessity for auxiliary driving means.

To effect this operation of the feeder, a series of holes may be provided in the horizontal leg 10ª of the angle bar 10, of that particular section to which the feeder is attached. These holes are designated 35. Hooked into one of the holes 35, is a hook 36 which is attached to a cable 37 passing around sheaves 38 and 39. The other end of this cable is attached to the angle bar 32 at 40. Hooked into another one of the holes 35, on the opposite side of the feeder, is a second hook 41 on the end of a cable 42 which is guided over sheaves 43 and 44 at the inner end of the feeder, and which extends along the feeder to sheaves 45 and 46 at the end of the feeder. The other end of the cable 42 is attached to the angle bar 32 at 47.

As thus arranged, the cables 37 and 42 will alternately slide the angle bar 32 back and forth on the I-beam 30 and thereby cause a movement of material from the outer end of the feeder towards the inner end where it will discharge into the main conveyer. These feeders can be located adjacent a working point in a mine where operators can conveniently throw coal or other material directly into the feeders. The feeders can be adjusted to any particular point in a given section, this being provided for by the series of holes in the web of the I-beam and in the horizontal leg of the angle bar as shown in Figure 8. It is not necessary to have these perforations in every section of the conveyer, as sections with perforations therein can be inserted in the length of the conveyer at any point where a feeder is necessary or desirable.

A conveyer, as thus constructed, can be cheaply manufactured and an operator can supply himself with only as many sections as are needed and subsequently obtain additional sections when necessary. The conveyer can be efficiently used in mines, where the limited space available does not permit of the use of conveyers of the ordinary continuous belt type, and where such continuous belt conveyers are not satisfactory for the reason that they cannot be extended with the advancing of a working face and contracted when a retreating operation is taking place. The sections can be made from standard rolled metal forms and from sheet metal, so that very little special machinery is necessary for the fabrication thereof, and the weight per section can be relatively low.

The invention can be conveniently used in connection with the loading machine disclosed in our copending application wherein the machine is provided with means for operating a reciprocable conveyer of this type. The provision of feeders at intervals along the conveyer increase the usefulness of the conveyer, especially in mining operations where it is desirable that the miners should have to carry the material as little distance as possible. The usefulness of the feeders is further increased by provision of means for driving them from the main conveyer so that auxiliary motors are not required. This enables the feeders to be built much more cheaply and materially simplifies the entire arrangement.

The conveyer is sufficiently flexible, as has been hereinbefore pointed out, to permit of the discharge terminal to be elevated so that material may be delivered directly from the conveyer to a receiving car or other receiving means, and the conveyer can effectively operate to move the coal or other material up such an incline.

Where the conveyer is operated from a mechanism such as that shown in Figures 1 and 2, the shaft 14ª which carries the disk in which the eccentric pin 14 is mounted, may be provided with a drum or winch 48 so that the operating means for the conveyer can also be utilized as a means for pulling posts in the mine, for dragging conveyer sections into place, and for performing other operations where a pulling apparatus is ordinarily required or desirable.

In the arrangement shown in Figures 11 and 12, the conveyer is of the general type hereinbefore described, but the flange 51 on the bottom plate 50 may carry some of the flights 52 while the remaining flights 53 are carried on the reciprocable angle bar 54. For instance, every other flight 52 may be stationary while the alternate flights 53 are movable. Instead of having alternate flights movable, there may be one stationary flight to several movable ones. This arrangement may be more satisfactory under some conditions, especially where there is any considerable incline to the conveyer.

The framework 24 at the discharge end of the conveyer preferably includes rollers 24ª, so that when sections are being added to the conveyer, these can be easily slipped into place

at the discharge end, where there is usually plenty of room. This is done after the entire conveyer has been pulled forward over the floor of the mine.

In Figure 13 I have shown a feeder wherein the flange 29 has been omitted from the plate 28 so that the feeder can be pushed into a pile of loose material and thereby function as a loader or gathering means. When this is done the bottom plate 28 is of rearwardly increasing width, as indicated by the broken line in Fig. 6.

While we have illustrated certain preferred embodiments of our invention, it will be understood that the invention may be otherwise embodied and that various changes may be made therein within the spirit and contemplation of our invention and under the scope of the following claims.

We claim:

1. A conveyer including a structural metal beam, a shoe slidable on the beam, a reciprocable side member carried by the shoe, a series of flights secured to the side member, said flights being inclined in one direction and having a material engaging shoulder thereon, means for reciprocating the side plate, and a bottom plate over which the flights are reciprocated.

2. A conveyer comprising a beam, a shoe slidable on the beam, a side plate member secured to the shoe, a series of spaced apart flights connected to the side plate member, said flights being inclined in one direction and having an abrupt vertical face thereon, a bottom plate over which the flights move, means for reciprocating the shoe and the parts carried thereby, and a second side plate secured to the bottom plate.

3. A conveyer section comprising a structural metal beam, a plurality of shoes slidable along the beam, an angle bar connecting the shoes, a side plate carried by the angle bar, and spaced apart flights carried by the side plate and angle bar, said flights being inclined in one direction and having a vertical face thereon, a bottom plate over which the flights move, a side plate secured to the bottom plate, and means for reciprocating the shoes and the parts carried thereby.

4. A conveyer comprising a plurality of sections, each of which is comprised of a bottom plate member, a beam secured to one side of the bottom plate member, means for connecting the adjacent beams, shoes slidable along the beams of the several sections, and an angle bar on each section secured to the shoes, the length of each bar being substantially coextensive with the beam, means for connecting the ends of adjacent bars, spaced apart flights on the bars, having pushing surfaces for effecting movement of material over the bottom plate sections in one direction only, and means for effecting reciprocation of the angle bar sections.

5. A sectional conveyer composed of a plurality of detachably connected individual sections, each of which comprises a fixed beam member, a plate secured to the beam member of each section, a bar slidably supported on the beam member of each section, spaced apart flights carried by the bar of each section and rigidly secured thereto, said flights having surfaces arranged to effect movement of material along the bottom plate members in one direction only upon reciprocation thereof, means for detachably connecting the several beam members, means for detachably connecting the bar members, and means associated with one of the sections for imparting a reciprocable movement to the bar sections to reciprocate the flights throughout the length of the entire conveyer.

6. A conveyer formed of detachably connected sections, each section having a series of reciprocable spaced apart flights therein including pushing and lifting surfaces to effect movement of the material along the conveyer in one direction only, means for detachably and effectively connecting the several sections, the portion of the conveyer at the discharge end thereof being inclined, and means for simultaneously effecting the reciprocation of the flights of the several sections.

7. The combination with a sectional conveyer of the reciprocating flight type, of a feeder conveyer of a similar type attached to one of the sections of the main conveyer, said feeder conveyer being adjustable along the section of the main conveyer to which it is attached and an adjustable driving connection for operating the feeder conveyer from the main conveyer.

8. The combination with a main conveyer comprising a continuous length of I-beam made up in sections, and having a bottom plate secured thereto and having a continuous series of flights slidably supported on the I-beam, of a means for reciprocating the continuous series of flights, and a feeder conveyer associated with the main conveyer and connected thereto, said feeder conveyer also having a reciprocable series of flights, and a flexible connection between the flights of the main conveyer and the flights of the feeder conveyer whereby the flights of the feeder conveyer may be operated upon reciprocation of the flights of the main conveyer.

9. The combination with a main conveyer comprising a continuous length of I-beam made up in sections, and having a bottom plate secured thereto and having a continuous series of flights slidably supported on the I-beam, of a means for reciprocating the continuous series of flights, and a feeder conveyer associated with the main conveyer and connected thereto, said feeder conveyer also having a reciprocable series of flights, and a flexible connection between the flights of the

main conveyer and the flights of the feeder conveyer whereby the flights of the feeder conveyer may be operated upon reciprocation of the flights of the main conveyer, said feeder conveyer being adjustable longitudinally of the main conveyer.

10. A conveyer made up of troughlike sections, a side wall part of each section being movable, and spaced apart flights carried by the movable part having one face arranged to ride past material in the conveyer upon movement thereof in one direction, and having another face to advance the material in the conveyer upon movement thereof in the opposite direction and means for effecting reciprocation of the movable part.

11. A conveyer comprised of a plurality of trough-like sections each of which includes a fixed bottom plate member and a movable bar member, the plate members of the several sections being connected and the movable bar members of the several sections being connected, a series of spaced apart flights carried by the movable bar members rigidly fixed thereto and having means arranged to effect movement of the material along the conveyer in one direction only upon reciprocation thereof, and means associated with one of the sections for effecting reciprocation of the movable bar member throughout the length of the conveyer.

12. A conveyer comprised of a plurality of trough-like sections each of which includes a fixed bottom plate member and a movable bar member, the plate members of the several sections being connected and the movable bar members of the several sections being connected, a series of spaced apart flights carried by the movable bar members rigidly fixed thereto and having their surfaces arranged to effect movement of the material along the conveyer in one direction only upon reciprocation thereof, and means associated with one of the sections for effecting reciprocation of the movable bar member throughout the length of the conveyer, said means including a driving motor, a shaft driven by the motor, an eccentric pin driven by the rotation of the shaft and a connecting rod between the pin and the movable bar of the conveyer.

13. A conveyer comprised of a plurality of trough-like sections each of which includes a fixed bottom plate member and a movable bar member, the plate members of the several sections being connected and the movable bar members of the several sections being connected, a series of spaced apart flights carried by the movable bar members rigidly mounted thereon and having their surfaces arranged to effect movement of the material along the conveyer in one direction only upon reciprocation thereof, and means associated with one of the sections for effecting reciprocation of the movable bar member throughout the length of the conveyer, said means including a driving motor, a shaft driven by the motor, an eccentric pin driven by the rotation of the shaft and a connecting rod between the pin and the movable bar of the conveyer, said shaft having a drum thereon.

14. A conveyer including a bottom plate member, a stationary side of the bottom plate member, a bar movable along the bottom plate member, flights on the bar with their surfaces arranged to effect movement of material along the bottom plate member in one direction only upon reciprocation thereof, and stationary flights interposed between some of the movable flights.

15. A conveyer of the reciprocating flight type having a bottom plate and a series of flights reciprocable along the bottom plate, means for connecting the reciprocable flights, and stationary flights interposed between some of the reciprocable flights.

16. A conveyer comprising a bed plate, an I beam secured thereto along one side, a plurality of shoes slidable on said beam, an angle bar supported on said shoes with a flange depending toward said plate, a series of flights carried by said flange, and means for reciprocating said bar.

17. A conveyer comprising a plurality of sections detachably connected end to end, each of which includes a bottom plate member and a movable bar member, means on the bottom plate member for guiding the bar member, spaced apart flights on the bar member of each section having surfaces for effecting movement of material along the bottom plate in one direction only, means for detachably connecting the bar members of the several sections, means for detachably connecting the plate members of the several sections, and a driving means for the connected bar sections for effecting reciprocation of the flights throughout the length of the conveyer.

18. A conveyer section including a bottom plate member having a fixed retaining flange on one side thereof, a movable retaining flange on the other side thereof, spaced apart flights rigidly fixed on the movable flange having an inclined lifting surface and a pushing surface adjacent said plate member, to effect movement of material along the bottom plate in one direction only, and means for reciprocating said movable side flange.

In testimony whereof we have hereunto set our hands.

GEORGE M. CRAWFORD.
JACOB M. LONDON.