Jan. 2, 1923.

1,440,788

E. C. MORGAN.

MACHINE FOR MINING.

FILED NOV. 4, 1915.

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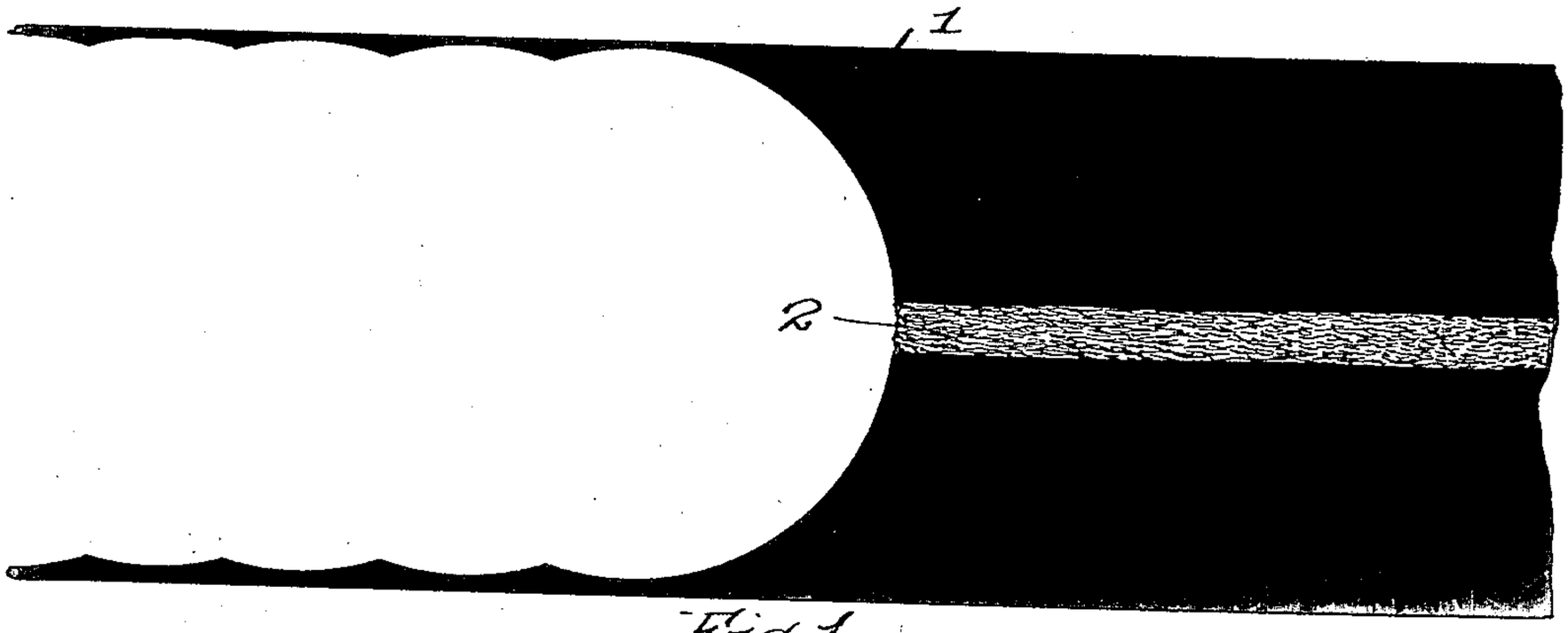

Fig. 1

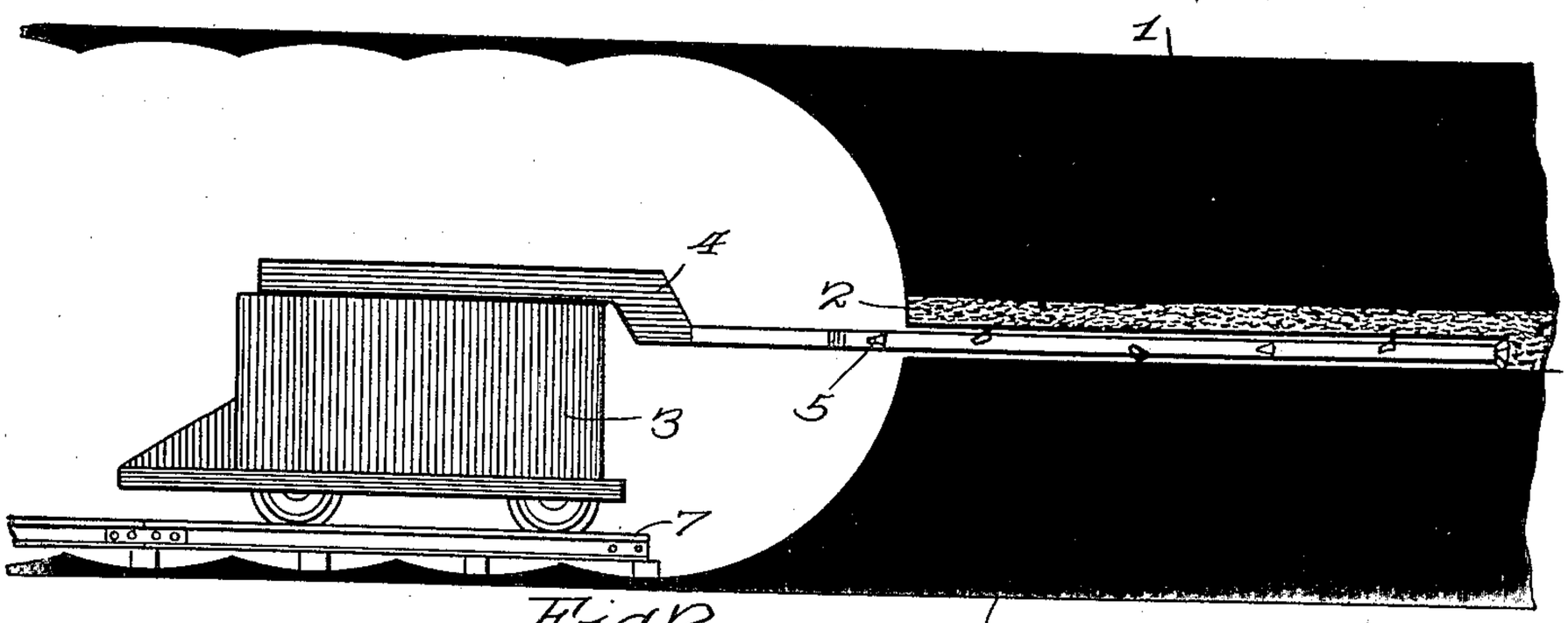

Fig 2

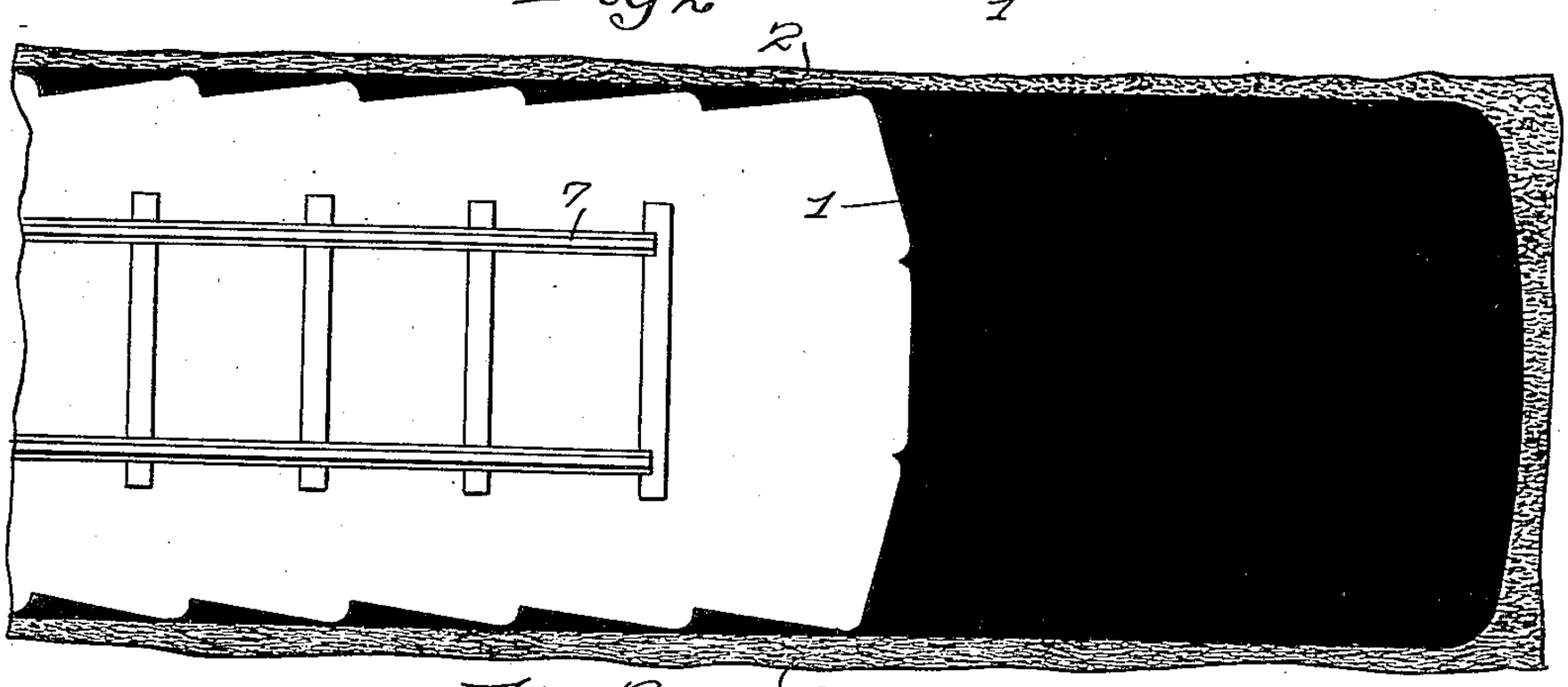

Fig. 3

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Jan. 2, 1923.

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MACHINE FOR MINING.

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11 SHEETS-SHEET 2

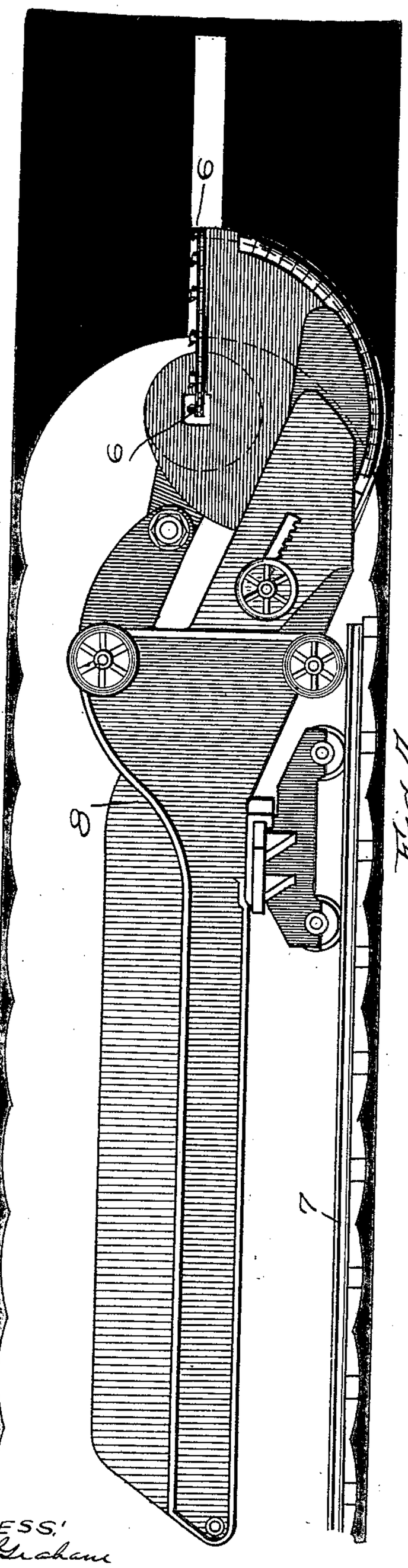

Fig. 4.

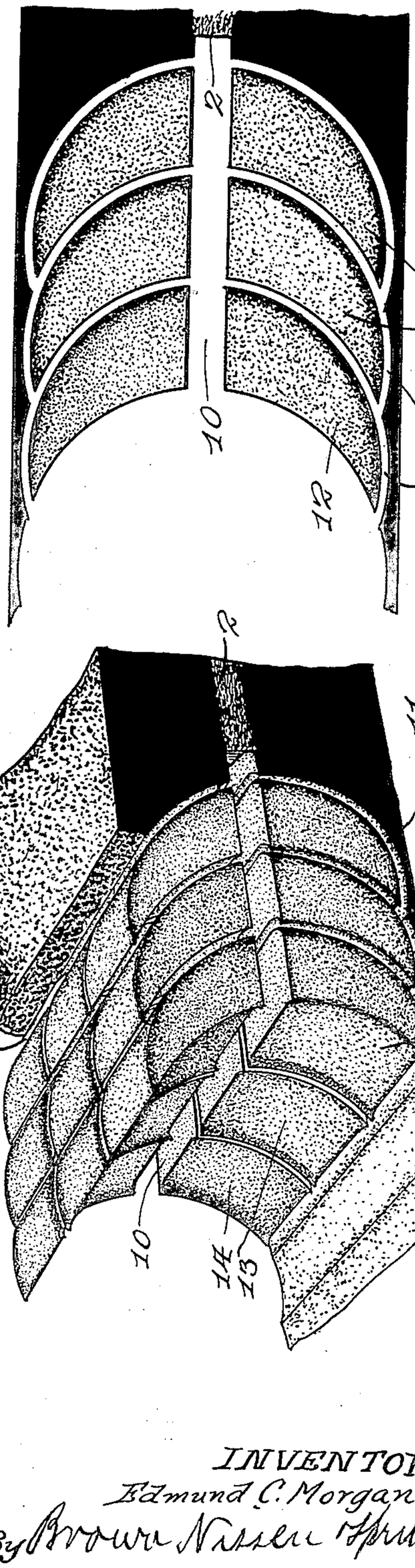

Fig. 6.

Fig. 5.

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Jan. 2, 1923.

1,440,788

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11 SHEETS-SHEET 3

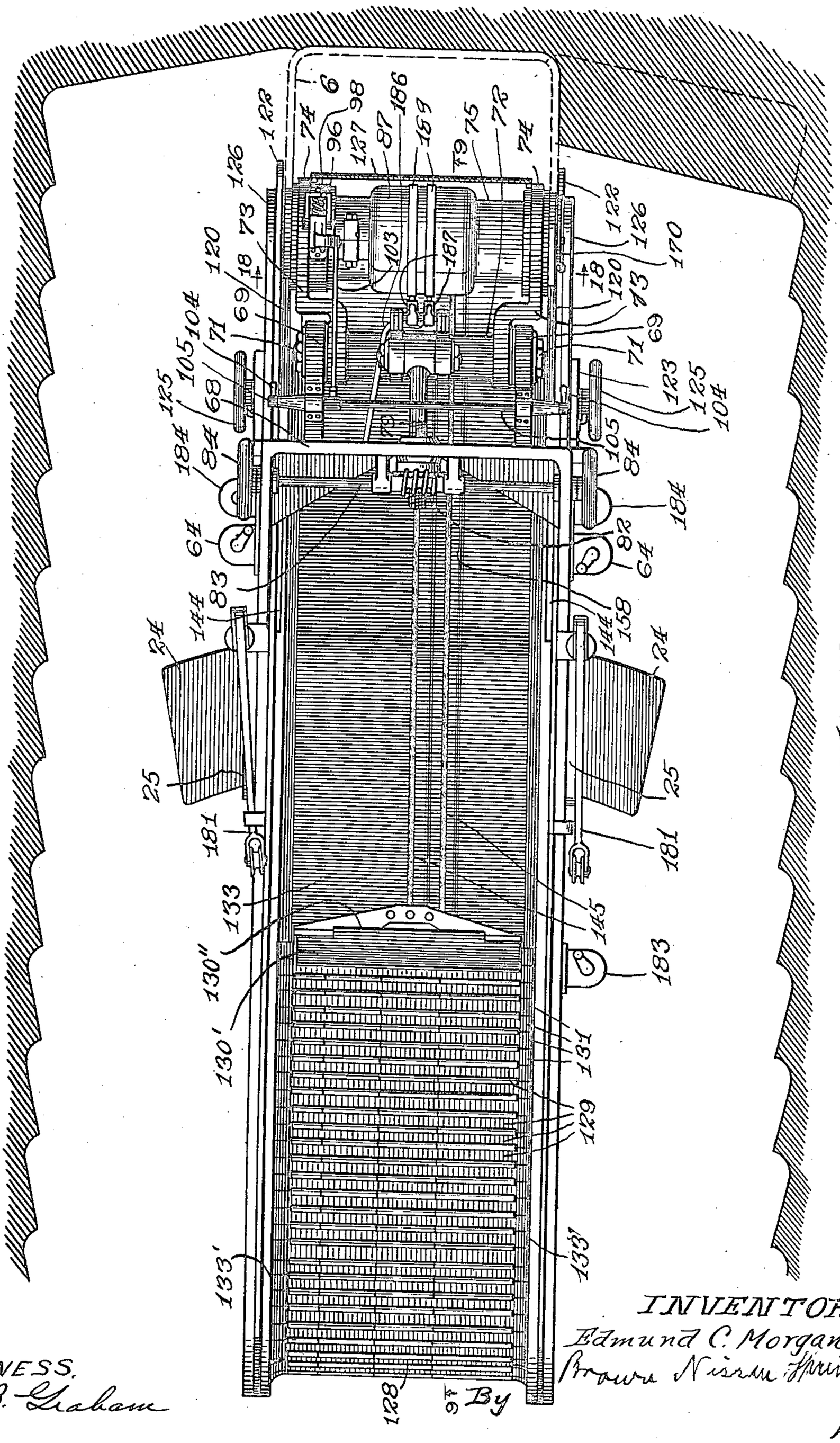

Fig. 2.

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Jan. 2, 1923.

E. C. MORGAN.
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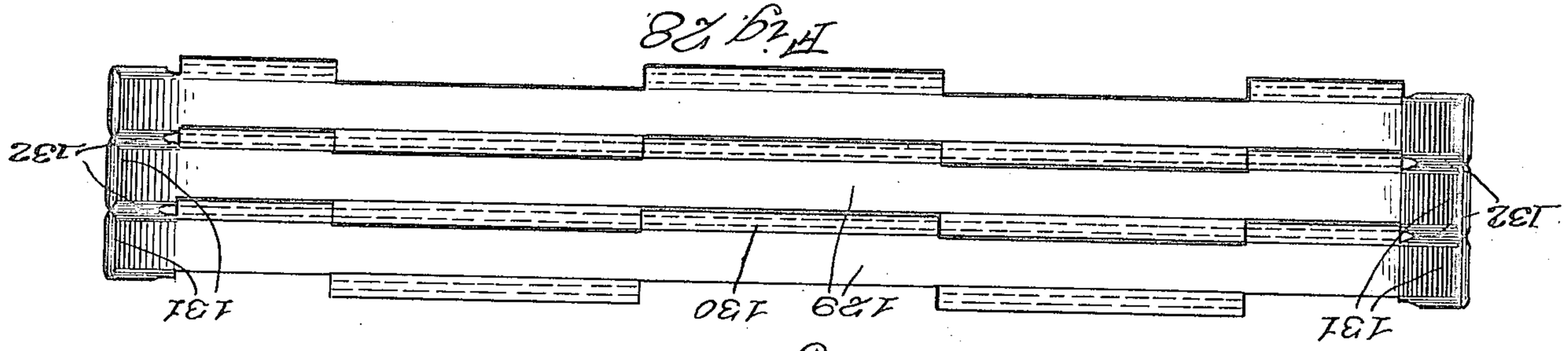

Fig. 28.

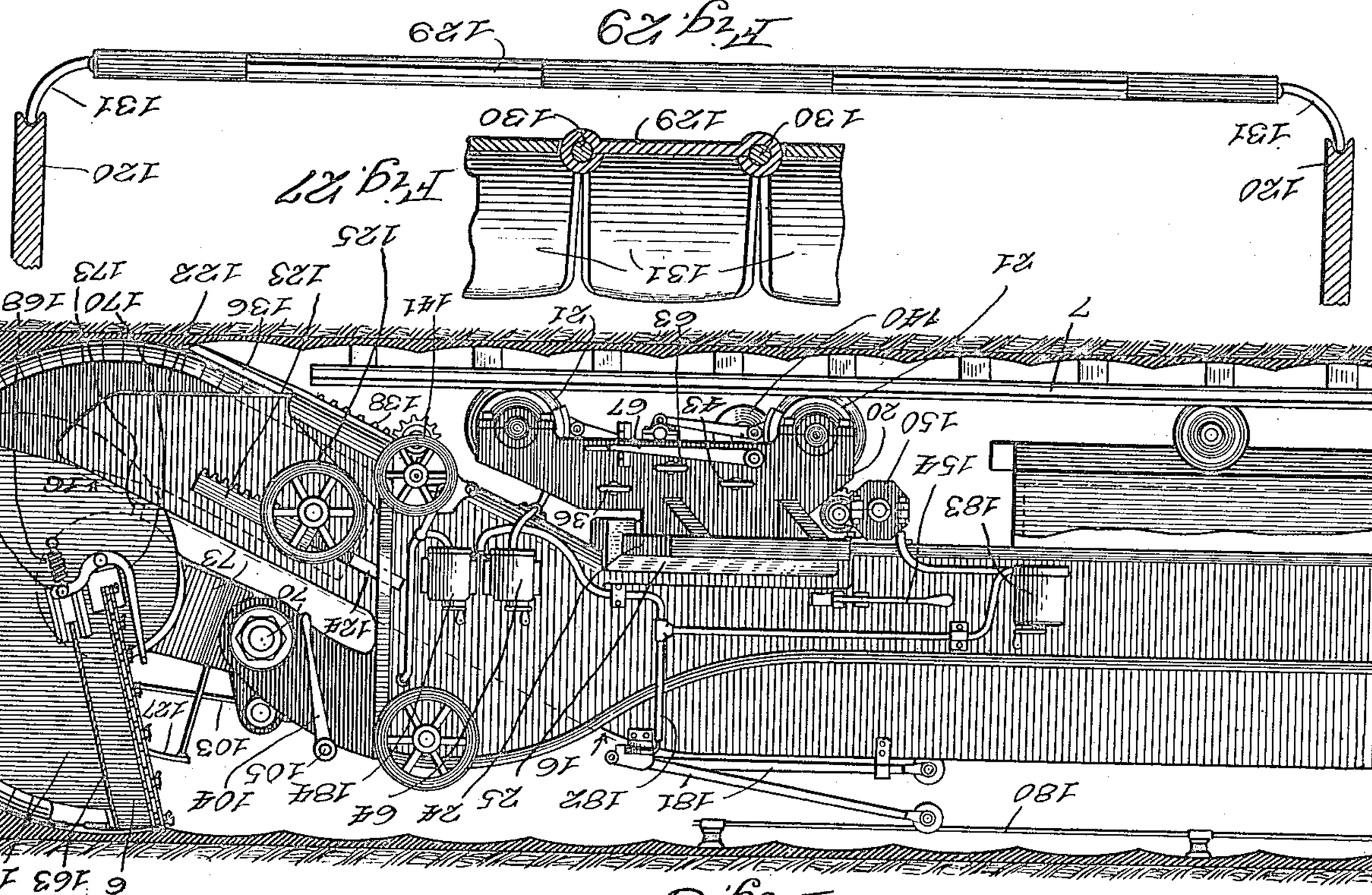

Fig. 27.

Fig. 8.

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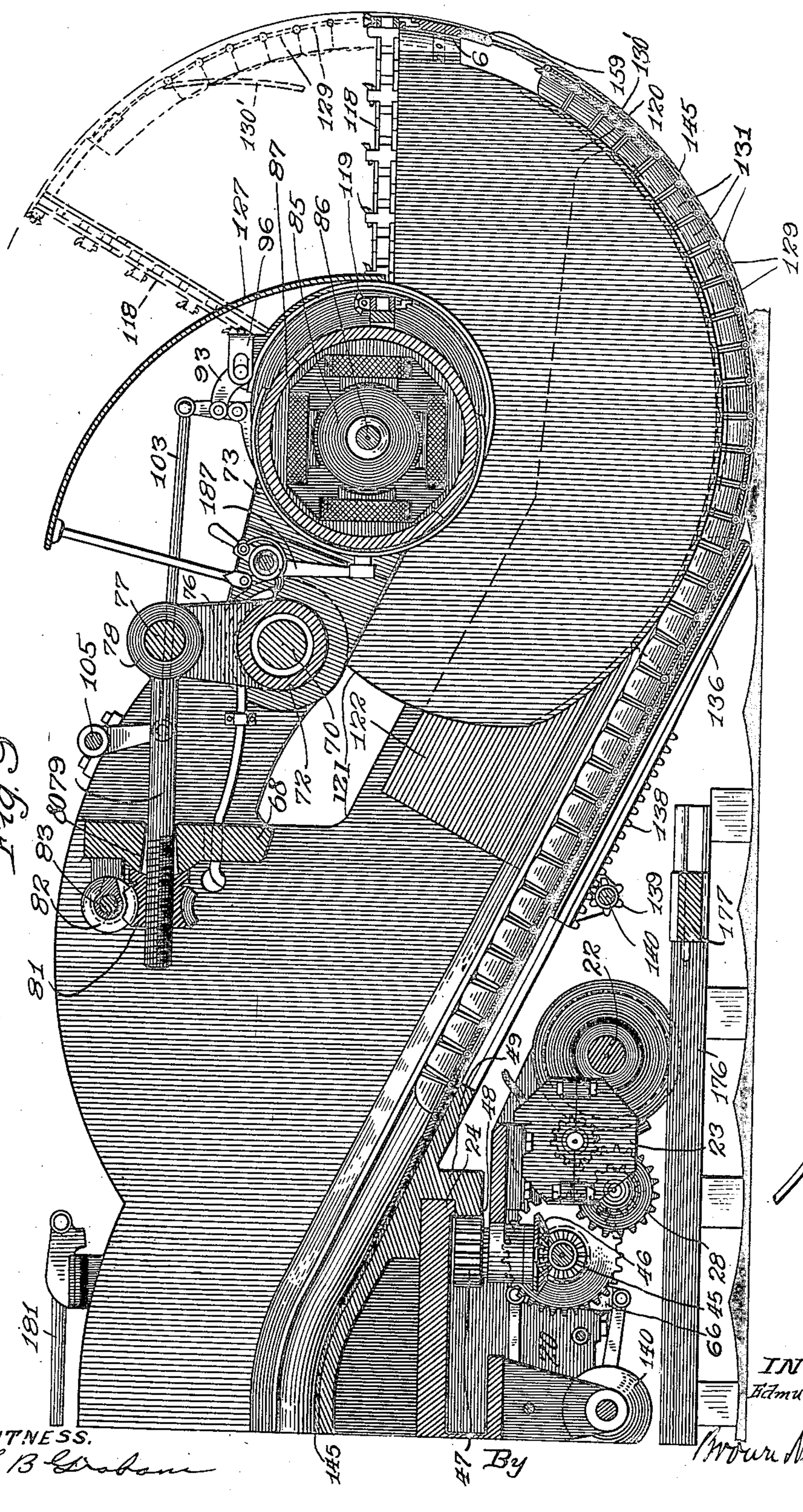

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E. C. MORGAN.
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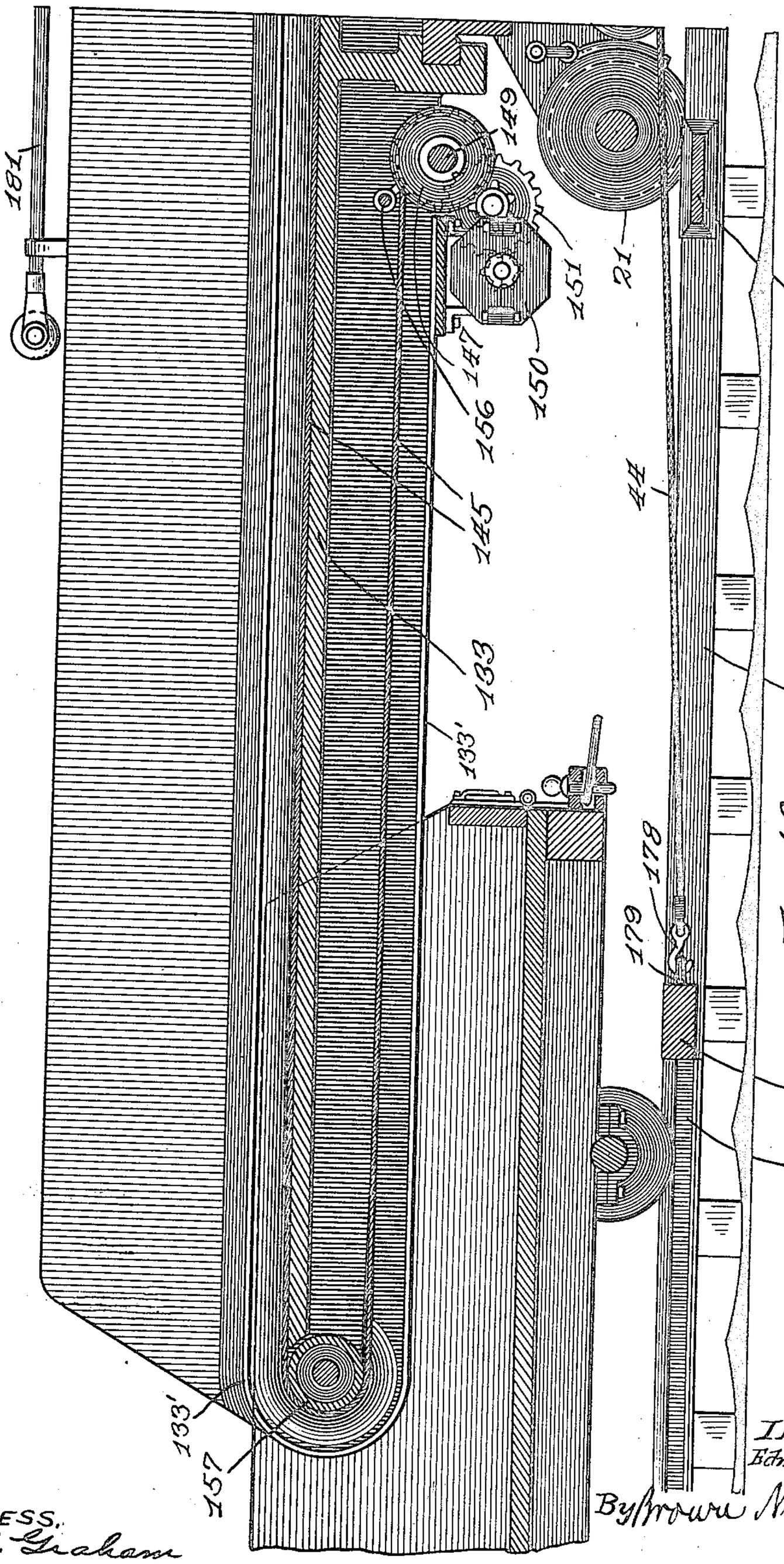

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E. C. MORGAN.
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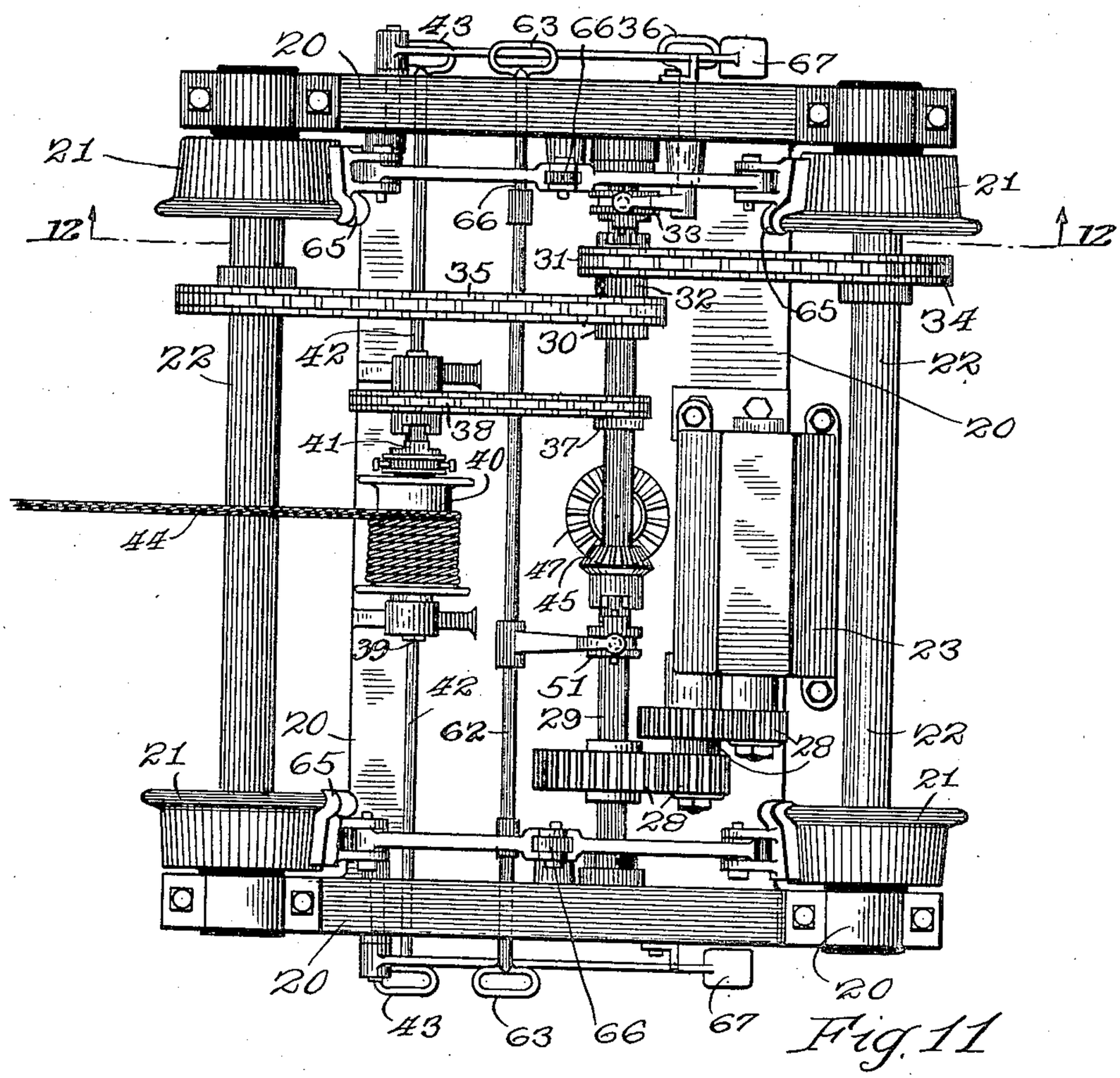

Fig. 11

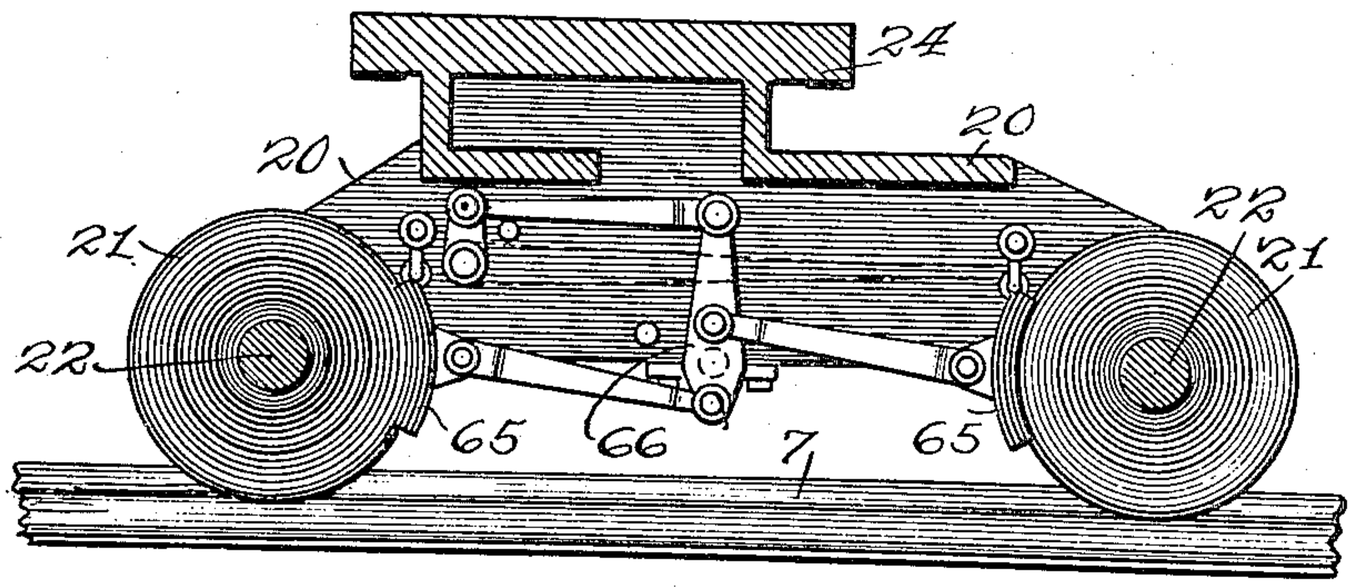

Fig. 12

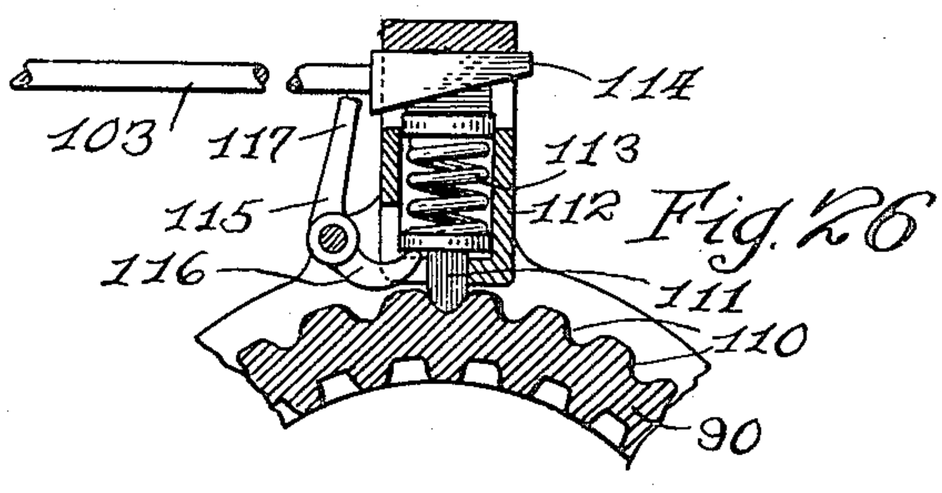

Fig. 26

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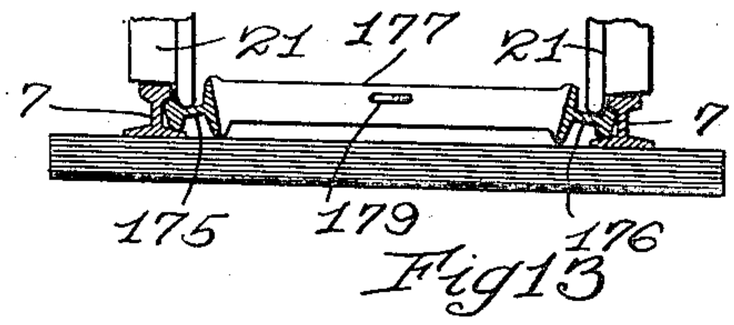

Fig 13

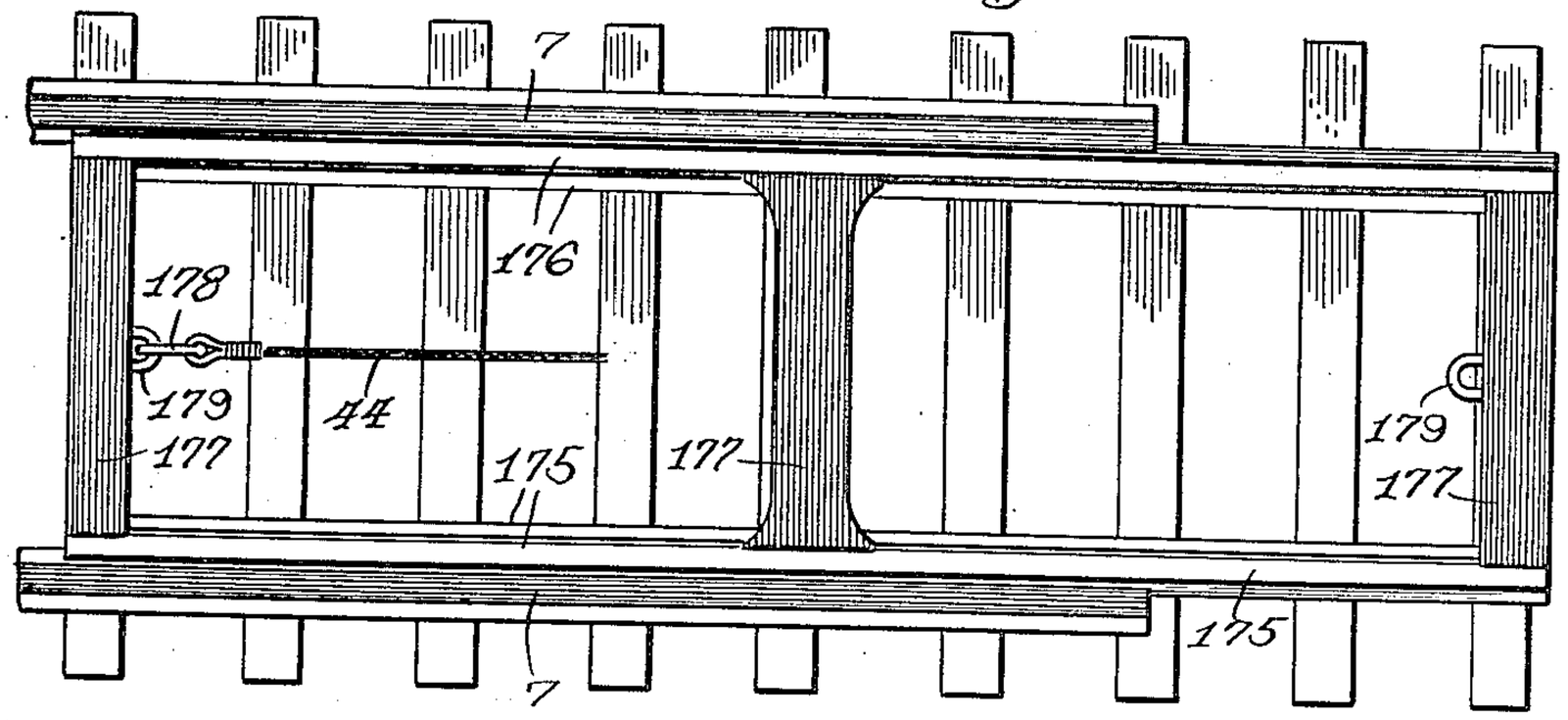

Fig 14

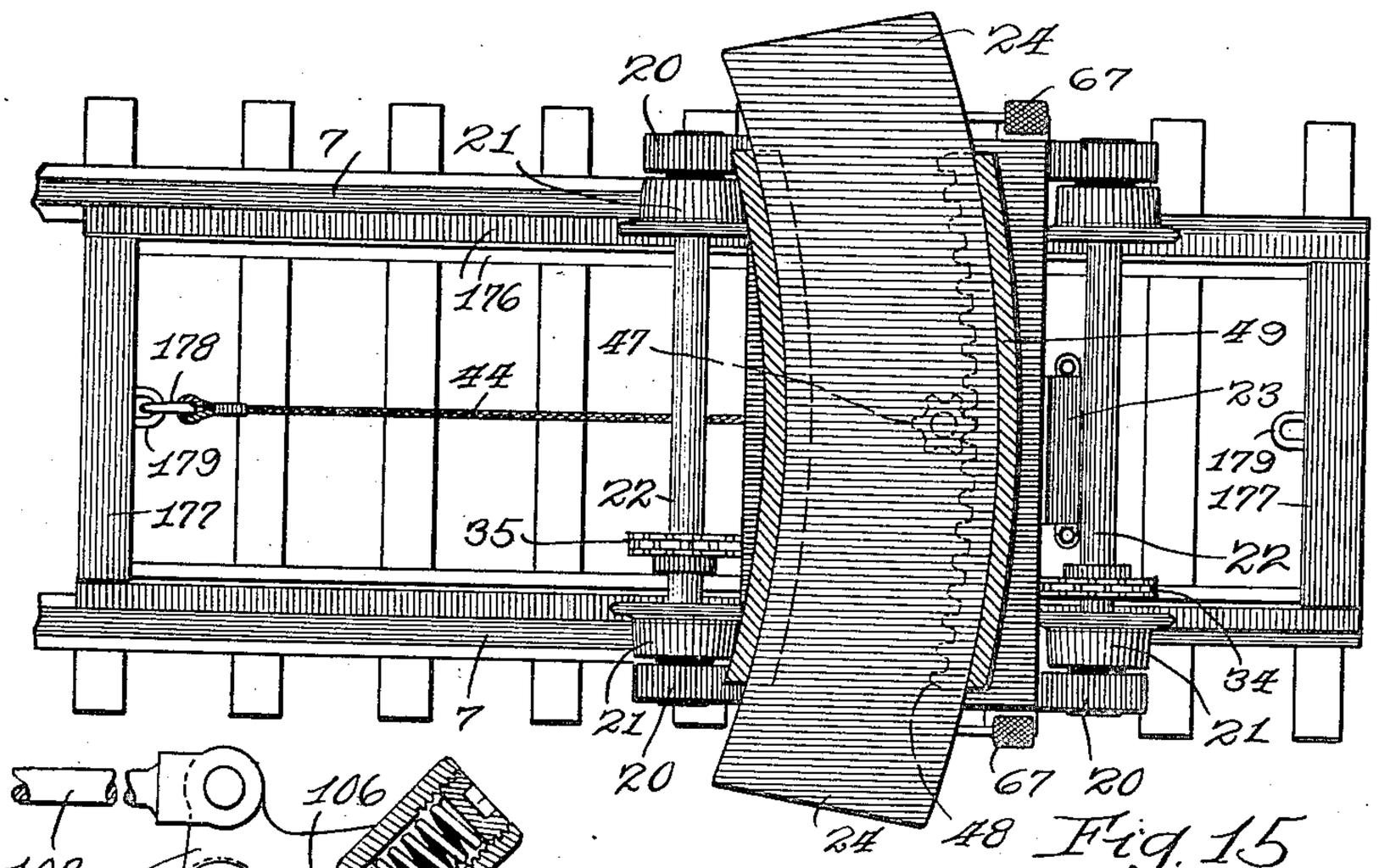

Fig. 15

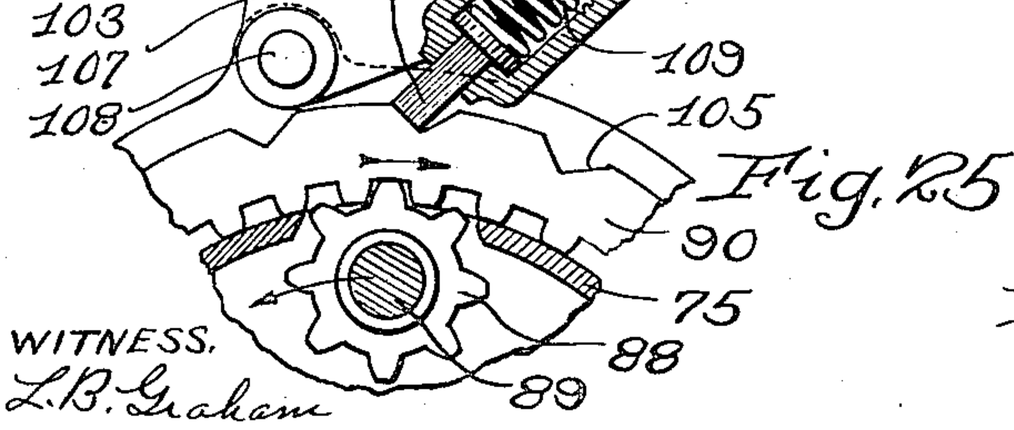

Fig. 25

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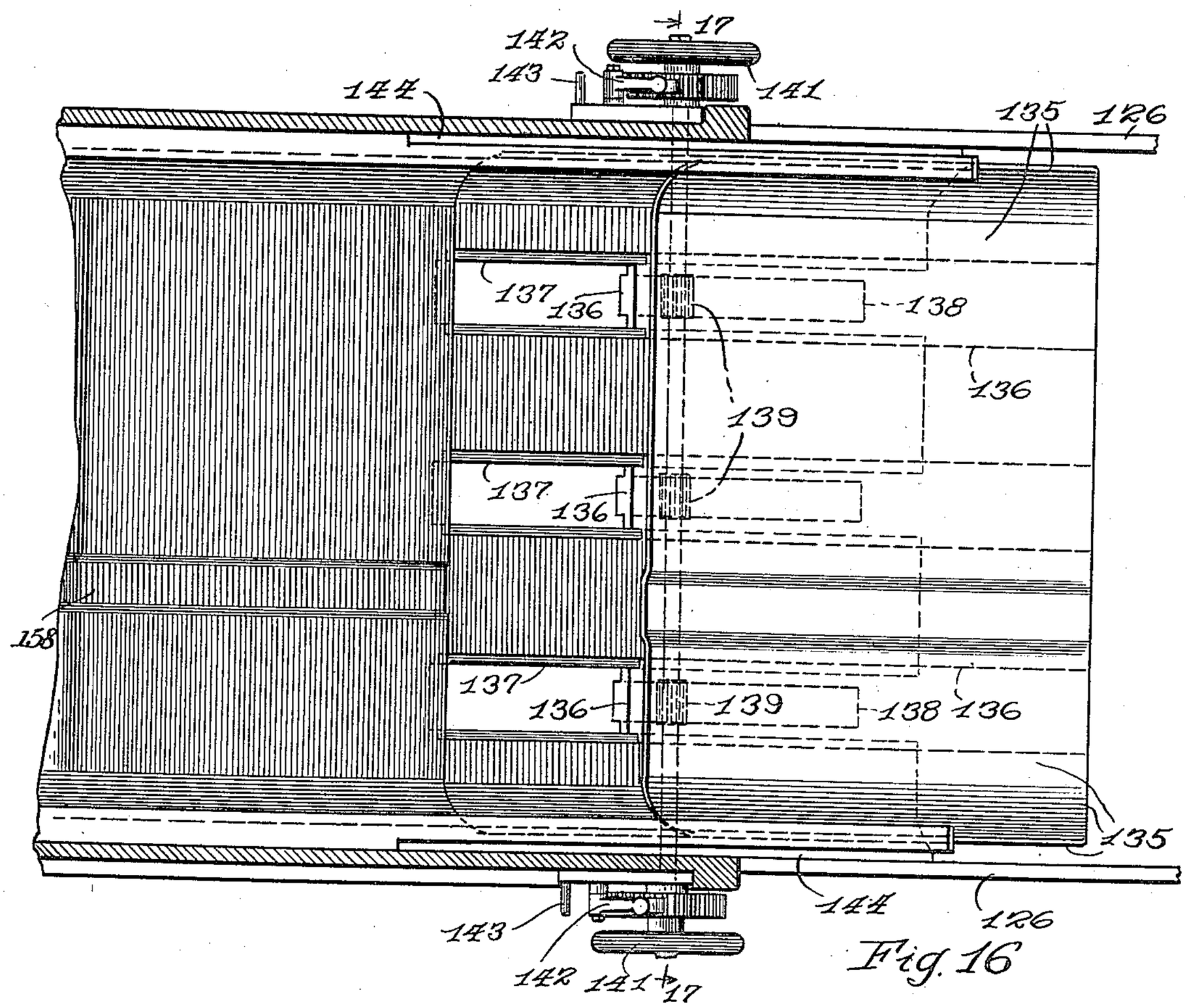

Fig. 16

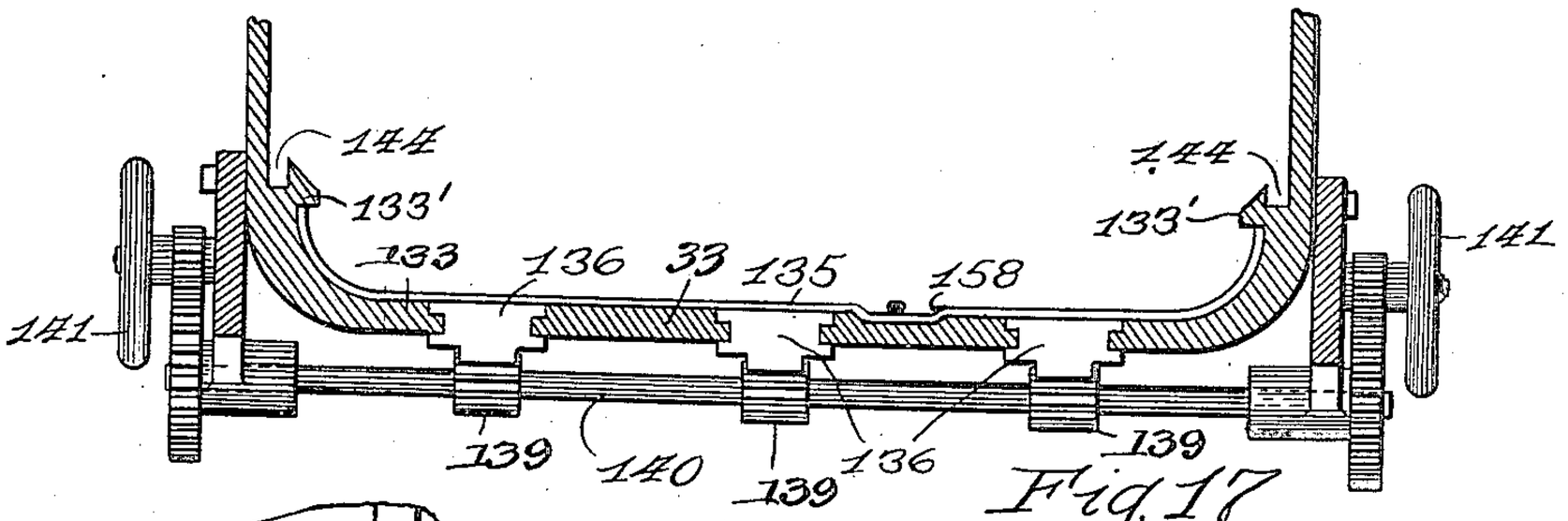

Fig. 17

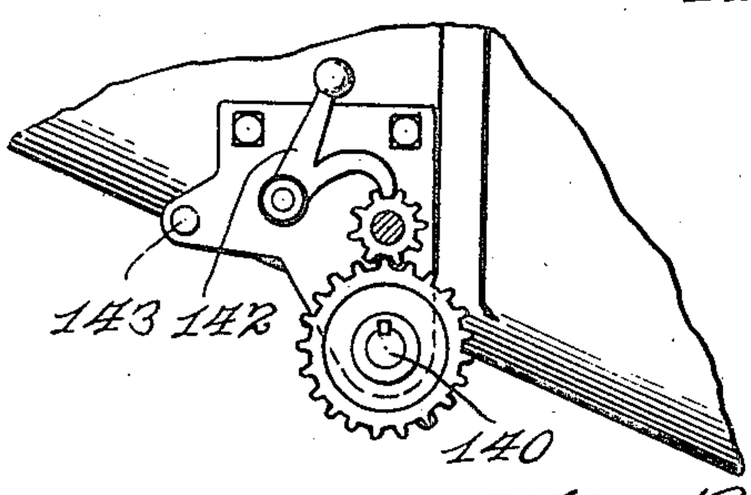

Fig. 30

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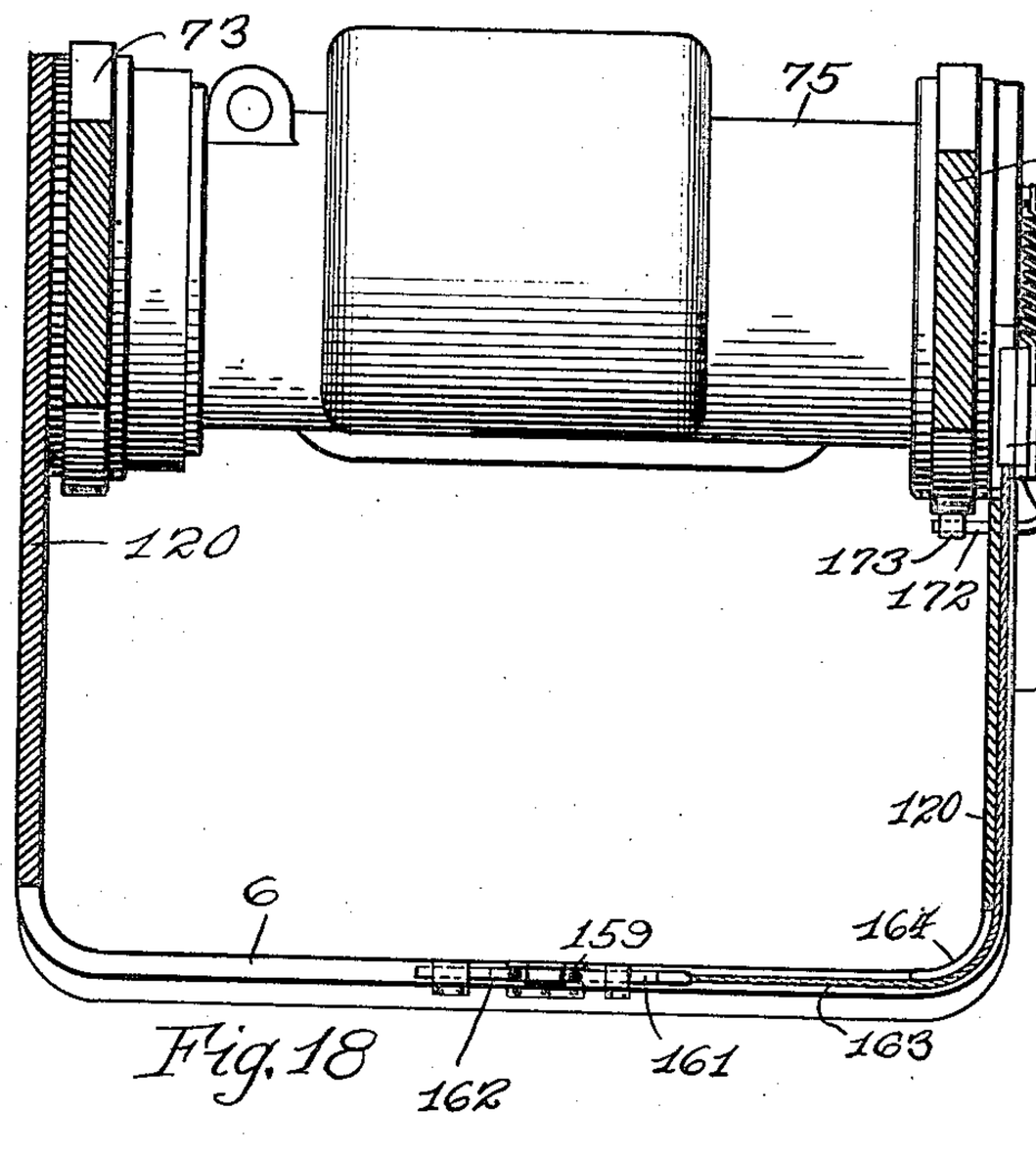

Fig. 18

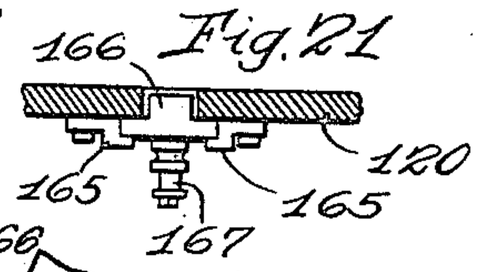

Fig. 21

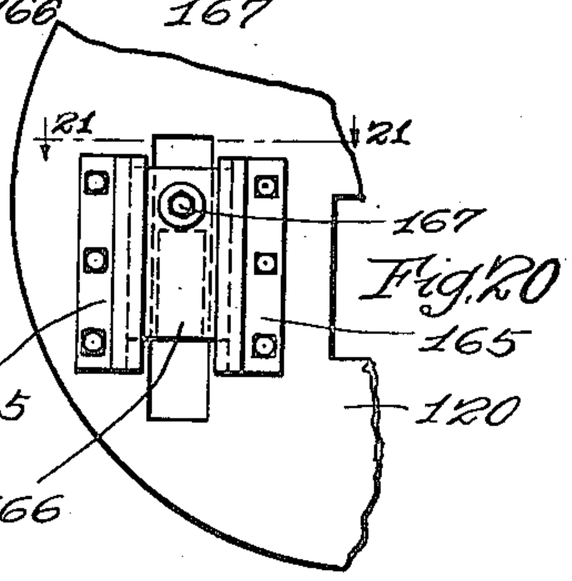

Fig. 20

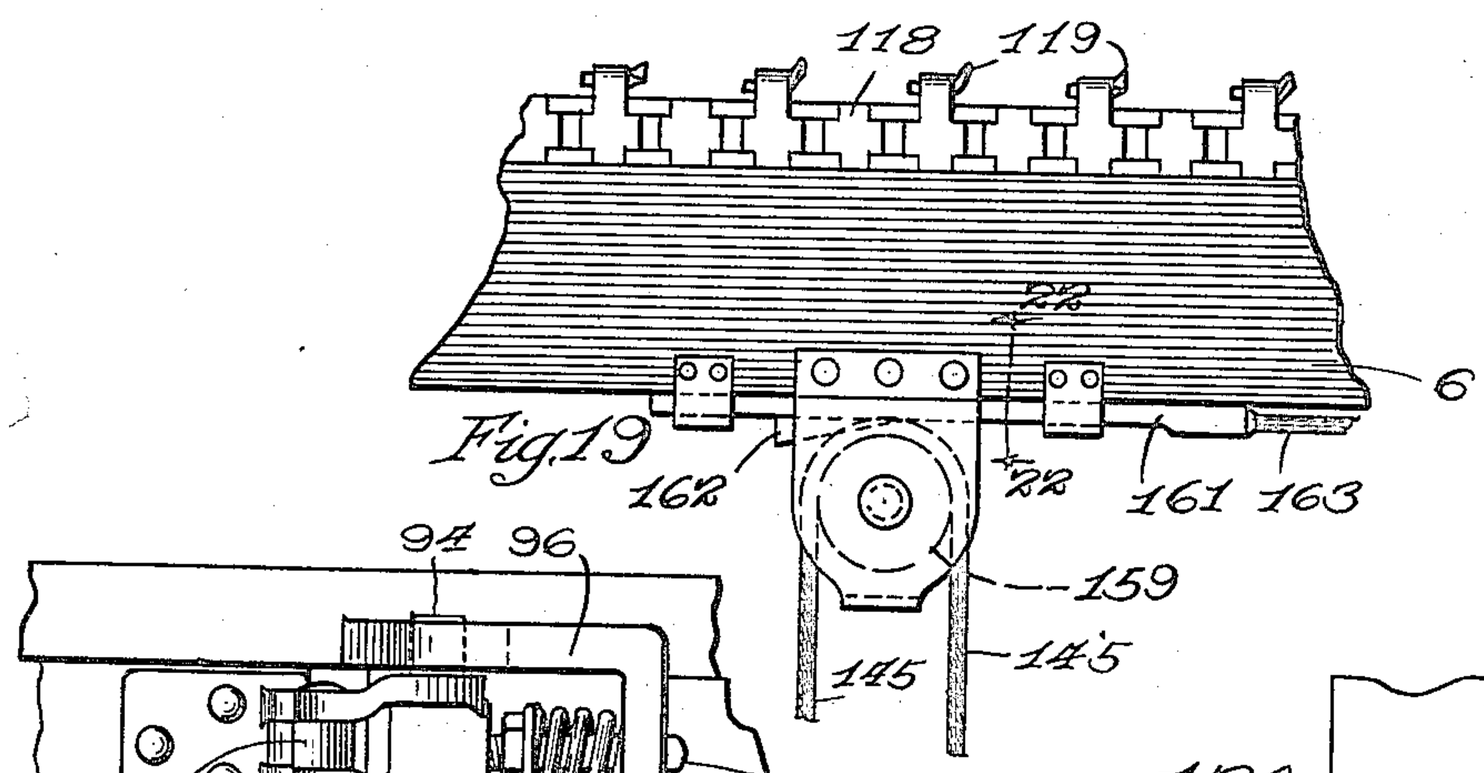

Fig. 19

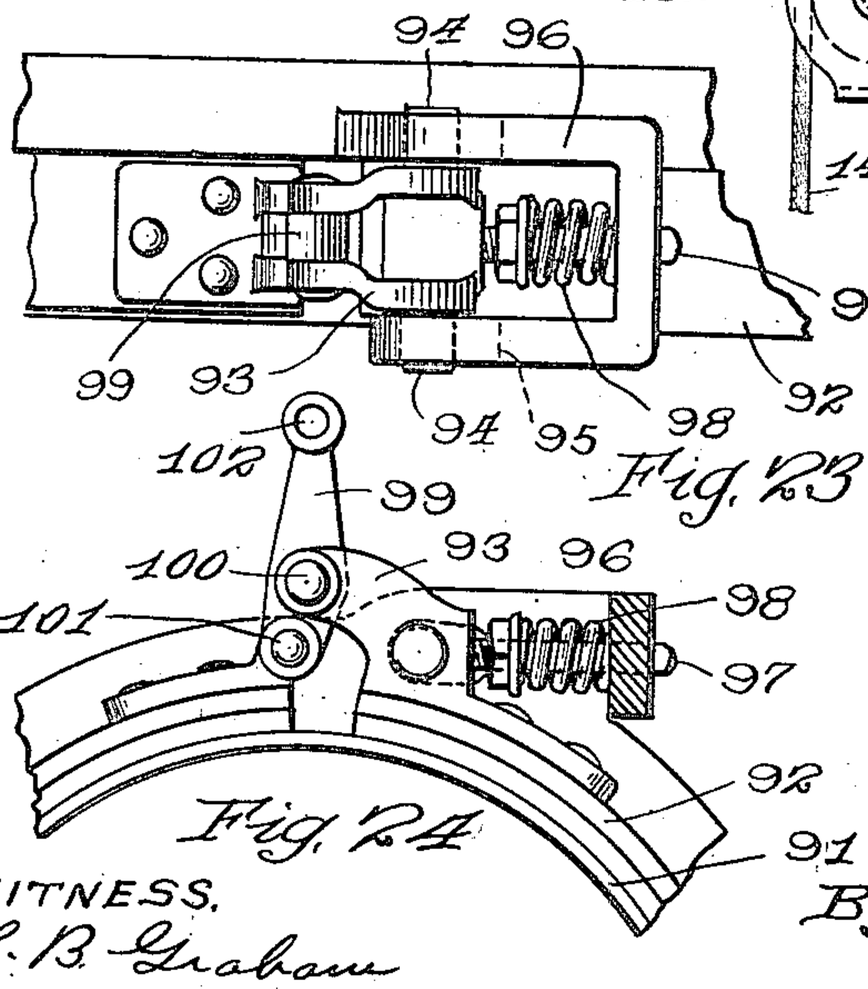

Fig. 23

Fig. 24

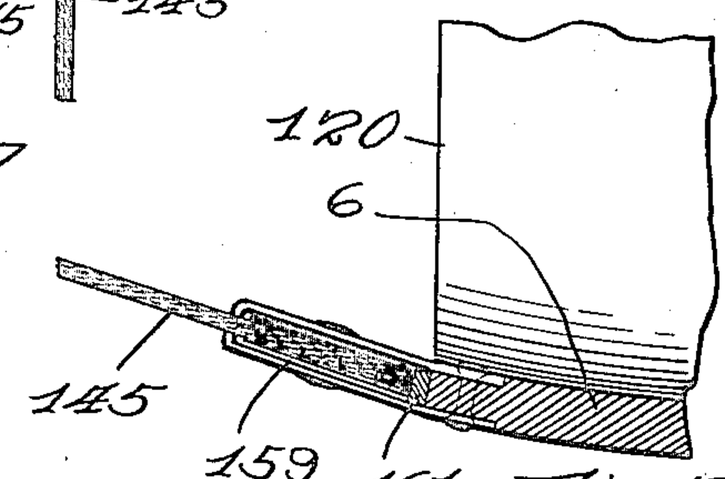

Fig. 22

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Jan. 2, 1923.

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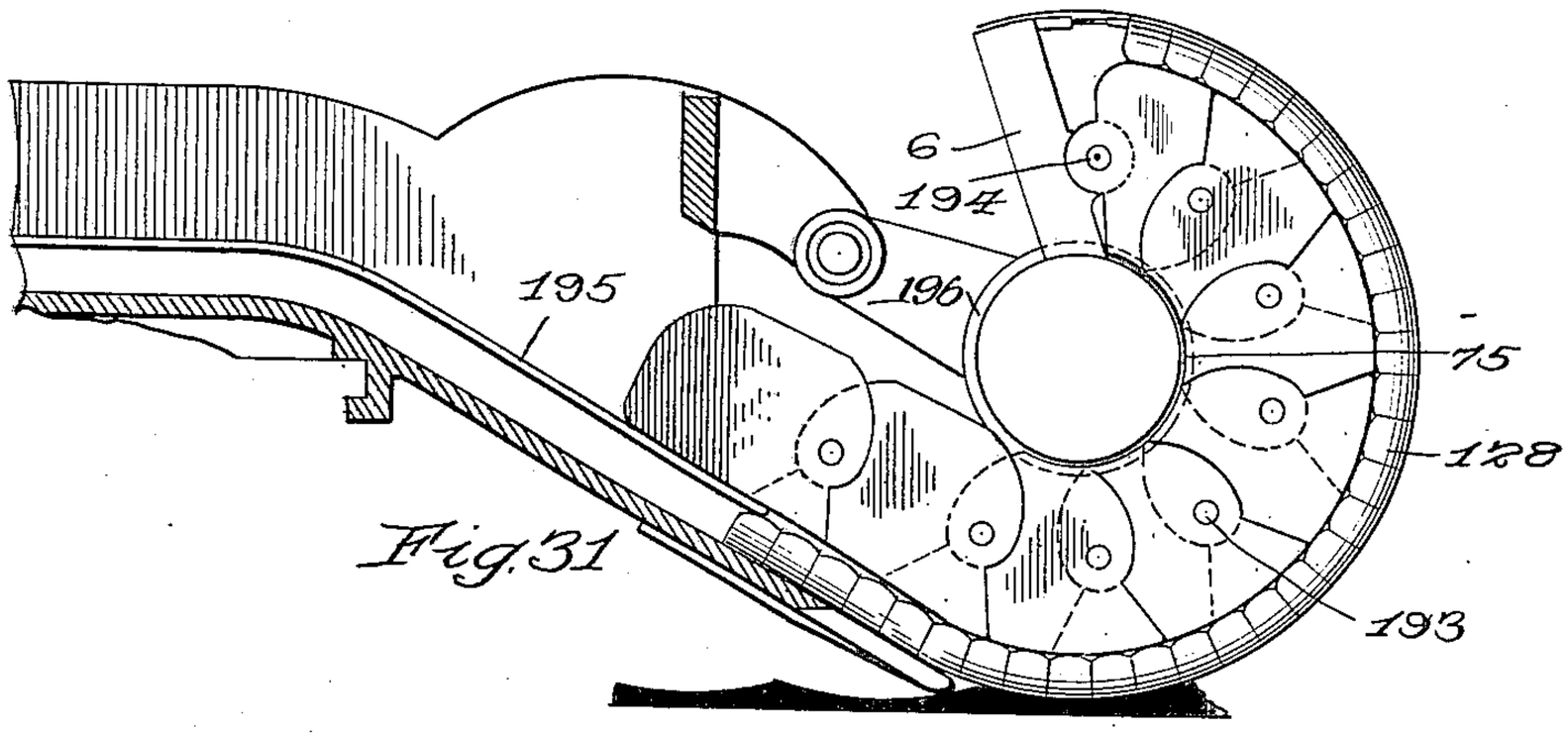

Fig. 31

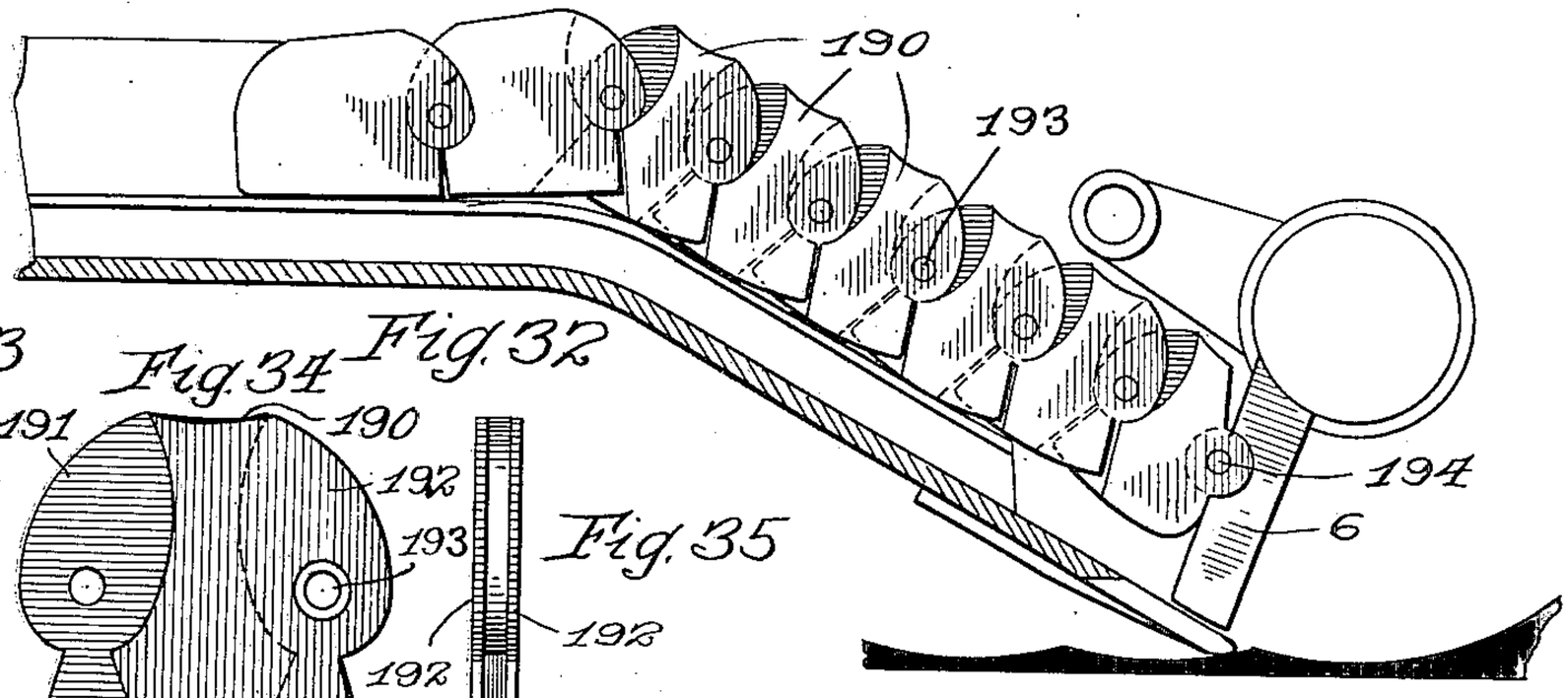

Fig. 32

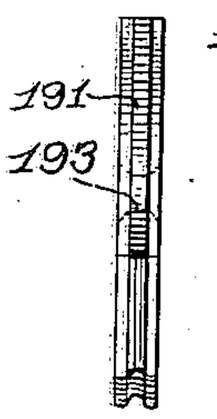

Fig. 33

Fig. 34

Fig. 35

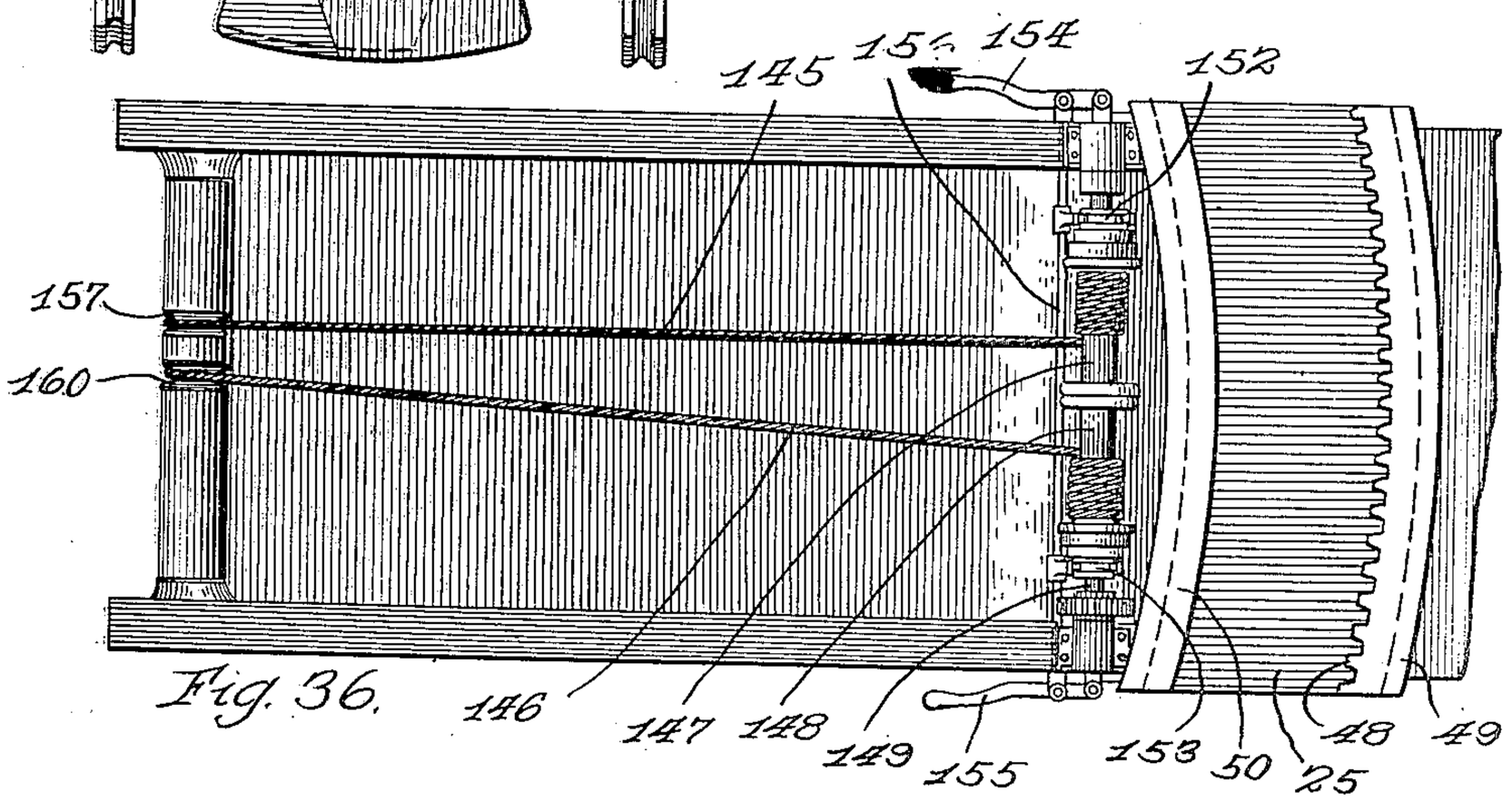

Fig. 36.

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Patented Jan. 2, 1923. 1,440,788

UNITED STATES PATENT OFFICE.

EDMUND C. MORGAN, OF CHICAGO, ILLINOIS.

MACHINE FOR MINING.

Application filed November 4, 1915. Serial No. 59,527.

To all whom it may concern:

Be it known that I, EDMUND C. MORGAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have made a certain new and useful Invention in Machines for Mining, of which the following is a specification.

My invention relates to an improved mining machine, especially adapted for mining coal, but having a general application. One of the objects of the present invention is the provision of a mining machine so mounted on a truck as to swing on a center distant from the rear end of said truck, whereby such mining machine may be provided with loading apparatus extending into or above a mine car irrespective of the arcuate position of the forward end of said mining machine.

Another object of the present invention is the provision of mechanism for confining and guiding the material cut from a mine wall by loop chain core cutting mechanism.

A further object of the invention is the provision of apron mechanism combined with cutting apparatus.

Another object of the invention is the provision of means for relieving strain on the operating mechanism when harder material than usual is encountered.

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

The mining apparatus herein disclosed is particularly adaptable to methods of mining which require initial elimination of veins or strata of foreign material. The strata in coal beds vary considerably in composition, sometimes being of stony material very difficult to cut, and sometimes consisting of earth or other material which breaks up easily and mixes with the coal and mine which is objectionable. Because of these deposits of foreign matter, it has heretofore been very difficult to use mining machinery in beds of coal where such strata occur. If the material is of rocky formation it interferes very seriously with the operation of the cutting parts of the mining machine, and if it is of softer material it permits the blocks of severed coal to break up to a greater extent than they would if the foreign material were absent, and moreover, the foreign material mixes with the severed coal and it is difficult to separate such foreign material. The mining apparatus herein disclosed is especially adapted for cutting out material from a mine wall in semi-crescent-shaped blocks after the vein of foreign material has been removed so far as practical. If the cutting mechanism strikes some hard material which has not been eliminated it will nevertheless be protected and although the crescent-shaped sections of material may be severed near the center or broken up into smaller pieces substantially all of the material which is lodged from the mine wall may be properly confined and directed by the loading mechanism into mine cars.

In the drawings—

Fig. 1 is a vertical sectional view through a mine chamber in which the method of mining comprising a part of this invention is employed.

Fig. 2 is a section similar to Fig. 1, showing a machine in place for performing one of the steps of this invention.

Fig. 3 is horizontal section through a mine chamber, showing the chamber at the completion of one of the steps of the process.

Fig. 4 is a vertical section through a mine chamber, showing a machine in place for performing a different step in the process from that performed by the machine in Fig. 2.

Fig. 5 is a perspective view of the material cut from the chamber, illustrating the different cuts made in carrying out the process comprised in the present invention.

Fig. 6 is a side elevation of the material shown in perspective in Fig. 5.

Fig. 7 is a plan view of the mining machine constituting a part of the present invention, and used in carrying out the process.

Fig. 8 is a side elevation of the machine shown in Fig. 7 in operative position in a mine chamber.

Fig. 9 is a vertical sectional view of the front portion of the machine shown in Figs. 7 and 8.

Fig. 10 is a horizontal section of the rear portion of the machine, the front portion of which is shown in Fig. 9.

Fig. 11 is a bottom plan view of the truck upon which the machine is mounted.

Fig. 12 is a vertical section substantially on line 12—12 of Fig. 11.

Fig. 13 is a transverse section of the track on which the machine runs, illustrating the method of advancing the machine along the track.

Fig. 14 is a plan view of the track.

Fig. 15 is a horizontal sectional view taken just above the supporting truck.

Fig. 16 is a fragmentary sectional view taken on line 16—16 of Fig. 8.

Fig. 17 is a transverse sectional view on line 17—17 of Fig. 16.

Fig. 18 is a vertical sectional view taken substantially on line 18—18 of Fig. 7, with the cutter in its lower position and the guard 120 omitted.

Fig. 19 is a fragmentary plan view of a portion of the cutter, showing the locking mechanism for the pulley connected thereto.

Fig. 20 is a side elevation of the slide for controlling the pulley shown in Fig. 19.

Fig. 21 is a section on line 21—21 of Fig. 20.

Fig. 22 is a section on line 22—22 of Fig. 19.

Fig. 23 is a fragmentary plan view of the operating mechanism for the brake for controlling the feed of the cutter.

Fig. 24 is an elevation of the mechanism shown in Fig. 23.

Fig. 25 is an elevation of a modified form of cutter control device.

Fig. 26 is still another form of cutter control mechanism.

Fig. 27 is a fragmentary sectional view showing the construction of the coal handling apron.

Fig. 28 is a plan view of a number of sections of the coal handling apron.

Fig. 29 is a side elevation of one of the sections shown in Fig. 28.

Fig. 29ª is a detail of the stop carried by the apron for holding material thereon.

Fig. 30 is a fragmentary elevational view of one of the details of the machine.

Fig. 31 is a fragmentary sectional view of a portion of the front of the machine, illustrating a modified form of guard for the severed material.

Fig. 32 is a fragmentary vertical sectional view showing another position of the guard illustrated in Fig. 31.

Figs. 33, 34 and 35 are detailed views of one of the sections of the guard illustrated in Fig. 31.

Fig. 36 is a bottom plan view of a portion of the mining machine, showing the operating drums for the coal carrying apron.

In the views of the drawings, the numeral 1 designates the desirable material, such as coal, as found in the mine. The numeral 2 designates a stratum of undesirable material which may be of rocky or other undesirable structure. Numeral 3 is a diagrammatical representation of a machine well-known in the art, for making a horizontal cut in the material to be mined. Machines of this character are usually provided with a movable frame 4, carrying a chain cutter 5 arranged to be driven in a manner to form a horizontal kerf in the material to be mined. In Fig. 2 of the drawing this machine is shown as operating to remove the lower part of the layer of foreign material 2. In Fig. 4 the numeral 8 designates somewhat diagrammatically the machine constituting a part of the present invention used in performing one of the steps of this method. This machine is provided with a loop core cutter 6, which swings vertically about a pivot, and cuts a section of material from the mine wall of the shape illustrated in Fig. 5. This machine is arranged to be swung in a manner to be described, from one side to the other of the mine chamber, in order to take a series of cuts for each position of the machine. The machine is movable along the track 7 in order to position it longitudinally of the chamber for different series of cuts.

In carrying out the process constituting the present invention, the machine 3 is first placed in the mine chamber, and the cutter 5 is operated to remove a portion of the stratum of waste material. If the material be of a comparatively soft nature the cutter 5 operates directly upon it. This material may be removed by cutting a single kerf in the lower portion of the material, as shown in Fig. 2, and then removing the upper portion of the material with bars or any other suitable tools. The waste material may, however, be all cut out by the cutter 5 by taking a series of cuts one above the other. If the material 2 be too hard to permit the cutter 5 to operate directly upon it, the kerf may be formed in the coal directly below the stratum of waste material, and the material be broken down and removed, or a kerf may be formed both above and below the stratum of waste material if it is found desirable to do so. It is preferable to remove the stratum of waste material for as great a distance into the wall of the mine as the cutter 5 will extend, and to swing the cutter from side to side in the mine chamber in order to remove the waste material for the entire width of the mine chamber. The depth of one cut made by the cutter 5 will be sufficient to permit several cuts to be taken by the core cutter 6 of the mining machine 8. After all the waste material that can be reached at a single position of machine 3 has been removed, the machine 3 is run out of the chamber, and the machine 8 is brought into its place. Machine 8 is now free to take a series of cuts, usually from three to five in number, without the interference of foreign material. The manner of making these cuts is best seen from Figs. 5 and 6, in which 10 designates the open space from which the foreign material has been removed, and 11 designates the kerf formed by the loop core cutter. The machine will usually make three cuts for each position on the track 7, removing

the vertical sections designated respectively as 12, 13 and 14, arranged laterally across the mine chamber one section at each cut. After each series of cuts the machine is moved forwardly in the mine and another series of cuts taken. This process is repeated until the machine reaches a position where further operation would be interfered with by the portion of the waste material 2 that has not been reached by the cutter 5. When the machine 8 reaches this position it is removed from the chamber, the machine 3 is brought back in and the process repeated. By this method of mining none of the waste material found in the stratum 2 is mixed with the desirable material found in the mine, and the operation of the loop cutter 6 is not interfered with by such waste material.

In order to carry out the process described above, it is necessary to have a mining machine especially arranged for the purpose. One essential feature of the machine is that it be readily movable into and out of the chamber. The machine shown in the drawings is therefore mounted on a truck 20 provided with wheels 21, having axles 22, and being provided with a motor 23 for operating the truck, (Figs. 8, 11, 12 and 15). In order that the machine may be swung from side to side in the mine chamber, the truck is provided with an arcuate supporting table or slideway 24, and the mining machine frame is provided preferably near the center of gravity thereof, with a corresponding slide 25 arranged to rest upon the slide 24, and to be moved from side to side thereon. As shown in Fig. 15, the slideway 24 has a curved formation, the curve being such that its center is located approximately at the rear end of the mining machine frame. The object of this arrangement is to provide a device whereby the machine may be supported near the center of gravity, and yet may be swung about the rear end as a center in order that the rear portion of the machine may remain substantially stationary during the adjustment of the front portion thereof from side to side of the mine. This is preferable in order that the machine may discharge the mined material into a car supported upon the track 7 regardless of the position of the front end of the machine.

In view of the foregoing it will be seen that the slide 24 constitutes a transversely extending substantially horizontal rail removable from the frame which is supported thereon. This frame may obviously slide to and be supported in operative position. By referring to Figs. 4 and 8 it will be seen that supports are provided for the rail 24. The self contained conveyer comprises an elongated frame and conveyer and power devices mounted within said frame, and it will also be seen that the structure comprises an inclined elongated conveyer frame rigidly attached to and projecting at both ends beyond a centrally disposed supporting frame which includes the center of gravity of the structure so that the said structure rests on the rail 24 in balanced relation. The conveyer frame has a flat bottom member 25 upon which the structure rests and this flat bottom member may slide either laterally or rotatively in horizontal planes because the lateral movement is in an arc having as its center of rotation the rear end of the conveyer. That is to say, since the structure slides on the rail 24 arcuately on the rear or delivery end of the conveyer as the center, the forward portion of the conveyer slides rotatively in horizontal planes. It will also be seen by referring to Figs. 8, 9 and 10 that the conveyer is mounted within the conveyer frame and that the power devices for actuating the conveyer are also mounted within said supporting frame since all of such power devices are carried by the supporting frame indicated at 25. The member 25 is provided with downwardly extending projections, which constitute guides supported on and bodily movable transversely of the truck. Therefore when the member 25 together with such downward extensions are regarded as the guide it will be seen that the elongated conveyer frame rests upon this guide and is adapted to horizontal rotary movement relative thereto and bodily sliding movement longitudinally thereof. That is to say, relatively the rotary movement of the guide 25 is on an axis located at the delivery end of the conveyer and there is also a bodily sliding movement longitudinally of the member 25. By referring to Fig. 7 it will be seen that the horizontally extending rail 24 is supported in substantial parallelism with the coal face, since the arc at the mine wall has substantially the same center as the arc of the rail 24. The rail 24 is adjustable relative to the coal face because it is movable with the truck to different distances from the coal face, so as to permit the positioning of the receiving end of the conveyer in convenient proximity to material adjacent to any part of the coal face while maintaining the delivery end in loading relation above the mine car or pit car suitably positioned on the mine track.

The motor 23 is connected by a chain of gears 28 to the shaft 29, (Fig. 11) which extends tranversely from one side of the truck frame to the other. This shaft carries a pair of sprocket wheels 30 and 31 rigidly secured to a collar 32 free to rotate upon the shaft 29, and arranged to be held for rotation therewith by the clutch 33. Chains 34 and 35 connect the sprocket wheels 31 and 32 respectively with the axles

22 of the truck. The clutch 33 may be operated by a handle 36 projecting from one side of the truck when it is desired to start or stop the wheels 21 to move the machine upon track 7. Another sprocket wheel 37 is rigidly carried by the shaft 29 and drives a wheel 38 mounted for free rotation on the counter-shaft 39. The drum 40 is rigidly carried by the shaft 39, and the shaft 39 may be clutched to the wheel 38, to rotate therewith, by the clutch 41, arranged to be operated by the rod 42 and the handles 43, one of which is located on each side of the truck. The cable 44 is arranged to be wound upon the drum 40 for a purpose to be described.

Rotatably mounted on the shaft 29 is a beveled pinion 45 arranged to mesh with a beveled gear 46 (see Fig. 9), carried on a vertical stub shaft extending upwardly, and supporting on its upper end directly beneath the slideway 24, a pinion 47 in position to mesh with a rack 48 carried by the downwardly extending lip 49 secured to the slideway 25. On the side of the slideway 25, opposite the rack 48, is a second overhanging lip 50, (Fig. 36) arranged to cooperate with the lip 49 and rack 48 for holding the slideway 25 in position upon the slideway 24. The pinion 45 may be clutched to the shaft 29 by a clutch 51 operated by a rod 62 and handles 63, one on each side of the machine (Fig. 11). It is thus apparent that by movement of either of the handles 63, the operator may connect the motor 23 with the pinion 47 to shift the frame of the machine laterally upon the truck. The direction of movement of the frame upon the truck, as well as the direction of movement of the truck upon the track, is determined by the direction of rotation of the motor 23, which is governed by a controller 64 positioned upon the side of the machine frame. The truck may be held in stationary position upon the track 7 by brakes 65, Figs. 11 and 12, operated by levers 66, which are in turn controlled by foot levers 67, one positioned at each side of the machine.

Extending transversely across the front portion of the mining machine frame is a bar 68, and extending forwardly from this bar is a pair of brackets 69, one bracket at each side of the frame. Supported by the brackets 69, and extending from one to the other, is a circular bar 70, held in position by nuts 71 threaded on each end of the bar. Journaled on the bar 70, for rotation thereon, is a sleeve 72 extending the full length of the bar between the brackets 69. Projecting forwardly from each end of the sleeve 72, and rigidly supported thereby, is an arm 73, and each arm 73 carries at its forward end a circular bearing collar 74 in which is journaled a hollow axle or drum 75, Figs. 7 and 9. Also secured to the sleeve 72 and projecting upwardly therefrom, is a short arm 76, carrying a pivot bolt 77 at its upper end, on which is mounted a collar 78 having a rearwardly extending threaded rod 79 rigidly secured thereto. The rod 79 passes through an opening 80 in the cross bar 68, and has a worm wheel 81 threaded thereon. The opening 80 is enlarged to permit lateral movement of the rod 79 as the sleeve 72 rotates about the bar 70, and the worm wheel 81 is provided with a curved bearing surface which contacts with a corresponding surface on the cross bar 68. The worm wheel 81 meshes with the worm 82 secured to a shaft 83 extending transversely of the machine frame, and carrying hand wheels 84, one on each side of the frame. By rotating the hand wheels 84, the sleeve 72 is rotated about the bar 70, and the hollow axle 75 is adjusted into various positions vertically.

The hollow axle 75 is free to rotate on its bearings 74, and is provided interiorly with a motor 85 mounted on a shaft 86. The portion 87 of the axle 75 which encloses the motor 85 is somewhat offset from the rest of the axle, as shown in Figs. 7 and 9. The shaft 86 is connected by a train of gearing to a pinion 88, Fig. 25, carried on a shaft 89 mounted in the axle 75 eccentrically thereon.

Such train of gearing is more fully illustrated in my co-pending application Serial No. 49,689, filed Sept. 9, 1915, for an improvement in mining and loading machines, and claims are made in said copending application covering such construction.

The teeth of the pinion 88, as shown in Fig. 25, extend through an opening in the wall of the axle 75 to engage with the teeth of an internal gear 90. The internal gear 90 is mounted on axle 75, and is free to rotate relatively thereto. Unless the gear 90 is held stationary, rotation of the motor 85 will cause it to revolve idly about the drum 75. Mechanism to be described is provided, however, for holding the gear 90 from rotation, and when this occurs it is evident that the pinion 88 will walk around the interior of the gear 90 and carry the hollow axle 75 with it, thus rotating the axle in its bearings 74. The purpose of this rotation is to feed the mining machine cutter into the work, as will be described. It is desirable to provide a means for permitting a slip in this feeding operation in case the cutter strikes a hard place in the material through which it cannot be fed. This object may be accomplished by a variety of devices, different ones of which are shown in Figs. 24, 25 and 26.

In the form shown in Figs. 23 and 24, a sleeve 91 is secured to the gear 90, and a brake band 92 surrounds this sleeve. Se-

cured to one end of the brake band 92 is a member 93 having laterally extending lugs 94 extending into elongated slots 95 in the stationary member 96. Extending rearwardly from the member 93 is a rod 97 provided with a coil spring 98 which normally tends to force the member 93 to the left, as shown in Fig. 24. A lever 99 is pivoted at 100 on the member 93, and has a short end pivoted at 101 at the opposite end of the brake band 92. The other end of the lever 99 is provided with an eye 102, which has an operating rod 103, Fig. 9, secured thereto, and extending rearwardly into position to be operated by levers 104 carried on the rod 105, one at each side of the machine (see Figs. 5, 7 and 8). When the lever 104 is operated to pull the upper end of the lever 99 to the left, as shown in Fig. 24, the brake band 92 will be tightened upon the sleeve 91, and the internal gear 90 be held stationary. This will cause the pinion 88 and shaft 89 to travel to the left, carrying the hollow axle 75 and the cutter with them. Re-action of the pinion 88 upon the gear 90 will tend to force the brake 92 and its connected parts to the right, as viewed in Fig. 24, against the compression of the coil spring 98. If the cutter should strike a hard substance this re-action will be greatly increased, and the spring 98 will yield under the increased pressure, and permit the brake 92 and the connected parts to move to the right. This movement will produce an additional pull upon the rod 103, which will be transmitted through the lever 104 to the operator's hand, thus warning the operator of the condition of the cutter. The operator, upon receiving this warning, will immediately release the pressure upon the brake band, and thus stop the feeding operation.

In the form of controller shown in Fig. 25, instead of using a brake band to surround the internal gear 90, the outer periphery of the gear itself is provided with a series of notches 105, and a spring pressed pin 106 is supported by a bell crank lever 107, so that the end of the pin 106 will engage the notches 105 in the periphery of the gear 90. The bell crank 107 is carried on a pivot 108, and is rocked about its pivot by the connecting rod 103 to move the pin 106 into and out of engagement with the notches 105. When the pin 106 is in engagement with one of the notches the gear 90 is held from rotation, and the cutter is fed into the work. If the cutter strikes a hard substance additional pressure is brought upon the gear 90, and the spring 109, which holds the pin 106 in place, will yield under the additional pressure, and due to the inclination of the walls of the notches 105, the pin will be forced backwardly out of the notch with which it is in engagement, and the gear 90 will be permitted to rotate under the pressure of the pinion 88, and the axle 75 in the cutter will thus be permitted to come to a stop. This will bring the condition of the cutter to the notice of the operator, who will release the pressure on the rod 103, and discontinue the feeding operation of the machine until the obstacle can be removed. If the operator fails to stop the feeding movement, the pin 106 will be forced out of each notch in succession with which it comes into contact until the machine is finally stopped by the operator.

In Fig. 26 is shown still another form of control, in which the notches 110 in the gear 90 are given a rounded formation. The pin 111 which co-operates with these notches is slidably held in the stationary guide 112, and is pressed into contact with the notches by a spring 113. A wedge-shaped cam 114 co-operates with the upper end of the spring 113 to force the spring downwardly to bring the pin 111 into contact with the notches. The position of the cam 114 is controlled by the rod 103. A bell crank 115 has its lower arm 116 in position to contact with the head of the pin 111, to withdraw the pin from operative engagement with the gear 90. The upper arm 117 of the lever 115 is in position to be engaged by the cam 114 when the cam is moved to release the pressure on the spring 113. This engagement of the cam with the arm 117 raises the pin 111 out of contact with the notches 110 at the same time that the pressure on the upper end of the spring 113 is released by the withdrawal of the cam 114. By this arrangement the operator is enabled to force the pin 111 into contact with the gear 90 through the interposition of the yielding spring 113. The withdrawal of the pin, however, is a positive action. If the cutter encounters an obstacle, the pin 111 will be forced out of contact with the notches 110 because of the rounded engagement surfaces of the two members, and because of the fact that there is always a yielding member in the chain of mechanism which holds the pin in engagement with the gear.

The cutter used in this machine is of the loop form, and is attached to the ends of the axle 75 having an unobstructed core opening therethrough, as shown in Figs. 7, 9 and 18. The cutter frame carries an endless chain 118 provided with bits 119 for forming the kerf in the material being mined. The chain 118 is driven by the motor 85 through a train of gearing not shown herein but disclosed and claimed in my co-pending application Serial No. 49,689 filed Sept. 9, 1915, for an improvement in mining and loading machines. It has been found desirable to entirely enclose the severed material, and to accomplish this result a pair of

plates or guards 120 is provided, one being secured to each end of the drum 75, as shown in Figs. 8 and 9. These guards are of arcuate formation, and form a continuation of the side bars of the cutter frame 6. They are arranged to follow in the kerf formed by the sides of the cutter as it is fed upwardly, and extend substantially to the curve formed at the corner of the kerf. The rear portions of the guards 120 are cut away, as shown at 121, so that the guards will not interfere with the parts of the machine frame and operating mechanism when the cutter is swung to its lowermost position. In order that there may be no opening left at the side of the cut when the frame 6 is in its upper position, a pair of sliding guards or sideboards 122 is provided, one at each side of the machine, and positioned just outside of the guards 120. These guards are controlled by racks 123, which are connected with the sideboards 122 through slots 124 formed in the sides of the machine frame. Hand wheels 125 are secured to the side of the machine frame, and carry pinions for operating the rack 123 to move the guards 122 into and out of operative position. The sides of the machine frame are provided with forwardly and downwardly extending plates 126, which are positioned just outside of the guards 122 to assist in holding the guards 122 in place, and to supplement them in their function of enclosing the sides of the machine. The stationary plates 122 can be extended downwardly a sufficient distance to entirely close the space left open by the guards 120, for the reason that if they were so extended they would interfere with the moving of the machine into and out of the mine.

A shield 127, Figs. 8 and 9, is supported adjacent the front surface of the axle 75, and is curved upwardly and backwardly to completely cover the axle and the operating mechanism connected therewith, so that any coal which may fall from the upper part of the mine wall will be directed forwardly into the pocket formed by the cut.

For receiving the severed coal and for transferring it rearwardly to a position where it may be loaded into a transporting device, an apron 128 is provided. This apron, as shown in Figs. 8 and 9, is drawn into the kerf formed by the cutter 6 by mechanism to be described, and co-operates with the guards 120 to form a completely enclosed pocket for the severed material. As shown in Figs. 27, 28 and 29, the apron consists of a series of apron sections 129 connected together at their edges by hinged connections 130, and provided at each end with upwardly curved portions 131. The curvature of the portions 131 is the same as that at the corners of the cutter 6. The lower edges of the guards 120 are provided with grooves as shown at 132 in Fig. 29, and the ends of the upturned portions 131 are arranged to fit into these grooves when the apron 128 is drawn into the kerf formed by the cutter 6. The upturned portions 131 have their edges sufficiently beveled to permit the apron to follow the curve of the kerf formed by the cutter 6. By this construction the severed coal is completely enclosed and no opening is left, not even at the corners of the cut, through which any of the coal may escape. Pivoted to the hinge 130 at the end of the apron 128 next the cutter is a plate 130′, Figs. 7, 9 and 29ª. The plate 130′ is curved to conform to the curvature of the kerf formed by the cutter, and is arranged to swing outwardly from the apron, as shown in Fig. 9, on its return, to hold the coal from sliding off the end of the apron. Since the member 130′ is a solid plate it will retain the fine as well as the coarser material. A stop 130″ is attached to the plate to prevent its turning backwardly under pressure of the coal.

The apron 128 is arranged to slide over a bed plate 133 extending longitudinally the full length of the machine, and inclined downwardly at the forward portion of the machine as shown at 134 in Fig. 9. The apron is guided by flanges 133′ co-operating with the upturned edges 131 of the apron 128. The flanges 133′, as shown in Fig. 10, are continued below the bed plate 133 to support the under run of the apron in a horizontal position. In order that the apron may be supported throughout its entire length when in operation, a portion of the bed plate 134 is provided with an adjustable extension 135, Figs. 9, 16 and 17. The extension 135 is carried by slides 136 movably mounted in slots 137 in the lower portion of the bed plate 134. The slides 136 are provided with rack teeth 138 which mesh with pinions 139 carried on a shaft 140 extending transversely of the machine, and provided on each side thereof with operating hand wheels 141. Catches 142, one on each side of the machine, are provided for holding the extension 135 in adjusted position. When the attendant is operating the machine from one side, he may leave the catch 142 at the opposite side of the machine thrown backwardly into inoperative position, where it will be held by one of the pins 143. The lower portions of the side plates of the machine frames are provided with a pair of notches or slideways 144, Fig. 17, in which the lower edges of the guards 122 slide.

The apron 128 is operated and controlled by a pair of cables 145 and 146, attached respectively one to each end of the apron. The ropes 145 and 146 are operated and controlled by a pair of drums 147 and 148 respectively. These drums are mounted on a shaft 149, Figs. 10 and 36, extending

transversely across the machine frame just below the frame and back of the supporting truck, the shaft 149 is driven by a motor 150 and a train of gearing 151, and the drums 147 and 148 may be clutched with the shaft 149 by clutches 152 and 153 controlled by operating levers 154 and 155. The operating levers 154 and 155 are connected by a bar 156 extending transversely across the machine, and so arranged that but one of the drums 147 and 148 may be connected with the shaft 149 at a time. It will be seen from Fig. 36 that when one of the drums is in operative engagement with the shaft, the other will be free to rotate thereon. When the levers 154 and 155 are in intermediate position both drums are free to rotate upon the shaft.

The cable 145 extends rearwardly from the drum 147, and passes over a pulley 157 at the rear portion of the machine frame. From the pulley 157 the cable 145 extends forwardly, as shown in Figs. 7 and 10, in a depression 158 (Fig. 17) in the upper surface of the bed plate 133 of the machine frame. The depression 158 is continued throughout the entire length of the bed plate and its extension 135, as shown in Figs. 9 and 17, and the cable 145 extends forwardly throughout the full length of this extension, and to a pulley 159, Figs. 9, 19 and 22, secured to the rear central portion of the cutter bar 6. The cable 145, after passing around the pulley 159, is again extended rearwardly and secured to the forward end of the apron 128, as shown in Figs. 7 and 9. The depression 158 is provided in the bed plate 133 in order that the forward run of the cable 145 will not be interfered with by the apron 128 when it rests upon or is drawn over the bed plate 133. The cable 146 extends from the drum 148 to the rear portion of the machine frame, where it passes over a pulley 160, and is thence brought forward and attached to the rear end of the apron 128. It will be apparent from the construction described that if the apron 128 is in a position at the rear of the machine, it may be drawn forward by winding the cable 145 on the drum 147 provided, of course, that the cutter 6 and pulley 159 are at the same time held stationary. It is also apparent that the apron may be drawn from the forward to the rear portion of the machine by winding on the drum 148, and allowing the cable 145 to run loosely from the drum 147.

Mechanism is provided, as best shown in Figs. 8 and 18–22 inclusive, for controlling the movement of the cable 145 through the pulley 159 at various positions of the cutter 6 in its cycle of operation. As shown in Fig. 19, a slide bar 161 is secured to the rear edge of the cutter bar 6, and carries a cam wedge 162 arranged to be drawn into contact with the cable 145 where it passes over the pulley 159, to hold the pulley 159 from rotation and to prevent movement of the cable 145 thereon. A flexible cable 163 is attached to the end of the slide bar 161 (Fig. 18), and extends to the side of the cutter frame, where it is guided around the corner of the frame by extension 164, and thence along a groove in the guard 120 to a position adjacent the end of the hollow axle 75. The end of the cable 163 opposite the slide bar 161 is attached to a slide 166, carried by guides 165 secured to the outer side of the guard 120. The slide 166 is provided with a projecting pin 167, to which is attached a coil spring 168, and which is connected with a short arm 169 of a bell crank lever 170, Figs. 8 and 18. The long arm 171 of the bell crank lever 170 is provided with an inwardly turned extension 172 arranged to contact with the lug 173 carried on the support 73 for the hollow axle 75. It will be apparent from the construction as shown and described, that the spring 168 will normally draw the bar 161 in a direction to force the wedge 162 into contact with the cable 145, and prevent movement of the cable relative to the pulley 159. This will be the condition of the parts during the cutting operation of the machine. As will be seen from Fig. 8, however, when the cutter 6 has reached the extremity of its downward movement, the inwardly bent extension 172 of the bell crank 170 will strike the projection 173, and rotate the bell crank lever 170 against the tension of the spring 168, and thus release the pull on the slide bar 161.

The operation of the apron is as follows: Assuming that the apron is at the rear portion of the machine frame, and that the machine is in position to take a cut, the cutter bar 6 will be in its lowermost position, and the tension of the slide bar 161 will therefore be released. The drum 147 is first clutched to the shaft 149, and the cable 145 is wound upon the drum. This will produce a tension upon the run of the cable 145 at the right of the pulley 159 in Fig. 19, and the apron will be pulled forwardly until its front end is adjacent the rear portion of the cutter 6. When the belt has reached this position, the lever 154 will be moved by the operator to release both drums 147 and 148. The cutter bar 6 will now be started on its forward movement, and as soon as this movement begins the lever 170 will move away from the stop 173, and the spring 168 will be permitted to operate to draw the wedge 162 into position to hold the cable 145 from movement on the pulley 159. In this way the apron 128 is drawn around after the cutter 6 throughout its entire movement, and thus encloses the severed material. After the cut has been completed and the cutter brought to a stop at its upper limit of movement, the

drum 148 is clutched to the shaft 149, and the cable 146 is wound upon the drum 148 (Fig. 36), thus exerting tension on the rear end of the apron 128 to draw it together with the material deposited upon it, and with the cutter bar 6, backwardly until the cutter bar reaches its extreme lower position. When this occurs the lever 170 will strike the stop 173 and the tension of the cable 163 will be released, thus freeing the pulley 159. The rearward movement of the apron continues under the influence of the drum 148 until the material carried by it is discharged at the rear end of the machine into a car or other receptacle placed upon the track 7 to receive the material.

To assist in moving the machine forward as the cuts are made in the wall of the chamber, a section of movable track 175 is provided, which comprises a pair of rails 176 fastened together by cross bars 177 (see Figs. 13, 14 and 15). As shown in Fig. 13, the rails for this movable track section are turned on their sides, with the bottom supporting flanges turned inwardly and secured to the cross bars 177. The movable track section is made of a proper width to fit between the rails of the fixed track. When the track section 175 is placed in position, as shown in Figs. 13 and 14, the rails 176 are so held that they form a support for the flanges of the wheels 21. When the machine is first placed in the mine chamber it will occupy the position shown in Fig. 8, and one cut may be taken with the machine in this position. After this cut has been taken, there is still room on the permanent track to move the machine forward a sufficient distance to take a second cut. After this second cut has been taken the brakes of the supporting truck are set, and the cable 44 carried by the drum 40 is secured to the rear cross bar 177 of the movable track section 175 by means of hook 178 and eye bolt 179, Figs. 10, 14 and 15. The drum 40 is then clutched to the shaft 39 and the cable 44 wound thereon, thus drawing the track section 175 forwardly. The machine may now be run forward on the extended portion of the movable track section and other cuts be taken. New rail sections 7 may be placed at intervals to extend the main track by fastening the same to the ties.

Current for driving the different motors is supplied from the trolley line 180 secured to the roof of the mine, and arranged to contact with trolley wheels carried on the trolley poles 181, either of which poles may be used. A conductor 182 extends downwardly from the terminal of the trolley pole, and branches of this conductor extend to the controller 64 for the motor 23, and to controllers 183 and 184 for the motors 150 and 85 respectively. These controllers are arranged both to govern the speed and to reverse the direction of the motors. The current is carried from the controller 184 to the motor 85 by means of a cable 186 (Fig. 7) and a sliding brush 187 arranged to bear upon insulated slip rings 188 carried on the casing 87 of the motor 85.

In Figs. 31–35 inclusive is shown a modified form of guard for enclosing the sides of the cut made by the loop cutter. The guard shown in these figures is composed of a series of plates 190 having their edges pivoted together to form a somewhat flexible chain of upright plates arranged to extend from the upturned edges of the apron 128 inwardly to the periphery of the hollow axle 75. Each of these plates is provided with two bearing flanges 191 and 192 respectively, offset from one another so that the bearing flanges of the adjacent plates will overlap one another, and form a substantially continuous surface in a common plane at each side of the chain of plates. The plates are held together by pivot pins 193 extending through openings in the bearing flanges 191 and 192. The forward plate 190 is pivoted to the cutter 6 at 194. When the cutter 6 is swung forwardly in making a cut the plates 190 move along with it, and arrange themselves in the manner indicated in Fig. 31 to completely enclose the severed material. On the return movement of the cutter 6 the plates are forced backwardly in a slideway 195 provided on the side plates of the mining machine frame. A flange 196 is carried by the axle 75 for supporting the inwardly extending edges of the plates 190 when they are in operative position. By this construction separate supplemental guards are made unnecessary, the single pivoted guard operating to enclose the entire opening at the side of the cut.

When the machine is being transported into and out of the mine chamber the cutter bar 6 may be swung upwardly, as shown in Fig. 8, thus raising the guard 120 a sufficient distance to clear the track 7 and any other obstacles that may be in the way of transportation. The apron 128 will also be drawn back onto its bed plate, and the guard 122 will be retracted. The bed-plates extension 135 will also be moved rearwardly until its lower end is raised above the level of the track 7. In this way all of the forward lower parts of the machine are retracted, and the entire mining and loading machine may be moved freely by its motor to and from the mine wall.

The operator, by actuating the controller 64 shown in Fig. 8, may start, stop, reverse and control the speed of the electric motor 23 shown in Fig. 11, by a well known electric mechanism. The operator can control the transportation of the truck together with the mining and loading machine thereon along the track by operating the clutch 33 by means

of the handle 36. At this time the brake mechanism is released, but when the cutting operation takes place an operator may step on the foot pedal 67 and firmly apply the brake mechanism to hold the truck and mining machine frame stationary.

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

From the foregoing it will be seen that the loading machine disclosed comprises a supporting truck on which is mounted an element 24 between the axles of the truck. As shown in Figs. 8, 10 and 15, a rearward extension 25, 133 is slidably mounted upon the element 24 to move sidewise. The gearing illustrated at 47, 48 in Figs. 9 and 15 constitutes means for imparting movement to the rearward extension 25, 133. The conveyer is supported upon this extension, as clearly shown in Figs. 7 and 10.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a mining machine, the combination with cutting mechanism, of means for operating the same, a supporting frame for said cutting mechanism and said operating means, a truck for carrying the aforesaid, a curved support for said frame on said truck, and an interlocking connection between said support and said frame to prevent vertical tilting of the latter relatively to said truck.

2. The combination with a mining machine comprising cutting mechanism, of a truck on which said mining machine is mounted, a horizontal curved slideway carried by said truck, a cooperating curved slideway on said mining machine arranged to rest on said first-mentioned slideway, and means for holding said slideways against relative movement longitudinally of the truck.

3. The combination with a mining machine comprising cutting mechanism and an elongated frame, of a truck supporting said mining machine frame, means for movably supporting said frame on said truck and for causing said elongated mining machine frame to swing about the rear portion thereof as a pivotal center when said frame is moved laterally on said truck, and interlocking means between said frame and said truck for preventing tilting of the mine machine relatively to said truck and for preventing longitudinal movement of the mining machine relatively to said truck.

4. The combination with a mining machine comprising cutting mechanism and an elongated frame, of a truck for supporting said frame in an approximately balanced position, means for confining said mining machine to lateral arcuate movements relatively to said truck and preventing tilting movements of said mining machine up and down relatively to said truck and by preventing forward and backward movements of said mining machine relatively to said truck, and means for swinging said mining machine laterally on said truck and the end of the said elongated frame remote from the cutting mechanism as a pivotal center.

5. The combination with a portable truck, of an arcuate supporting platform carried by said truck and having spaced-apart parallel arcuate edges, a loader frame mounted on said truck, a slideway carried by said frame and arranged to rest on said supporting platform and to conform to the shape thereof and with the center of arcuate movement of said frame relatively to said truck toward the rear of said frame, and means for moving said frame laterally relatively to said truck where such slideway between the parallel arcuate edges of said platform prevents longitudinal movement of said frame relatively to said truck.

6. The combination with a mining machine having an elongated frame, of a truck for supporting said elongated frame with one end of the latter overhanging the rear end of said truck, an arcuate platform on the upper side of said truck, a flat plate on the under side of said elongated frame resting in sliding contact with the upper surface of said arcuate platform, arcuate connections between said arcuate platform and said arcuate plate to guide said elongated frame laterally relatively to said truck with the center of arcuate movement of said frame at the rear portion of the latter distant from the rear end of said truck, and driving mechanism for moving the frame laterally in an arc relatively to said truck.

7. The combination with an elongated frame, of means extending longitudinally of said frame for transferring material from the forward portion of said frame to the rear end thereof, a portable frame for supporting said elongated frame near the center of gravity thereof, arcuate guiding connections between said supporting frame and said elongated frame comprising an arcuate groove in said elongated frame, and driving mechanism on the supporting frame to said elongated frame adjacent said arcuate guiding connections for swinging said elongated frame transversely of said supporting frame approximately about the discharge end of said elongated frame as a pivotal center.

8. The combination with a mining machine comprising a frame, of a truck on which said frame is mounted, a supporting platform carried by said truck and having the front and rear edges thereof curved as a center located at a distance from the rear end of said truck, means on said frame ar-

ranged to rest on said supporting platform and shaped to conform to the curvature of the edges of said platform, a segmental gear extending from said frame to a position under the forward edge of said platform, and driving mechanism mounted on said truck and connected to said segmental gear to move said frame laterally about said center as a pivot.

9. In a mining machine, the combination with a truck, of a supporting platform carried by said truck and comprising a flat plate extending transversely of the truck, an elongated mining machine frame overhanging both ends of the truck, a slideway secured to the lower side of said frame near the longitudinal central portion thereof, guides on said slideway, inwardly projecting flanges carried by said guides and arranged to underlie the edges of said transverse supporting platform to prevent tilting of said mining machine and longitudinal movement thereof relatively to said truck, and loading apparatus extending from a receiving position in advance of one end of said truck along said frame to a delivery position rearward of said truck for loading purposes in the various lateral positions of the forward end of said frame relative to said truck.

10. The combination with a truck, of a horizontal, transversely extending supporting arcuate platform carried by said truck, a mining machine frame fitting on said platform and having arcuate interlocking connections therewith to prevent tilting of said frame relatively to said truck and also movement longitudinally of said frame relatively to said truck, and mechanism for moving said mining machine frame on said platform transversely of said truck on a center of arcuate movement spaced from the rear end of said truck, the lateral movement of the forward end of said frame being in advance of the forward end of said truck.

11. In combination, a truck, a supporting platform carried by said truck comprising a flattened horizontally curved supporting bar, a mining machine frame having a curved slideway near the longitudinal center thereof fitted to and co-operating with said supporting bar, and a rack and pinion for moving said slideway on said bar to cause said mining machine frame to swing about one end thereof as a pivotal center distant from the rear end of said truck.

12. In combination, a truck, a supporting platform arranged transversely of said truck and comprising a flattened horizontally curved bar, an elongated mining machine frame, a slideway secured to the lower portion of said frame near the longitudinal center thereof and shaped to conform to the curvature of said bar, means for moving said slideway on said bar to cause said frame to swing about one end thereof as a pivotal center distant from the rear end of said truck, cutting apparatus carried at the end of said frame opposite said center of arcuate movement, and means for transferring material from said cutting apparatus longitudinally of said frame to the end thereof about which said frame swings.

13. The combination with a truck, of an elongated frame mounted on said truck, conveyer mechanism extending from the forward portion of said frame to the rear end thereof, the rear end of said frame being adapted to overhang the rear end of said truck to extend over or into a mine car, the forward end of said frame being adapted to overhang the forward end of said truck, means for supporting said frame on said truck intermediately the ends of said frame for lateral movement of said frame on said truck on a center back of the rear end of said truck to maintain the discharge end of said conveyer mechanism above the floor of the mine car while the forward end of said frame has a wide latitude of movement, interlocking connections between said frame and said truck for preventing longitudinal movement of said frame relatively to said truck and also preventing tilting movements of said frame relatively to said truck either up or down without interfering with the arcuate lateral movement of said frame relatively to said truck, and power-operated mechanism under control of the operator for automatically moving the forward portion of said frame in an arc laterally relatively to said truck.

14. In a mining machine, the combination with a supporting frame, of kerf cutting mechanism mounted thereon for operation in advance of said frame, means for operating said kerf cutting mechanism including feed thereof relatively to said frame and in advance thereof, and a guard connected to said kerf cutting mechanism to move bodily therewith during the entire feed thereof from the floor to the roof and extending back therefrom for confining the material when dislodged by said kerf cutting mechanism to one side of said guard during the operation of said kerf cutting mechanism.

15. In a mining machine, the combination with a supporting frame, of kerf cutting mechanism mounted thereon for operation in advance thereof, means for operating said kerf cutting mechanism including arcuate feed thereof relatively to said frame to cut a kerf in a mine wall in advance of said frame, and an arcuate guard connected to said kerf cutting mechanism to move therewith back of said kerf cutting mechanism during the feed thereof through an arc of about 180 degrees and in the kerf produced

by the latter to confine the material when dislodged from movement across the plane of said kerf.

16. In a mining machine, the combination with a loop chain core cutter, of means for operating said core cutter including arcuate feed thereof, and spaced-apart arcuate guards carried by said core cutter for movement therewith and arranged to extend a distance back therefrom to confine dislodged material from movement laterally from the space originally occupied thereby.

17. In a mining machine, a cutter head, a U-shaped cutter frame carried by said cutter head for pivotal movement thereon, a chain cutter on said cutter frame for cutting a kerf, means for operating the foregoing, and arcuate guards carried by the legs of said U-shaped frame for movement therewith into the kerf formed by said cutter.

18. In a mining machine, a cutter head, a U-shaped cutter frame pivotally mounted on said cutter head, a chain cutter mounted on said cutter frame, guard plates carried by the legs of said cutter frame for movement therewith into the kerf formed by said chain cutter, and an apron connected to move with said cutter frame and arranged to co-operate with said guard plates to form an enclosed pocket for the material severed by said cutter.

19. In a mining machine, a core cutter comprising chain cutting mechanism, a flexible apron, means for drawing said apron into the kerf formed by said core cutter, and upwardly extending guards carried by said apron for retaining material on said apron.

20. In a mining machine, a rotary cutter head, arms secured to said cutter head for rotation therewith, a cross bar connecting the extremities of said arms, cutting mechanism carried by said arms and cross bar, means for rotating said cutter head arms and cross bar to make an arcuate cut in the material to be mined, guard plates carried by said arms for closing the sides of said cut, and a flexible apron carried by said cross bar for closing the curved face of said cut, said guard plates and apron arranged to form a closed pocket for receiving the material severed by said cutter.

21. In a mining machine, a core cutter comprising chain cutting mechanism, guard plates secured to said cutter, a flexible apron secured to said cutter, said apron having up-turned edges arranged to co-operate with the edges of said guard plates for forming a continuous enclosure for the core cut by said cutter.

22. In a mining machine, a cutter comprising a pair of arms and a connecting cross bar, means for rotating said cutter to form an arcuate cut in the material to be mined, guard plates secured to the arms of said cutter and arranged to follow said arms into the kerf formed thereby, said guard plates having curved edges to conform to the curvature of the cut made by said cutter and having grooves in their curved periphery, and a flexible apron secured to the cross bar of said cutter to be drawn into the kerf formed by the said cross bar, said apron having upturned edges arranged to register with the grooves in said guard plates thereby forming a continuous wall for enclosing the material severed by said cutter.

23. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, spaced apart upright guards connected to said cutting mechanism to move bodily therewith, and supplemental spaced apart upright guards carried by said supporting frame in position to form spaced apart walls in continuation of the walls of the first-named guards for enclosing the dislodged material.

24. In a mining machine, a frame, a movable cutter head carried by said frame, guards secured to said cutter head for movement therewith, an apron secured to said cutter head for movement therewith into the mine wall, and movable supplementary guards carried by said frame and arranged to co-operate with said first mentioned guards and said apron for enclosing the material severed by said cutter.

25. In a mining machine, a frame, a cutter carried by said frame, guards carried by said cutter and movable therewith, an apron carried by said cutter and movable therewith, stationary guard plates on said frame, and supplemental guard plates slidable on said stationary guard plates for forming an extension thereof, said guard plates and apron co-operating to form an enclosed pocket and chute for the material severed by said cutter.

26. In a mining and loading machine, the combination with a supporting frame, of dislodging mechanism mounted on the forward end of said frame for operation on an upright mine wall in advance of said frame, and an apron having one end connected to said dislodging mechanism at the forward end of said frame and the other end spaced back from the forward end of said apron, said apron comprising a plurality of narrow metallic plates arranged side by side a distance between adjacent edges, and having upturned portions at the ends of said plates to form a flexible trough-shaped apron adapted to receive dislodged material directly from the mine wall adjacent said dislodging mechanism.

27. In a mining machine, the combination with a supporting frame, of dislodging mechanism mounted on said frame for arcuate feeding movement on a horizontal axis

extending transversely of said supporting frame, and a stationary guard extending transversely of said frame and longitudinally of said axis in position to permanently cover the latter to protect the parts adjacent thereto between the lateral limits of said dislodging mechanism.

28. In a mining machine, the combination with a supporting frame, of a loop chain core cutter connected to said frame for feeding movement on a horizontal axis and having an unobstructed core opening therethrough, and an upwardly and rearwardly extending guard always positioned above such horizontal axis to intercept the falling of the uppermost material of said core and prevent its coming in contact with the mechanism adjacent said horizontal axis.

29. In a mining machine, the combination with a supporting frame, of cutting mechanism comprising an axle mounted on said supporting frame in a horizontal position extending transversely of said supporting frame, and a guard mounted on said supporting frame to always extend therefrom over said axle over approximately its whole length to protect the same at all times from falling material.

30. In a mining machine, the combination with a supporting frame, of a loop chain core cutter having an unobstructed core opening therethrough and comprising an axle mounted on said supporting frame in a substantially horizontal position, and a guard positioned so as to be always above said axle and arranged to direct material falling toward the axle into the space in front of said axle.

31. In a mining machine, the combination with a supporting frame, of a rotary cutter having an axle mounted on said frame to enable said cutter to swing into a position to surround material located above said axle, a pocket for receiving material dislodged by said cutter, and a guard plate positioned above said axle and arranged to direct the dislodged material in front of said axle between the mine wall and said axle and into said pocket.

32. In a mining machine, the combination with a supporting frame, of an annular gear movably mounted on said supporting frame, yielding means interposed between said frame and said gear for holding said gear normally in stationary position relatively to said frame and for permitting lost motion between said gear and said frame when the resistance of said yielding means is overcome, cutting mechanism mounted on said frame, and means comprising a pinion meshing with said gear for operating said cutting mechanism including the feed thereof relatively to said gear and said frame.

33. In a mining machine, the combination with core-cutting mechanism, of means for operating said core-cutting mechanism including the feed thereof, such operating mechanism comprising an internal annular gear, and yielding means for holding said annular gear stationary during the normal operation of said core-cutting mechanism and acting to automatically restore the normal driving relation after abnormal resistance to feeding movement of said cutting mechanism is removed.

34. In a mining machine, the combination with a supporting frame, of kerf-cutting mechanism pivotally connected to said frame, a gear movably mounted on said frame at the pivotal axis of said kerf-cutting mechanism, means for operating said kerf-cutting mechanism including the feed thereof in an arc on said pivotal axis, said operating means comprising a pinion meshing with said gear, and yielding means interposed between said gear and said frame for permitting a succession of slips between said gear and said supporting frame when said cutter is subjected to abnormal resistance, such yielding means effecting the restoration of the normal driving relation after each of said slips.

35. In a mining machine, the combination with a supporting frame, of kerf cutting mechanism mounted on said frame for swinging movement relatively thereto, means for operating said kerf cutting mechanism including the feed thereof by swinging the same relatively to said frame, yielding means interposed between said frame and said operating means and arranged to permit a succession of slips relatively to said supporting frame when said cutting mechanism meets with abnormal resistance when given said swinging feeding movement, whereby the operator is made aware of such abnormal resistance, and means for releasing said yielding means to effect a slowing down in the feeding rate of travel of the kerf cutting mechanism.

36. In a mining machine, the combination with a supporting frame, of kerf cutting mechanism mounted thereon for swinging feeding movement relatively thereto, means for operating said kerf cutting mechanism including such swinging feeding movement thereof, yielding means interposed between said operating means and said frame for permitting a succession of slips relatively to said frame when said kerf cutting mechanism is subjected to abnormal conditions, means for automatically restoring normal fixed relation between said yielding means and said frame, to restore the normal operation of said operating means, and means under the control of the operator for preventing such automatic restoration of normal feed and thereby retard the feeding travel of the kerf cutting mechanism until such abnormal resistance has been overcome.

37. In a mining and loading machine, the combination with a supporting frame comprising spaced-apart side bars extending forwardly, of a bed plate forming the bottom of said frame, adjustable spaced-apart extensions for said side bars and extending from the forward end thereof, an adjustable extension for said bed plate, means for moving the extensions for the side bars, separate and independent means for moving the extension of the bed plate into operative receiving position and to retract the same, mechanism mounted on the forward end of said frame for dislodging material from a mine wall in a space between upright planes extending through said side bars and the adjustable extensions thereof, and conveyer mechanism extending longitudinally of said supporting frame to a receiving position between the upright planes of said bars and the extensions thereof for moving the dislodged material toward loading position.

38. In a mining and loading machine, the combination with an elongated supporting frame, of an inclined bed plate at the forward portion of said frame, plates at the edges of said bed plate and extending downwardly and forwardly, adjustable extensions for said side plates arranged for movement forwardly and downwardly in advance of said side plates, a separate adjustable extension of said bed plate to the floor of the mine chamber, means for retracting all of said extensions to permit free transportation of said machine, mechanism mounted on the forward portion of said supporting frame for dislodging material to the space between said adjustable extensions of said side plates, and conveyer mechanism in position for receiving the dislodged material at the forward end of said supporting frame between said extensions of the side plates and conveying such dislodged material longitudinally of said elongated frame toward loading position.

39. A mining and loading machine comprising a supporting frame, a cutter mounted on said frame, means for operating said cutter, a bed plate carried by said frame, a flexible apron movable along said bed plate into position for receiving material cut by said cutter adjacent said frame, means for moving said apron over said bed plate to transfer cut material along said frame toward loading position, and an adjustable extension for said bed plate movable into position to bridge the space between the forward end of said bed plate and the base of the mine to form a continuous support for said apron in its movement over the mine floor in advance of said extension and along said extension and said bed plate toward loading position.

40. In a mining and loading machine, the combination with a supporting frame having an inclined bed plate at its forward portion, of an adjustable extension for said bed plate, means for moving said extension relatively to said bed plate to and from the floor of the mine chamber in advance of said frame, a lock for holding said extension in adjusted position, dislodging mechanism mounted on the forward end of said frame for operation in advance thereof, and a conveyer extending along said bed plate including the extension thereof to a receiving position adjacent said dislodging mechanism for effecting the transfer of the dislodged material from the mine wall along said frame toward loading position.

41. In a mining and loading machine, the combination with an elongated supporting frame having a bed plate with an inclined portion forwardly, of an adjustable extension for said inclined portion of said bed plate, means comprising rack and pinion mechanism for moving said extension relatively to said bed plate, a pawl lock arranged to cooperate with said rack and pinion mechanism to hold said extension in adjusted positions, core-cutting mechanism mounted on the forward end of said frame for cutting a core of material in a mine wall in advance of said frame, and conveyer mechanism movable into position for receiving the dislodged material and conveying it along said extension and said bed plate to the rear of said elongated frame.

42. In a mining machine, a cutter for severing material to be mined, a frame, an apron for transferring the severed material along said frame, a cable for controlling the movement of said apron movably secured to said cutter, and means for automatically locking said cable to said cutter at certain periods in the operation of said cutter.

43. In a mining machine, a cutter, an apron for receiving the material severed by said cutter, a cable secured to one end of said apron and passing over a guide carried by said cutter, and means for automatically clamping said cable in said guide to cause said apron to move with said cutter during certain periods of the operation thereof.

44. In a mining machine, a swinging cutter, an apron for receiving the material severed by said cutter, a cable secured to one end of said apron and passing over a pulley carried by said cutter, and means for automatically locking said cable in said pulley during the forward movement of said cutter and for automatically releasing said cable when said cutter reaches the end of a return stroke.

45. In a mining machine, a swinging cutter, an apron for receiving the material severed by said cutter, a cable secured to one end of said apron and passing over a pulley carried by said cutter, a device for locking said pulley and cable to prevent relative

movement thereof, and means controlled by the movement of said cutter for automatically operating said locking device at certain positions in the movement of said cutter.

46. In a mining machine, a swinging cutter, an apron for receiving the material severed by said cutter, a cable secured to one end of said apron and passing over a pulley carried by said cutter, a sliding wedge arranged to prevent movement of said cable relative to said pulley when in one position, a spring for automatically holding said wedge in position to prevent such movement during the cutting operation of said cutter, and means for automatically releasing said wedge when said cutter reaches the extremity of its return stroke.

47. In a mining machine, a cutter, an apron connected to said cutter for receiving the material directly from said cutter, a frame over which said apron is arranged to be moved, a cable for moving said apron on said frame, and a depression extending longitudinally of said frame to accommodate said cable.

48. In a mining machine, a frame, a cutter carried by said frame, an apron for receiving material directly from the mine wall as cut by said cutter, said apron being connected to said cutter a bed plate carried by said frame over which said apron moves, a cable for moving said apron over said bed plates, and a depression extending longitudinally of said bed plate for accommodating one run of said cable to prevent contact between said cable and said apron when said apron is drawn over said bed plate.

49. In a mining machine, a frame, a cutter carried by said frame, an apron for receiving the material severed by said cutter and for transferring it along said frame, cables secured to opposite ends of said apron, a pair of drums for operating said cables to move said apron along said frame, a pulley carried by said cutter over which one of said cables travels, means for automatically locking said cable to said pulley to prevent movement thereof relative to said pulley during the cutting operation of said cutter, and means for automatically releasing said cable from said pulley at the close of said cutting operation to permit said apron to be drawn along said frame to transfer the severed material carried thereby.

50. In a mining machine, a cutter, an apron for receiving the material severed by said cutter, a frame over which said apron travels to transfer said material away from said cutter, a cable secured to each end of said apron, a pair of drums for operating said cables to move said apron in opposite directions, means for preventing simultaneous operation of said drums to wind said cables thereon but permitting simultaneous unwinding thereof, a guide secured to said cutter over which one of said cables passes, means for automatically locking said cable and guide relative to one another during the operation of said cutter, and means for automatically releasing said cable and guide after each operation of said cutter.

51. In a mining machine, a frame, a pivoted cutter carried by said frame, an apron for receiving the material severed by said cutter, a pair of cables one secured to each end of the apron, drums for operating said cables, a guide for one of said cables arranged to cause said cable to move said apron in a direction away from said cutter, a guide for the other of said cables carried by said cutter and arranged to cause said cable to move said apron toward said cutter when said cutter is stationary, means for automatically locking said cable to said guide during the operative movement of said cutter to cause said cable to draw said apron into the kerf formed by said cutter, and means for automatically releasing said cable from said guide after the completion of each operation of said cutter to permit said apron to be moved along said frame to transfer the material thereon away from said cutter.

52. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, an apron connected to said cutting mechanism in position for receiving material severed by said cutting mechanism, and a plate connected to said apron in position to retain dislodged material on said apron.

53. In a mining machine, a cutter, an apron connected to said cutter for receiving material severed by said cutter, and a solid plate pivotally carried by said apron to assist said apron in moving said material.

54. In a mining machine, a core cutter, an apron connected to said cutter, means for moving said apron into the kerf formed by said cutter, a solid plate hinged to said apron near one end thereof to assist said apron in moving said material, and means for limiting the pivotal movement of said plate relative to said apron in one direction to cause said plate to bear against said material when said apron is operated to move said material.

55. In a mining machine, a supporting frame, a pivoted cutter mounted on said frame, means for imparting an arcuate movement to said cutter, an apron on said frame, means on said frame for moving said apron into the kerf formed by said cutter, a solid plate hinged to said apron near one end thereof and curved to conform to the curvature of the kerf formed by said cutter, and means for limiting the pivotal move-

ment of said plate relative to said apron in one direction.

56. In a mining and loading machine, the combination with a supporting frame, of mechanism mounted thereon for dislodging material from the mine wall adjacent said frame, a flexible apron having its edges curved to form a trough-shaped conveyer, means for moving said apron along said frame from a receiving position adjacent said dislodging mechanism, and guides secured to said frame and arranged to cooperate with the curved edges of said apron for guiding said apron along said frame.

57. In a mining and loading machine, the combination with a supporting frame, of core-cutting mechanism mounted on said frame, a flexible apron connected to said core-cutting mechanism to be drawn thereby back of the core, said apron having upturned edges at the sides of the back portion of said core, a bed plate carried by said frame over which said apron is adapted to move, and guides extending longitudinally of said frame above and below said bed plate and arranged to cooperate with the upturned edges of said apron to hold said apron in a horizontal position on said bed plate.

58. In a mining and loading machine, the combination with a portable frame mounted on wheels adapted to run on a track, of cutting mechanism mounted on said frame for operation at the forward end thereof in advance of the forward end of said track, loading apparatus mounted on said frame and extending forwardly to a receiving position in advance of the forward end of said track, brake mechanism applied to the said wheels to hold said frame stationary on said track, a track extension connected to the forward end of said track, and power mechanism mounted on said frame and adapted to be connected to said track extension to move the same forwardly to increase the forward range of operation of said cutting mechanism and the receiving end of said loading apparatus.

59. The combination with a mining and loading machine, of a truck for supporting the same with the forward end thereof in advance of the track on which said truck is mounted, a track extension connected to the end of said track, and means for operating said track extension to increase the effective length of said track and the distance of operation of said mining and loading machine beyond the forward end of said track.

60. The combination with a mining and loading machine, of a truck mounted on a track for supporting said machine, means for holding said truck against forward movement toward the forward end of said track, and power mechanism mounted on said truck and adapted to be connected to said extension to move the same forward when said truck is held against forward movement.

61. A mining machine comprising a frame having wheels mounted on a track, of means for holding said frame against forward movement toward the end of said track, a track extension movable longitudinally of said track, and power mechanism mounted on said frame and adapted to be connected to said track extension to move the same forwardly to increase the effective length of said track and the range of operation of said mining machine beyond the forward end of said track.

62. The combination with a mining machine comprising a frame mounted on flanged wheels adapted to run on a track, of an extensible track section comprising a pair of rails connected by cross-pieces and having their heads guided along the grooves formed by the heads, webs and bases of the track to which the extension is connected, and power mechanism on said frame adapted to be connected to one of said cross-pieces to move said extension beyond the end of the track for increasing the range of operation of said mining machine beyond the forward end of said track by forming a support between the webs and heads of the extension for the flanges of said wheels.

63. The combination with a mining machine comprising a frame mounted on flanged wheels adapted to run on a permanent track, of a track extension comprising a pair of rails tilted in opposite directions with their heads fitting in the grooves formed by the heads, webs and bases at the insides of the rails of the permanent track, and means for moving the tilted pair of rails forward in position for receiving the flanges of said wheels along the grooves on the upper sides of said rails between their heads and bases and along their webs.

64. The combination with a mining machine comprising a longitudinal frame mounted on wheels adapted to run on a track with cutting mechanism in position at the forward end of said frame for operation in advance thereof and in advance of said track, a track extension comprising a pair of rails tilted in opposite directions and rigidly connected between their bases with their heads fitting in the inside grooves of the upright rails, means for holding the mining machine against movement as a whole, and power mechanism mounted on said frame comprising a rope adapted to be connected to the track extension to move the same and adjust the position thereof in accordance with the position of the cutting mechanism in advance of the track.

65. The combination with a mining and

loading machine comprising a longitudinal frame with cutting mechanism mounted on the forward end thereof and loading mechanism extending from the forward end thereof to the rear end thereof, a truck for supporting said machine, an arcuate horizontal platform on said truck to serve as the sole support for said mining and loading machine on said truck, the forward and rearward edges of said platform being curved on a center substantially at the rear end of said loading apparatus, means for connecting the frame of said mining and loading machine intermediate its ends to the arcuate edges of said platform to hold the mining and loading machine on said truck during the operation of said mining and loading machine, and means for moving the mining and loading machine laterally on said truck in an arc having its center substantially at the rear end of said loading apparatus to widen the range of operation of said cutting mechanism in advance of said frame and said truck while the rear end of said loading apparatus remains in substantially the same position for continuous loading into a mine car back of said truck.

66. In a mining machine, the combination with a supporting frame, of loop chain core-cutting mechanism mounted at the forward end of said supporting frame to swing on a horizontal axis, means for operating said core-cutting mechanism to cut an upright crescent-shaped core in a mine wall in advance of said frame, spaced-apart guard plates connected to the sides of said core-cutting mechanism to move therewith into the mine wall, and a pair of supplemental guard plates between the lower forward end of said frame to cooperate with the first-named guard plates to confine material dislodged from the core to the space between the upright planes of said guard plates.

67. In a mining machine, the combination with a supporting frame, of a loop chain core-cutting mechanism mounted on the forward end of said supporting frame to swing on a horizontal axis, said loop chain core-cutting mechanism comprising operating means therefor and an axle carrying such operating means, and a curved guard plate mounted on said supporting frame in position to extend forwardly over said axle at all times for protecting such operating means and directing falling material into the core space.

68. In a mining machine, the combination with a supporting frame, of loop chain core-cutting mechanism having an unobstructed core opening therethrough and comprising an axle drum mounted on the forward end of said supporting frame on a horizontal axis, said core-cutting mechanism comprising means for operating the same located within said drum, and a guard plate mounted on said supporting frame and extending through such unobstructed core space when the cutting mechanism is in its upper position to guard said drum against falling material and to direct the latter through such unobstructed core opening into the core space approximately below said drum.

69. In a mining and loading machine, the combination with a frame comprising a longitudinal chute inclined toward the mine floor at its forward portion and adapted to overhang a mine car at its rear portion, of loop chain core-cutting mechanism having an unobstructed core opening therethrough and mounted on a horizontal axis at the forward end of said frame, means for operating said loop chain core-cutting mechanism including upward feed thereof to cut a crescent-shaped core of material in a mine wall in advance of said frame, a flexible apron comprising a plurality of pivotally connected metallic sections, two ropes one connected to the forward end of said apron and the other connected to the rear end of said apron, a rope guide connected to the rear of said loop chain core-cutting mechanism for receiving the rope connected to the forward end of said apron, means for exerting a pull on the last-named rope to draw said apron into a position with its forward end near the rear of said loop chain core-cutting mechanism, means for locking said rope guide to the rope connected to the forward end of said apron to cause said apron to be dragged into the kerf back of the crescent-shaped core during the upward feed of said core-cutting mechanism, means for exerting a pull on the rope connected to the rear end of said apron to restore the core-cutting mechanism to initial position and move the core carrier and said apron away from the mine wall into the inclined portion of said chute, and automatic mechanism for releasing from said rope guide the rope connected to the forward end of said apron when said core-cutting mechanism reaches initial position, the continued pull on the rope connected to the rear end of said apron effecting the carrying of the core to the rear end of the chute for loading out of the rear end thereof into the mine car, the means for exerting a pull on the rope connected to the forward end of said apron being also capable of reversing the movement of said apron along said chute back to its initial position in close proximity to the rear side of said core-cutting mechanism.

70. In a mining and loading machine, the combination with a base frame, of a supplemental supporting frame having a forward extension adapted to engage the floor of a mine chamber and having also a rearward extension adapted to overhang a mine car, a conveyer extending from a receiving position on the forward extension to a discharge

position on the rear extension, dislodging mechanism mounted on the forward end of said supplemental supporting frame for operation in advance of said supplemental frame to dislodge material onto the receiving portion of said conveyor mechanism, means for supporting said supplemental frame on said base frame for lateral movement of said forward extension and of said dislodgng mechanism while said overhanging extension remains in communication with said mine car, and means for operating said dislodging mechanism and said conveyer mechanism in the various lateral positions thereof to mechanically mine the material from the mine wall and load it into the mine car.

71. In a mining and loading machine, the combination with a base frame, of an arcuate platform mounted thereon, a mining and loading machine comprising an elongated frame having forward and rearward portions respectively extending forwardly and rearwardly of said base frame, means for supporting said mining and loading machine on said platform for lateral movement of the forward portion of said mining and loading machine while the rear delivery portion thereof remains approximately in the same position for delivering material into a mine car, and means independent of the weight of said mining and loading machine for swinging the forward portion thereof laterally relatively to said base frame.

72. In a mining and loading machine, the combination with a wheeled truck adapted to run on track, of a platform mounted on said truck and having spaced-apart arcuate edges, a supplemental frame having spaced-apart arcuate grooves to fit the spaced-apart arcuate edges of said platform, conveyer mechanism mounted on said supplemental frame, dislodging mechanism mounted on said supplemental frame for operation in advance thereof to dislodge material into position to be received by said conveyer mechanism, means for operating said conveyer mechanism to mechanically transfer the dislodged material from the position assumed thereby after being dislodged to loading position at the rear end of said supplemental frame, and gearing connected between said truck and an overhanging portion of said supplemental frame adjacent one of said grooves to slide the supplemental frame laterally on said platform to secure lateral adjustment of said dislodging mechanism and the receiving portion of said conveyer mechanism while the discharge end of said conveyer mechanism remains approximately in the same discharging position.

73. In a mining and loading machine, the combination with a truck, of a supporting frame mounted on said truck for lateral movement relatively thereto, spaced-apart arcuate interlocking connections between said truck and said supporting frame to prevent tilting of said supporting frame relatively to said truck, means independent of the weight of any portion of said supporting frame for moving the forward portion of said supporting frame laterally while the rear end thereof remains approximately in the same position, a chute on said supporting frame extending downwardly and forwardly in advance of said truck and rearwardly behind said truck to overhang a mine car, core-cutting mechanism mounted on the forward end of said supporting frame to swing on a horizontal axis to dislodge a core in advance of said supporting frame, and conveyer mechanism for taking the material from the position where it is dislodged by said core-cutting mechanism and transferring such material mechanically along said chute out of the rear end thereof into the mine car.

74. In a mining machine, the combination with a truck adapted to run on an ordinary mine track laid up to a position adjacent an upright mine wall from which material is to be mined, of a mining machine mounted on said truck for operation in advance of the forward end of said mine track, propelling mechanism on said truck to move such mining machine forward into new cutting positions in advance of the forward end of said track, a supplemental track for said truck, and means on said truck adapted to be connected to said supplemental track for moving the latter forward step by step to afford a support for said truck and said mining machine when the latter has reached forward cutting positions where said truck can no longer be supported by said ordinary track but is supported by said supplemental track to permit continued operation of said mining machine in positions in advance of said ordinary track.

75. In a mining machine, the combination with a truck adapted to travel on a mine track, of a supplemental track adapted to occupy a position at the outer end of the mine track under said truck, a mining machine mounted on said truck in position to operate on an upright mine wall in advance of the front end of said mine track, means mounted on said truck and adapted to be connected to said supplemental track to shift the same forwardly beyond said mine track in position to support said truck for new forward positions of said mining machine, and means for propelling said truck along said mine track and also along said supplemental track to move the mining machine to such new positions.

76. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track adapted to be interconnected with said mine track and extend in advance thereof, means between said truck and said

supplemental track for shifting the latter forward into position to receive the weight of said mining machine, and propelling mechanism for moving the mining machine step by step off from the forward end of said mine track onto said supplemental track for new successive dislodging positions of said mining machine.

77. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track in interconnected relation with said mine track and adapted to extend in advance thereof, means between said truck and said supplemental track for shifting the supplemental track forward step by step as the upright mine wall is dislodged ahead of the tracks by said mining machine, and means for propelling said truck off the forward end of said mine track onto said supplemental track to move the mining machine to new successive dislodging positions.

78. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track adapted to extend beyond said mine track, part of the weight of the mining machine being supported on said mine track and the remaining weight by said supplemental track when said truck is on the forward end of said mine track, and means adapted to be connected between said truck and said supplemental track for moving the latter forward beyond the end of said mine track to support the forward portion of the mining machine when the forward portion of the truck runs off the mine track while the rear portion of said mining machine has its support distributed on said mine track and said supplemental track.

79. A mining machine comprising a truck adapted to travel along a mine track, a supplemental track having rails in position to receive said truck and adapted to extend from said mine track in advance thereof, and means for extending said supplemental track beyond the forward end of said mine track to support the mining machine in new successive forward dislodging positions as said mining machine progresses into the mine wall.

80. In a mining machine, the combination with a truck having wheels adapted to travel on a mine track extending to a position adjacent the heading of a mine entry, of a mining machine mounted on said truck in position for operation on said mine heading in advance of the forward end of said mine track, a supplemental track mounted betwen the rails of said mine track for movement relatively thereto beyond the ends of said mine track and in position to receive the flanges of the wheels of said truck, and means for moving said supplemental frame step by step beyond the forward end of said mine track in position to support said truck in new successive positions as permitted by successive advances of said mining machine operations.

81. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, flexible receiving means, a cable connected between said flexible receiving means and said cutting mechanism to cause said receiving means to move with said cutting mechanism, means for releasing such connection, and means for moving said flexible receiving means relatively to said cutting mechanism.

82. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, flexible receiving means, means for moving said flexible receiving means along said frame to transfer dislodged material toward loading position, releasable connecting means between said receiving means and said cutting mechanism, and means for operating said cutting means to cause said receiving means to travel with said cutting mechanism into receiving position and also relatively to said cutting mechanism when transferring dislodged material toward loading position.

83. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, receiving means extending along said supporting frame toward loading position, a cable secured to the forward end of said receiving means and extending over a guide carried by said cutting mechanism, a releasable connection between said guide and said cable, and means for moving said receiving means toward loading position relatively to said cutting mechanism.

84. In a mining machine, the combination with a supporting frame, of kerf-cutting mechanism mounted thereon, means for operating said kerf-cutting mechanism including swinging feeding movement thereof, means for returning said kerf-cutting mechanism to initial position, and automatic means having a closed bottom movable into the kerf with said kerf-cutting mechanism and co-acting with said returning means to assist in moving back from the mine wall the material dislodged and retaining both the smaller portions of the material as well as the larger portions for rearward movement toward loading position.

85. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, receiving means mounted on said frame and adapted to travel along the same, a cable secured to one end of said receiving means and passing over a guide carried by said cutting mechanism, means for locking said cable to said guide during the forward movement of said cutting mechanism, said locking means being releasable to permit rearward movement of said receiving means relatively to

said cutting mechanism, and means for moving said receiving means along said frame toward loading position.

86. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, receiving means mounted on said frame for movement relatively thereto toward loading position, releasable connecting means between the forward end of said receiving means and said cutting mechanism to cause said receiving means to travel with said cutting mechanism into receiving position, and means for moving the receiving means along said frame toward loading position relatively to said cutting mechanism when released therefrom.

87. In a mining machine, the combination with a supporting frame, of cutting mechanism mounted thereon, flexible receiving means extending along said frame and mounted thereon for movement relatively thereto, a cable secured to one end of said receiving means and passing over a guide carried by said cutting mechanism, a slidable wedge in position to prevent movement of said cable relatively to said guide when in one position, a spring for holding said wedge in position to prevent such relative movement during the cutting operation of said cutting mechanism, means for releasing said wedge to permit movement of said receiving means relatively to said cutting mechanism, and means for moving said receiving means along said frame toward loading position.

88. The combination of a loop-shaped cutting mechanism arranged to simultaneously cut a plurality of kerfs at an angle to each other to entirely sever a block of coal from the vein, means for bodily moving said cutting mechanism to remove the block of coal from its original relative position, and means, embodying a flexible sectional receiving chute connected to said cutting mechanism and positioned in alinement with the line of movement of said cutting mechanism for directing the block of coal away from said cutting mechanism.

89. In apparatus of the class described, the combination of a main track, a mining machine arranged to run on said main track by means of a plurality of supporting wheels, and means adapted to enable the mining machine to be supported beyond the end of said supporting track during the operation of said mining machine while maintaining said supporting wheels in alinement with said main track, said means comprising a supplemental track in slidable relation with said mining machine.

90. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track having rails spaced laterally from the rails of said mine track, and means for supporting said mining machine on said supplemental track to extend in advance of said mine track.

91. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track adapted to be laid to extend in advance of said mine track, and means for supporting the forward portion of said mining machine on said supplemental track when the forward portion of said truck runs off the mine track.

92. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track adapted to extend beyond said mine track, and mechanism for supporting part of the weight of the mining machine on said supplemental track while the remaining weight is supported by said mine track and for supporting the forward portion of the mining machine when the forward portion of the truck runs off the mine track while the rear portion of said mining machine has its support distributed on said mine track and said supplemental track.

93. A mining machine comprising a truck having wheels adapted to run on a mine track, and extension track mechanism for supporting said truck with its forward wheels off the mine track in advance thereof but in alinement therewith during the operation of said mining machine.

94. In a mining machine, the combination with a truck adapted to travel on a mine track, of a supplemental track of a different gauge from that of the mine track, means for supporting the truck on said supplemental track to permit the latter to extend beyond the forward end of said mine track, and power mechanism for propelling the truck along said supplemental track when supported by the latter and while extended beyond the forward end of said mine track.

95. A mining machine comprising a truck adapted to travel on a mine track, of a supplemental track having a gauge differing from that of the mine track but adapted to rest on the ties of the mine track and extend beyond the forward end of the latter, and means for supporting said truck on said supplemental track to permit such truck to be extended beyond the forward end of said mine track.

96. A mining machine comprising a truck adapted to travel on a mine track, of a supplemental track having a gauge narrower than that of the mine track and adapted to be located between the rails of the latter, means for supporting the truck on the supplemental track to permit the truck to extend beyond said mine track, and means for propelling the truck along said supplemental track.

97. A mining machine comprising a truck adapted to travel on a mine track with its forward end near an upright mine wall, of a supplemental track having a narrower gauge

than that of the mine track and adapted to rest on the ties of the latter between the rails thereof and movable beyond the forward end of said mine track, means for supporting the mining machine on said supplemental track with the truck thereof extended beyond the forward end of said mine track to permit operation of the mining machine in various extended positions of the mining machine beyond the forward end of said mine track.

98. A mining machine comprising a truck adapted to travel on a mine track and also comprising kerf cutting mechanism adapted to cut a kerf in a mine wall in front of the forward end of said track, a supplemental track, means for supporting said truck to permit the operation of said kerf cutting mechanism in various advanced positions beyond the forward end of said mine track while carried by said supplemental track, and power mechanism for propelling the mining machine along said supplemental track independently of said mine track.

99. A mining machine comprising a truck adapted to travel on a mine track, a supplemental track adapted to extend in advance of said mine track, means between said supplemental track and said truck for supporting part of the weight of the latter, and means for propelling the mining machine along said supplemental track to extend the mining machine beyond the forward end of said mine track.

100. A mining machine comprising a supporting frame movable along a track, a supplemental track adapted to extend in advance of the first-named track, means between said supplemental track and the mining machine for supporting part of the weight of the latter, and means for propelling the mining machine along said supplemental track when the latter is extended beyond the forward end of said first-named track to advance the mining machine to various operating positions in front of said first-named track while the mining machine has its forward portion supported by said supplemental track and its rear portion supported partly by said first-named track and partly by said supplemental track.

101. A machine of the class described comprising a tubular receiver into which cut material is passed, the said receiver having an inlet opening at one end through which the cut material passes, and a movable cutter at the inlet opening and forming a part of said receiver through which the cut material also passes, the successive charges of material entering the receiver forcing out the preceding charges therefrom.

102. A coal cutting machine comprising a swinging enclosure having a conveying means movable therewith, and an open cutting component mounted directly on and movable around a portion of the enclosure for cutting coal or other material in columns directly from a vein, the cut columns of coal or other material being injected into and carried by the receiver during the cutting operation.

103. A machine of the class specified comprising a tubular receiver having an inlet at one end and a movable cutter at the inlet end thereof through which the cut material also passes into the receiver, the material being passed in charges into the cutter and receiver and the successive charges entering the receiver forcing out the preceding charges therefrom, and means for conveying the material away from the receiver.

104. A coal cutting machine comprising an enclosing receiver having a cutting component movably associated therewith to cut coal in columns from the face of a vein and cause the coal as it is cut to be passed directly into and carried clear of the vein by the receiver and said component.

105. A coal cutting machine comprising an enclosing receiver, a core cutter having an unobstructed core opening therethrough and associated with said receiver for registry with the inlet opening thereof, and means for operating said core cutter to cut a core or column of coal for passage directly from the coal vein into said receiver to be carried by the latter clear of the vein and said core cutter.

106. In a mining and loading machine, the combination with a supporting frame, of an arcuate receiver adjustably mounted thereon, an endless core cutter, means for mounting said core cutter for an arcuate path of travel to cut an arcuate core for passage through said core cutter into said receiver directly from the face of the mine vein, said receiver having an inner wall at its outer end conforming in curvature to the arcuate path of travel of said core cutter, and means for operating said core cutter including feed thereof along such arcuate path of travel to cut a core in position to extend into said receiver directly from the mine vein.

107. In a mining machine, the combination with a tubular receiver into which cut material is adapted to be passed, said receiver having an inlet opening at one end, core-cutting mechanism associated with the said inlet opening, and means for supporting said core-cutting mechanism in position to cut a core in arcuate alinement with said tubular receiver.

108. In a mining machine, the combination with a swinging receiver, of an open cutting component adapted to cut material in columns directly from a mine vein, and

means for cutting such columns of material in alinement with the said receiver in the various positions to which it may be swung.

109. In a mining machine, the combination with a receiver having an inlet opening, of of a cutting component movably associated with said receiver to cut coal in columns from the face of a mine vein and cause the coal to be directed into said inlet opening, and means for operating such cutting component.

110. In a mining machine, the combination with a receiver, of cutting mechanism comprising a frame adapted to form an extension of such receiver, and means for operating said cutting mechanism to dislodge material from a mine vein and direct such material along such cutter frame into said receiver.

111. In a mining machine, the combination with a receiver having a cutting component movably associated therewith to cut material from the face of a mine vein and cause such material as it is cut to be passed directly into and carried clear of the vein by the receiver and said component, and means for operating the cutting component.

112. In a mining machine, the combination with a curved chute, of core-cutting mechanism in position to cut a core in arcuate alinement with said chute, and a curved extension for said chute to direct the core material into said chute.

113. In a mining machine, the combination with an arcuate receiving chute, of core-cutting mechanism comprising a curved frame movable with said core-cutting mechanism in position to form an extension of said arcuate chute, and means for operating said core-cutting mechanism including upward arcuate feed thereof on an axis extending in a general horizontal direction to cut a core of material toward the roof of a mine chamber and effect the dislodgment of such core of material by gravity and the movement thereof over said curved frame into said arcuate chute.

114. A coal cutting machine of the class specified comprising a tubular receiver means having an open inlet end provided with a cutting means movable around the inlet, the cutting means being open to permit cut material to pass therethrough, the receiver means and its cutting means being operable as a unit in an arcuate path for cutting coal or other material from the face of a vein or ledge and retaining the cut coal or other material therein in bulk accumulations, and means for relieving the receiver means of the accumulations of cut material therein.

115. A coal cutting mechanism comprising a tubular receiver with an open inlet end and an outer arcuate wall, a cutter associated with and forming a part of and movable around the inlet end of the receiver and open to the interior of the receiver, the receiver and cutter being mounted to swing as a unit in the arc of a circle for cutting coal or other material from the face of a vein to effect a passage of the cut coal or other material at intervals into the receiver, and means for effecting a release of the accumulations of coal or material in the receiver from the vein.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 2nd day of November A. D. 1915.

EDMUND C. MORGAN.

Witnesses:
CHARLES H. SEEM,
A. J. CRANE.