Nov. 17, 1953 S. LEVEN 2,659,586

SIDE BOARD-EQUIPPED DISINTEGRATING MECHANISM

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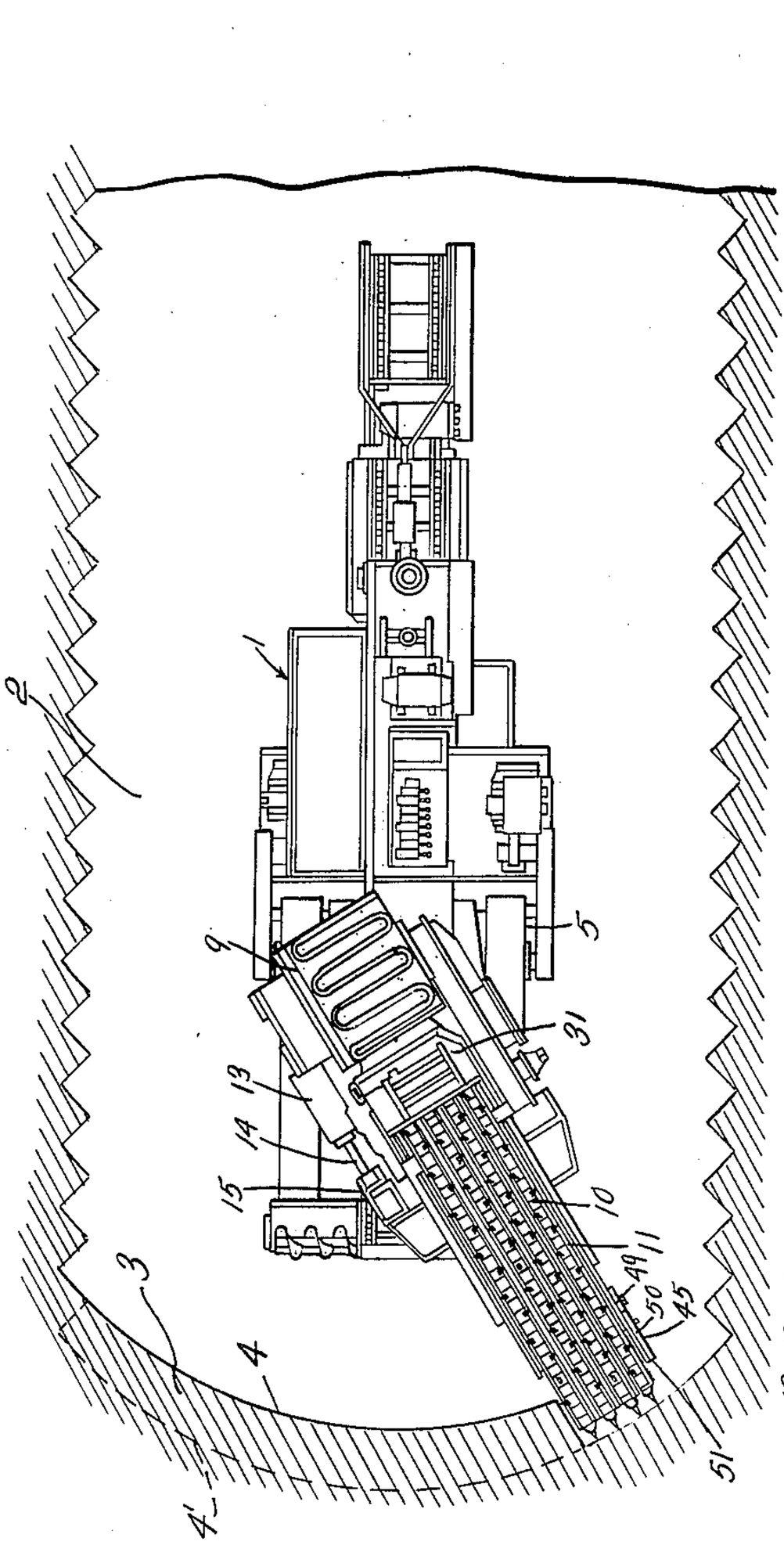

Fig. 1

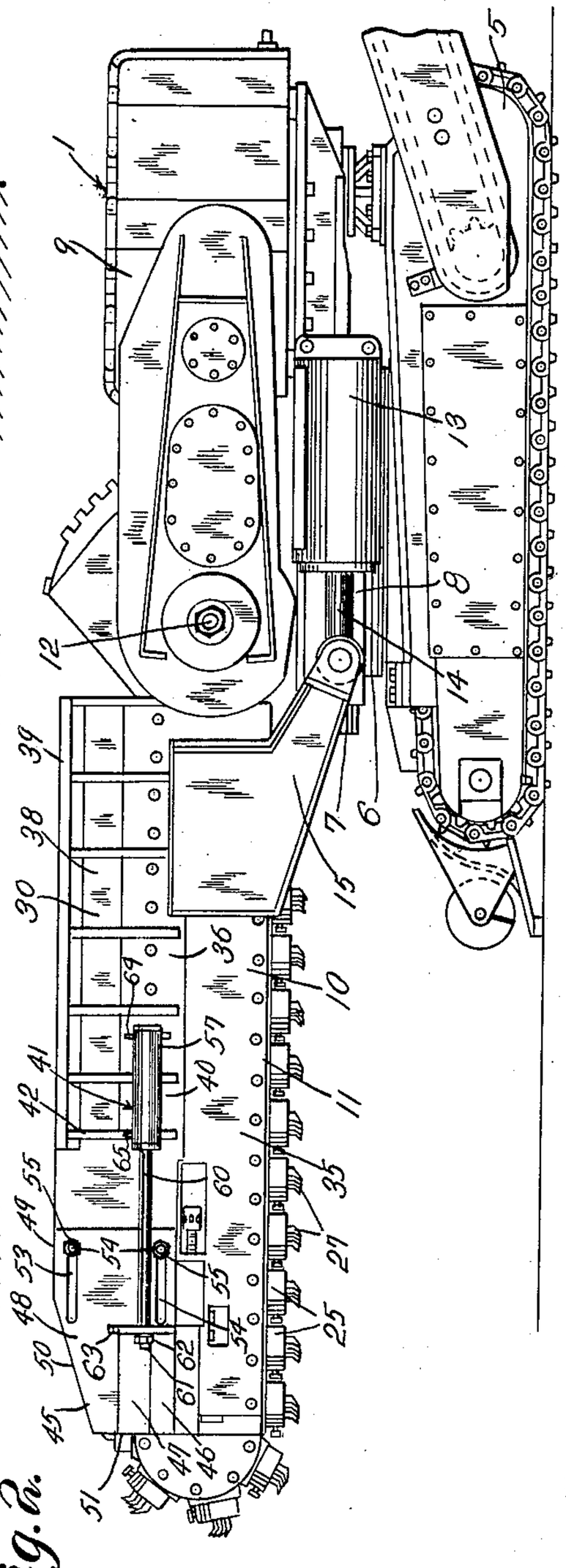

Fig. 2.

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Fig. 3.

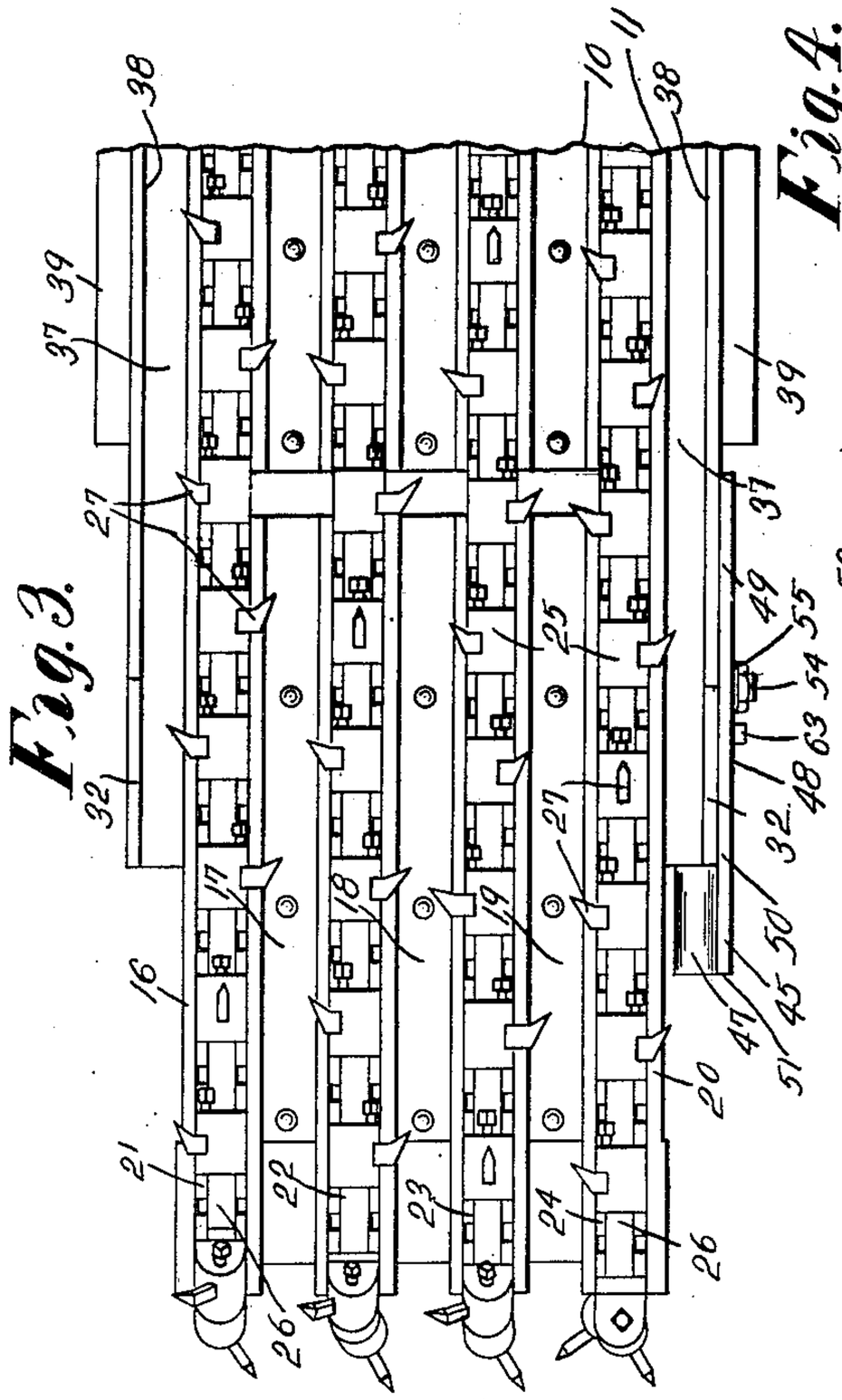

Fig. 4.

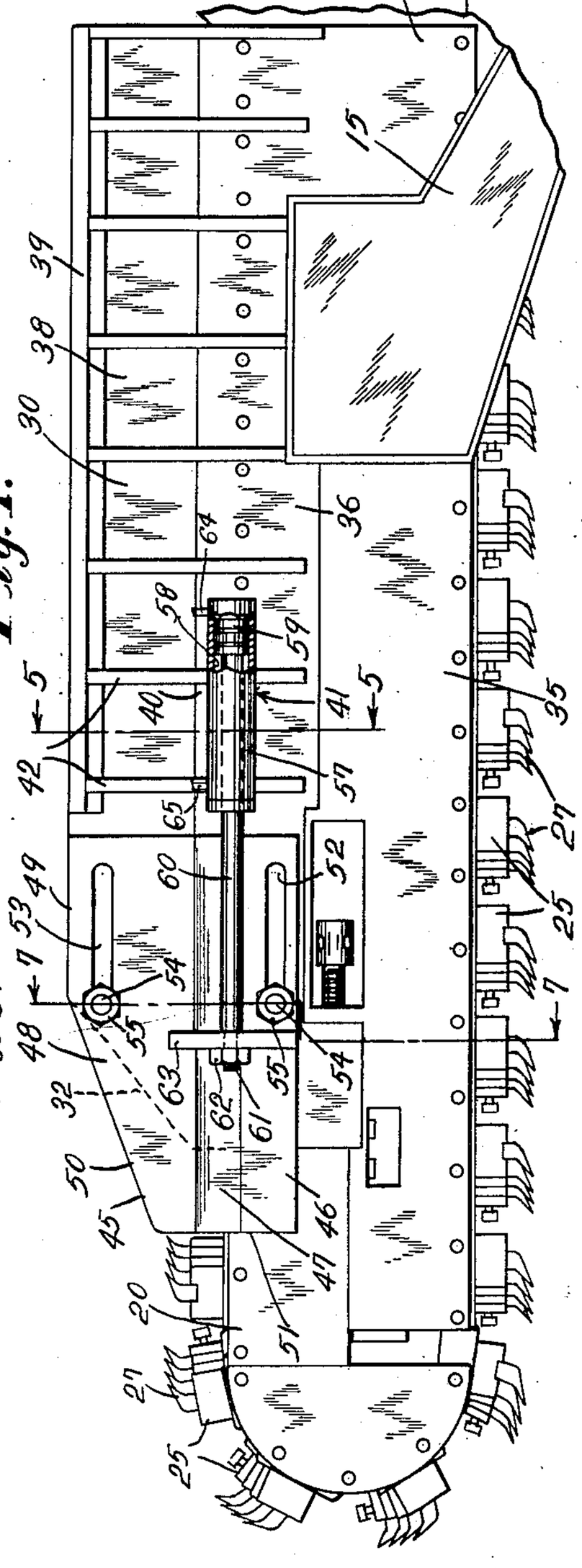

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Fig. 6.

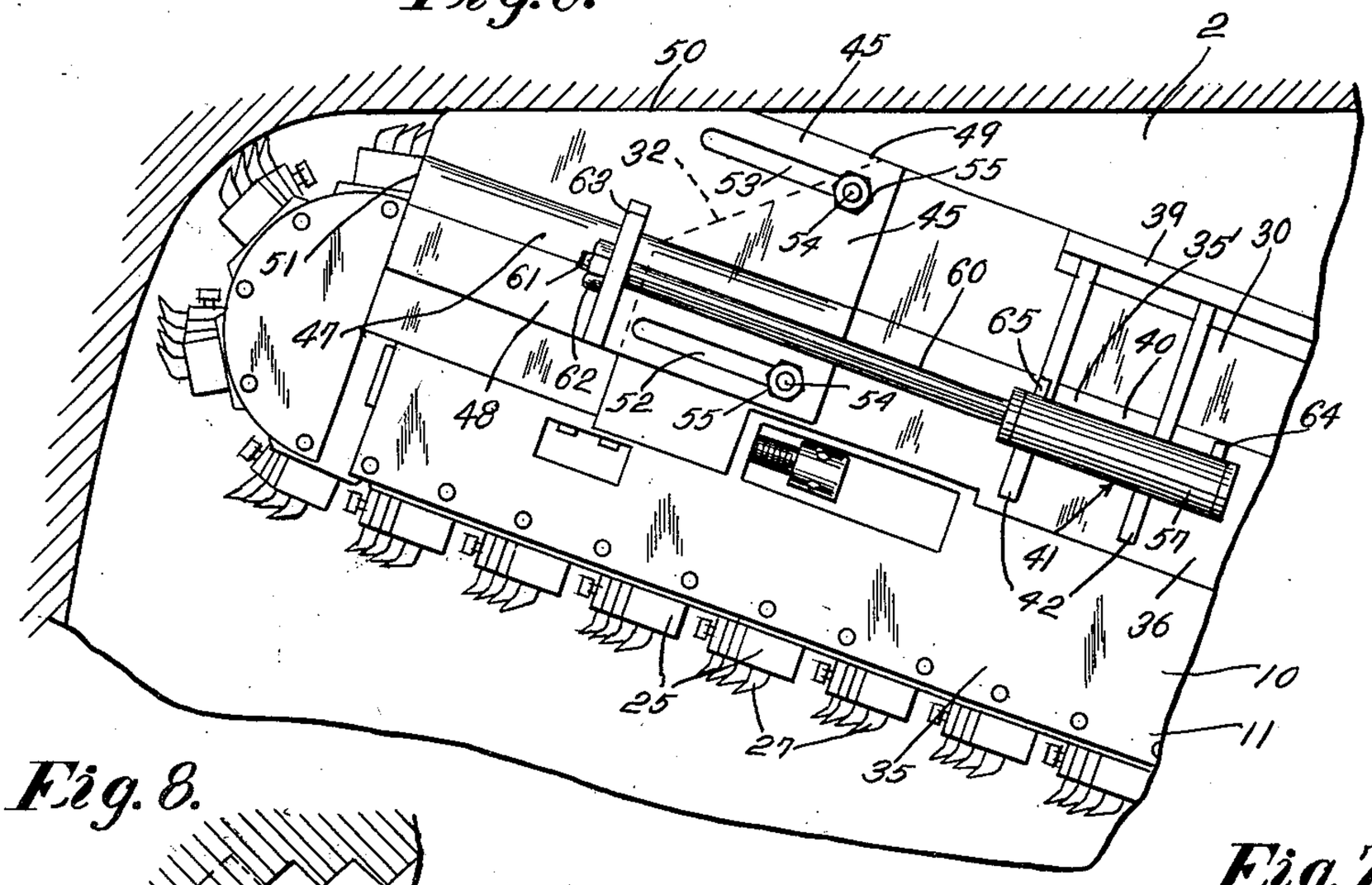


Fig. 8.

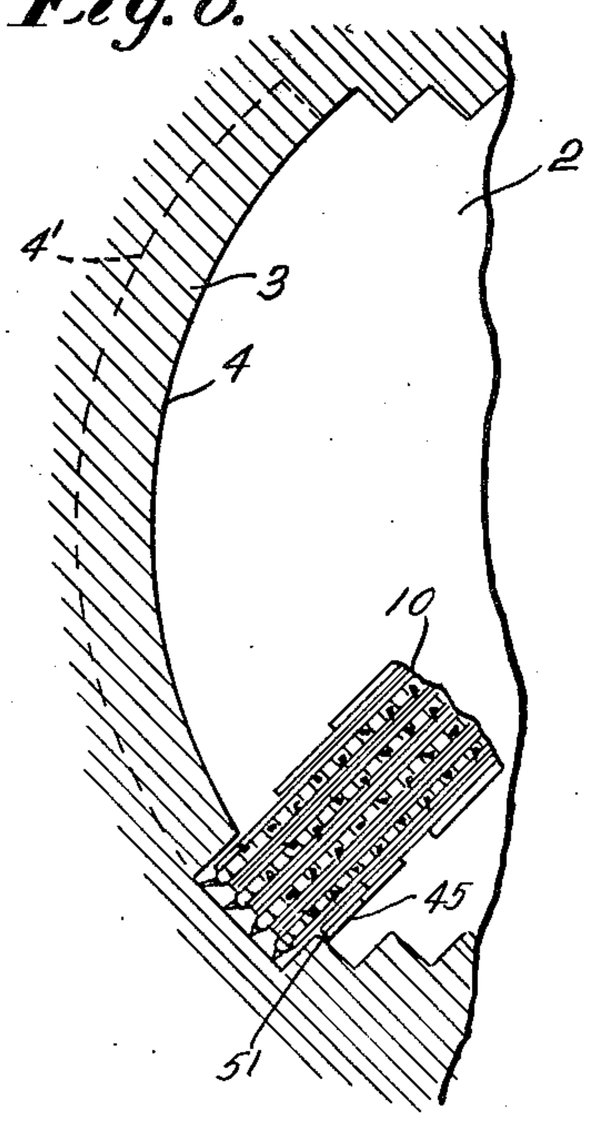


Fig. 9.

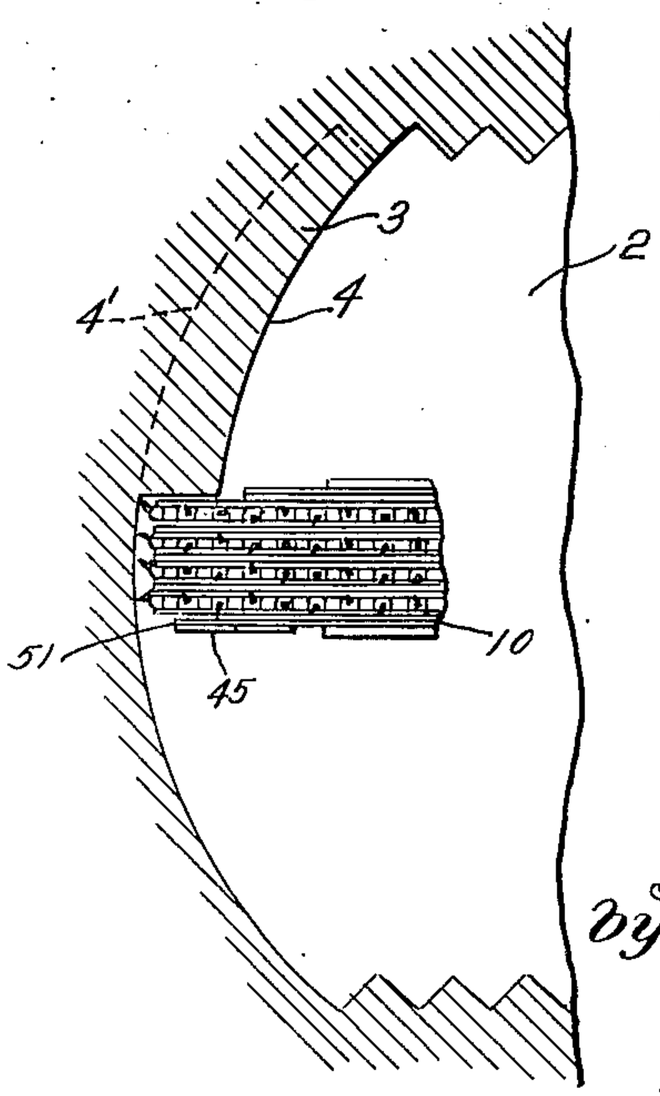
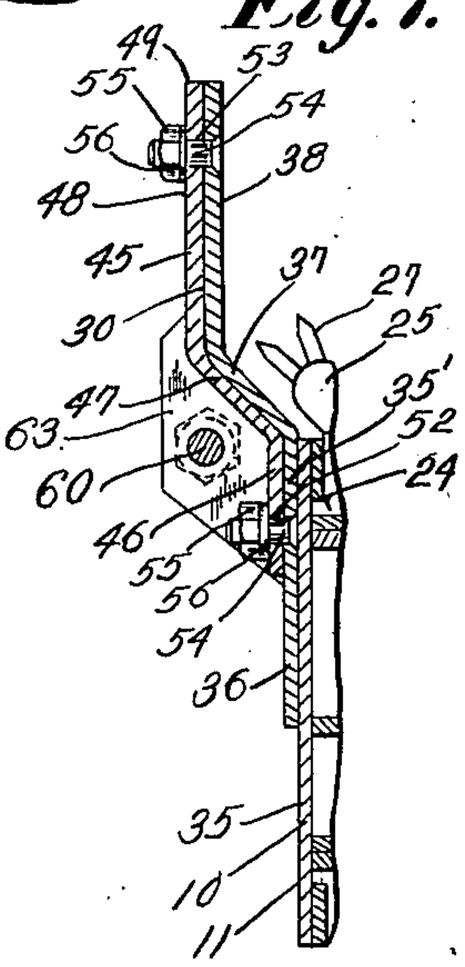


Fig. 7.



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UNITED STATES PATENT OFFICE

2,659,586

SIDE BOARD-EQUIPPED DISINTEGRATING MECHANISM

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Application December 23, 1948, Serial No. 67,023

6 Claims. (Cl. 262—29)

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My invention relates to material disintegrating apparatus, and more particularly to material disintegrating apparatus having improved means for preventing the lateral escape from the paths of travel of the disintegrating devices of such apparatus of the material torn loose by them before such material reaches a position where its delivery will be assured.

Continuous miners are apparatus for the disintegration of a mineral vein and the loading out of the disintegrated material which results, as a relatively continuous process. They commonly comprise a movable base and means supported by the base for successively attacking, disintegrating, and loading out a series of vertical bands until a strip extending from the mine floor to the mine roof and for the full width of the working place has been disintegrated and removed; after which another arcuate section extending across the width of the room or entry will be attacked, disintegrated and loaded out. As a consequence of their mode of operation, which consists generally, in the case of the disintegration of any given band, of a sumping operation, a vertical swinging operation, and (usually) a withdrawing movement, there will be formed adjacent one rib an initial vertical recess extending from floor to roof, of a depth equal to the depth which has been found most desirable for effective disintegrating operation and of a width, perhaps on the order of two to three feet, which is determined largely by the power of the machine and by the rate at which the material which is torn loose thereby may be handled by conveying equipment.

After the first band of material is removed adjacent one rib, there will be a repositioning of the disintegrating mechanism of the apparatus, a sumping in thereof, usually at the bottom of the next vertical strip to be removed, an upswing thereof, and, usually, a rectilinear withdrawal thereof and this sequence will be repeated as often as the width of the face requires. It will be appreciated that during the second, third, fourth, etc. attacks on the seam, the forward end of the side of the disintegrating mechanism towards the vertical recess last previously formed commonly has nothing to obstruct the escape of disintegrated material, because the usual fixed side walls which extend along the sides of the disintegrating apparatus for the prevention of lateral escape of material do not extend, since they must not strike the face, to and along the forwardmost end of the disintegrating apparatus, and there is accordingly a serious possibility of substantial discharge onto the mine floor of the material from the side of the forward end of the disintegrating

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apparatus which is not working with solid mineral beside it. The probability of loss of disintegrated material without delivery thereof to the material handling portions of the apparatus may be considerably reduced if there be provided, at least as far forwardly as the point of emergence of the bits from the face, as it were, a side guard plate for receiving the material torn loose and guiding it along the forward end of the upper side of the disintegrating mechanism until it reaches the fixed side walls mentioned. Because the disintegrating mechanism ordinarily swings upwardly, and is generally at a considerable upward inclination when in its uppermost position, some shaping of the side board so that it will not project beyond the plane of the mine roof is necessary, and it is necessary also, in order that there may not be interference with the solid mineral during the removal of the part forming the initial strip, that the side plate be movable out of its working position, for example, that it be made advanceable and retractable.

It is an object of my invention to provide an improved, movable side board arrangement for minimizing the escape from a continuous miner, or the like, of coal or other material as material disintegration takes place. It is another object of my invention to provide an improved, movable side board type of apparatus for use in association with a disintegrating apparatus which shall be moved into and out of effective position in a convenient manner and suitably controlled during such movements. It is a further object of my invention to provide an improved, slidable side board arrangement which shall have provision for permitting its effective guidance of material, but which shall preclude interference with the upswing of the disintegrating mechanism even when the latter is approaching its highest positions. It is still a further object of the invention to provide an improved adjustable sideboard mechanism having fluid operated adjusting means. Other objects and advantages of the invention will hereinafter appear.

In the accompanying drawings, in which one illustrative embodiment of the invention is shown,

Fig. 1 is a plan view of a continuous miner engaged in disintegrating the second of a series of bands extending across a face.

Fig. 2 is a side elevational view of the forward portion of the apparatus shown in Fig. 1.

Fig. 3 is a top view of a disintegrating mechanism such as is shown in Figs. 1 and 2, but on a larger scale.

Fig. 4 is a side elevational view of the dis-

integrating mechanism shown in Fig. 2 on a larger scale, with parts broken away, and with the side board shown in retracted position.

Fig. 5 is an enlarged vertical sectional view on the transverse vertical plane of section line 5—5 of Fig. 4.

Fig. 6 is a fragmentary enlarged view of the forward end of the disintegrating mechanism, showing the latter in raised position and the improved side board construction associated therewith in forward position.

Fig. 7 is an enlarged vertical sectional view on the transverse planes of the section line 7—7 of Fig. 4.

Fig. 8 is a fragmentary diagrammatic view somewhat similar to the left hand end of Fig. 1, but showing the making of an initial cut.

Fig. 9 is a fragmentary view similar to the forward portion of Fig. 1, showing the disintegrating mechanism operating in the central planes of the face.

Referring to the drawings, and first to Fig. 1, a continuous miner, generally designated 1, is shown operating in an entry 2. It is operating in the entry by the successive removal of arcuate vertical strips of coal 3, whose forward surfaces form successive faces 4, 4' and other similar faces. The disintegrating apparatus includes (see Fig. 2) a portable base 5, on which there is arranged a turntable mechanism 6, relative to which there are reciprocable guides 7 which carry a slidable frame 8. For details of this mechanism attention may be had to my application, Serial No. 19,698, filed April 8, 1948, for Continuous Mining Apparatus. This slidable frame includes (or, better, carries) a motor 9 actuating a disintegrating mechanism 10. The latter includes a vertically swingable frame 11 pivoted for vertical movement about an axis 12 and adapted to be swung vertically by hydraulic cylinder and piston means 13 connected by a connecting rod 14 to a depending arm 15 carried by the disintegrating apparatus. The disintegrating apparatus provides a series of guides 16, 17, 18, 19 and 20, pairs of which cooperate, in the mechanism shown, in the guidance of a series of four circulating chains 21, 22, 23 and 24. These circulating chains include disintegrating element-carrying blocks 25, connected by strap links 26. Various arrangements of disintegrating elements 27 carried by the blocks 25 can be employed, and in the drawings I have illustrated an arrangement which is the invention of one Harold F. Silver, and which includes slightly oblique block rows.

The disintegrating apparatus has associated with it side walls 30 forming a trough which guides the disintegrated material back towards a hopper 31 from which the material is discharged by suitable conveying means to a rearward point. These side walls are tapered at their forward ends, as shown at 32, so as not to strike the roof in the raised positions of the disintegrating mechanism. Necessarily, since they are not adjustable relative to the disintegrating mechanism, they must terminate at a point slightly more remote from the innermost point of the disintegrating operation than the depth of penetration of the disintegrating mechanism. This obviously means that there must be a substantial distance along which disintegrating elements are moving rectilinearly outwardly from the inner ends of their orbit, and along which a lateral escape of disintegrated material will be possible unless suitable escape-prevention-means is provided. To reduce this escape of material, I have provided, in the illustrative embodiment of my invention, a movable—specifically illustrated as slidable—side board arrangement which may now be described in more detail.

First it may be well, however, to note that the side plates 35 of the frame which guides the chains carrying the disintegrating elements are relatively vertical (see Fig. 5) and that the side wall elements 35' which cooperate with them have a lower vertical portion 36 bolted to the side plates 35, an obliquely outwardly extending portion 37 providing increased width to accommodate the movements of the disintegrating elements and greater carrying capacity, and another vertical portion 38 spaced outwardly laterally from the vertical portion 36. Thus there is formed a wider upper trough section reinforced by an angle bar as at 39 and providing a relatively protected space 40 in which a feeding and retracting cylinder mechanism 41 is arranged, this being carried by positioning plates 42 secured to the plate portions 36, 37 and 38.

In Fig. 7 the parts 35, 35', 36, 37 and 38 again appear, and it will be noted in this figure that a correspondingly shaped side plate or board element 45, having portions 46 corresponding, except in vertical dimension generally to the portion 36, an oblique portion 47 corresponding to the oblique portion 37, and an upper vertical portion 48 corresponding to the vertical portion 38 is disposed outside the side wall element 35'. This side board element 45 has a horizontal top surface, as shown at 49, and a forwardly inclined surface, as shown at 50, and a nose portion 51 whose forward end barely extends above the tips of the disintegrating elements in the outward run of the latter. The side board element 45 is adjustable and is herein disclosed as slidably adjustable and is provided with longitudinal slots 52 and 53 for its guidance and through which there extend, as illustrated, bolt elements 54 with which nuts 55 and washers 56 cooperate. These bolt elements extend through the slots 52 and 53, and the slots permit the side board element 45 to be reciprocated forwardly and rearwardly by the feeding and retracting mechanism 41. This mechanism is herein shown as a hydraulic cylinder 57 having a bore 58 in which a piston 59 is reciprocable, while a piston rod 60 connected with the piston is connected through a reduced end portion 61 and a nut 62 to a lateral extension 63 carried by the side board element 45. Fluid can be admitted to the cylinder 57 from any suitable source, and under any suitable control, and accordingly detailed description of such arrangements is unnecessary, it being sufficient to call attention to the fact that conduits 64 and 65 lead respectively to the rearward and forward ends of the cylinder 57 for the delivery of hydraulic fluid under pressure to one end of that cylinder while permitting the venting of fluid from the other end. The sideboard element may be provided at either or both sides of the apparatus, but will normally be provided only at the side which will be at the rib when the first of the series of attacks on a band extending across the face is to be made.

In the retracted position of the slidable side board element 45, it will be observed that its nose 51 is outside the line of the face 4 (see Figs. 4 and 8). Accordingly, in the retracted position of the side board, the rib attack on the coal can be effected with the side board wholly withdrawn from any position where it would strike the face.

As shown in Fig. 6, however, the side board 45 can be moved forwardly until the rear ends of the slots 52, 53 reach and engage the bolts 54 and thus be brought to a position in which the nose 51 is about on the line of the axis about which the semi-circular forward portion of the orbital movement of the disintegrating elements 27 about the forward end of the disintegrating mechanism takes place (see Figs. 1, 6 and 9). Thus it will appear that the improved side board mechanism so far described consists, in the illustrative embodiment thereof, of a movably positioned, herein slidable, side board having means for supporting it for movement, herein sliding movement, between positions wholly outside of the face and positions materially inside the face—between positions in which it will not interfere with the operation of the disintegrating mechanism as the latter is making an initial attack on a transverse face but which on all subsequent attacks may extend substantially inside the face and thus reduce the escape of disintegrated material as this is detached and outwardly directed. It will be noted that the plate is so formed as in the advanced position thereof not to interfere with the roof in the most upward position of the disintegrating apparatus as the latter completes its upswings (see Fig. 6). It may be noted, incidentally that in the position of the disintegrating apparatus just described, if it were desired to retract the side board, its motion would be outward and downward. Therefore, there would be no interference with the roof during retraction. By the provision of hydraulic control, the side board can be advanced and retracted as may be necessary, and if an obstruction is met the board will simply not move forward; and it will be possible for the side board to be forced outward in the event an outwardly directed force of sufficient magnitude is applied to its forward end. The source of hydraulic fluid for its operation may obviously be a pump such as is provided for the hydraulic operation of the continuous miner or a pump providing a considerably lesser pressure will suffice and may indeed be desirable.

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

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

1. In combination, in an apparatus for disintegrating and removing material from a mineral vein in a series of vertical bands bounded laterally by substantially parallel surfaces and at front and back by arcuate surfaces struck from different axes, by successive attacks on the vein each including a shearing operation following a sumping operation, a disintegrating mechanism supported for sumping and shearing movements and including a bar structure having vein-attacking elements moving thereon in orbits the forward portions of which extend within the face for a limited distance during vein disintegration, trough-forming means mounted on said bar structure and extending forwardly along the sides thereof but terminating short of the rearmost point thereof which enters the face, and an element mounted on said bar structure and movable relative to the latter to

form an extension of said trough-forming means at one side only of said bar structure, said element movable between positions in which no portion of it is as far forward as the rearmost point which enters the face and in which, during disintegration, its forward end substantially overlaps laterally portions of said orbits which are within the working face whereby said element in outer position cannot foul undisintegrated solid material and when in its forward position diminishes the lateral escape of disintegrated material by extending the trough at the free side of a band undergoing disintegration.

2. Disintegrating mechanism as defined in claim 1, in which the vein-attacking elements move in similar orbits each including a curved forward portion and a relatively straight upper, outwardly extending portion and in which said trough-forming means mounted on the bar structure and extending forwardly along the sides thereof terminates short of the curved forward portion of said orbits, and in which the element mounted on the bar structure and movable relative to the latter to form an extension of the trough-forming means at one side only of said bar structure is movable forwardly to a position closely adjacent the curved forward portions of said orbit and has no portion thereof overlying the curved forward portion or the relatively straight upper, outwardly extending portion of any of said orbits.

3. Disintegrating mechanism as defined in claim 2 in which said element movable to form an extension of the trough-forming means comprises a rearward portion having a top edge at a like level with the top edge of said trough-forming means at points adjacent to it, and has a forward portion whose top edge inclines downwardly so that in the uppermost position of said disintegrating mechanism the forward end of said element shall not project substantially above a horizontal plane tangent to the curved forward portions of said orbits at the uppermost points thereof.

4. Disintegrating mechanism as defined in claim 1 in which said element mounted on said bar structure and movable relative to the latter to form an extension of said trough-forming means at one side only of said bar structure has no portion thereof overlying the upper portion of the nearest one to it of said orbits and in which means is provided in the form of cylinder and piston mechanism supplied with a fluid under pressure for advancing said element at will from its rearward position when it is in the latter.

5. In a vein disintegrating mechanism, a bar structure having extending along its opposite sides upwardly projecting walls cooperating with said bar structure to form a trough, said upwardly projecting walls terminating short of the forward end of said bar structure, disintegrating elements carried by said bar structure and supported for movements in parallel orbits in upright planes lying between said upwardly projecting walls, said orbits having forward portions at the forward end of said bar structure and in advance of the forward ends of said upwardly projecting walls, an element mounted on said bar structure at one side only thereof and movable relative to the latter to form an extension of the upwardly projecting wall at its side of said bar structure, which extension lies, during the vein-disintegrating operation, alongside but outwardly of the most adjacent orbit at a portion of the latter in which during such vein disin-

tegration the disintegrating elements thereof engage solid material to be disintegrated, and means for effecting, during vein-disintegration, an extension as aforesaid of said element, said means arranged on the side of said bar structure and below the top of said trough.

6. A mineral vein-attacking and disintegrating mechanism including a bar structure supported for swinging and translational movements in upright planes, said bar structure having spaced rearwardly from its forward end upstanding side walls forming the sides of a trough and having between its sides numerous material-disintegrating elements moving in orbits in vertical planes extending lengthwise of said bar structure, said orbits all having forward portions ahead of said upstanding side walls, and an element movable to form an extension of one of said side walls and located wholly at that side of said bar structure at which said one of said side walls is disposed, and having portions thereof projecting

higher than the uppermost portions of said orbits but laterally wholly outside the cumulative space occupied by said orbits, said element arranged, when extended, to enter, during one attack of the disintegrating elements on a mineral vein the space produced by the action of said disintegrating elements during an immediately preceding attack thereof on the vein, thereby to diminish lateral escape of material and means for advancing said element to effect its presence in said space during vein-disintegration.

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