Sept. 19, 1939. J. I. PHILP 2,173,790

ELEVATOR MECHANISM

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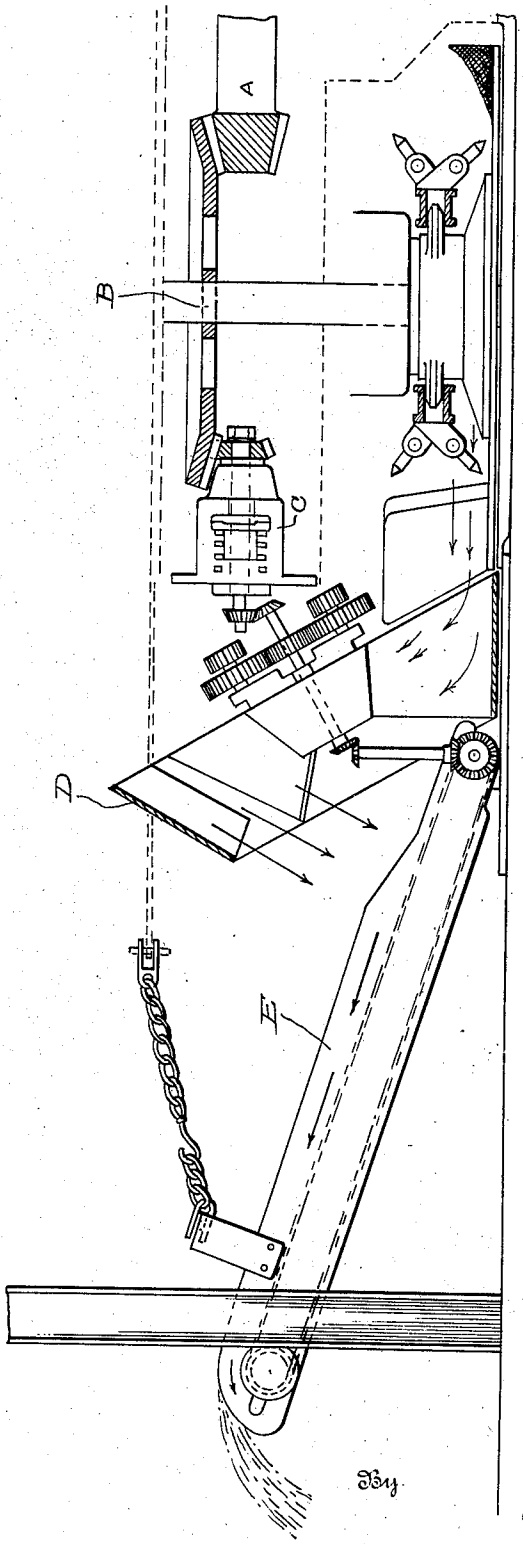


Fig. 1

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J. I. Philp

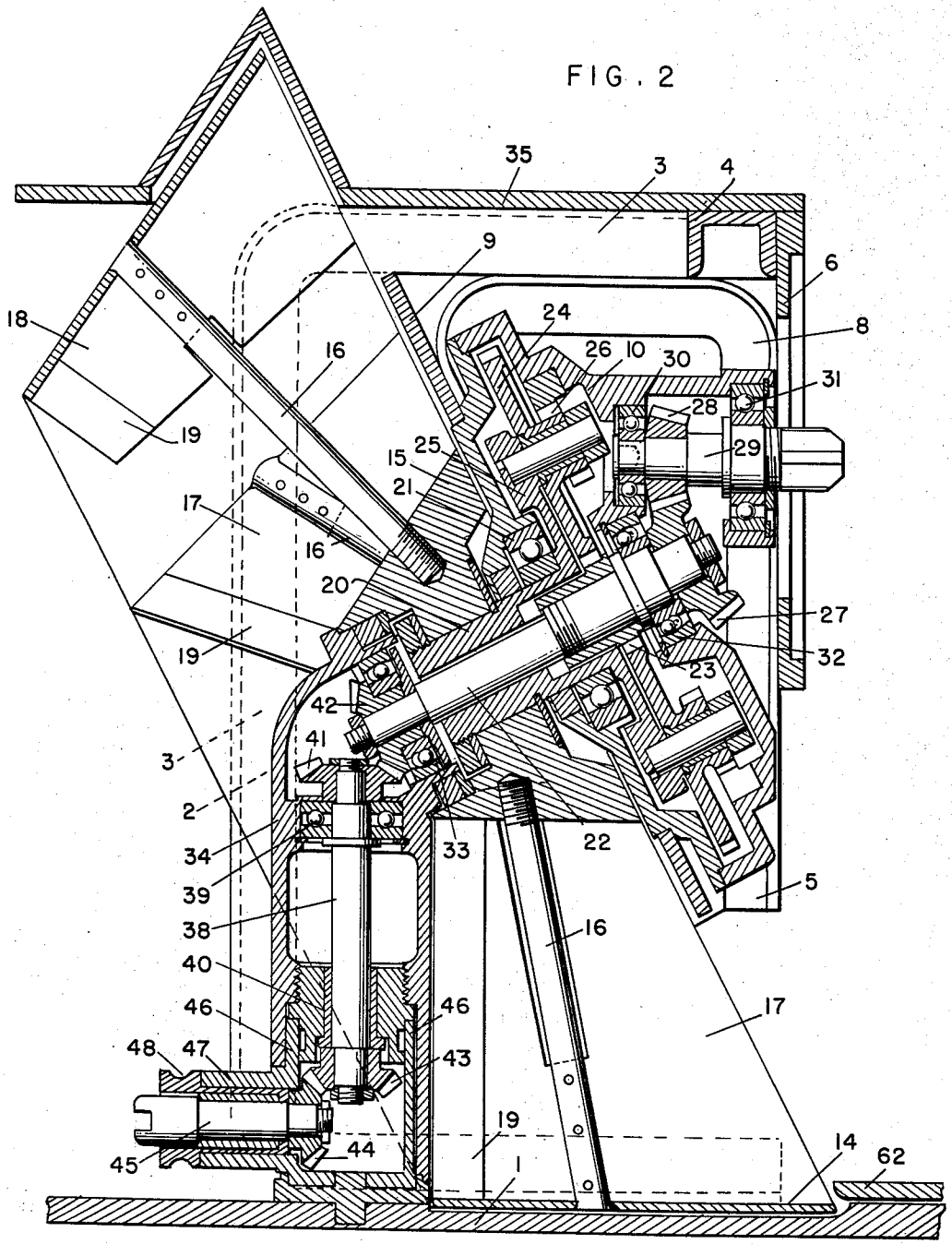
Attorney

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ELEVATOR MECHANISM

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FIG. 2



J. I. Philp

By Blair & Kilmayer

Attorneys

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Fig. 3.

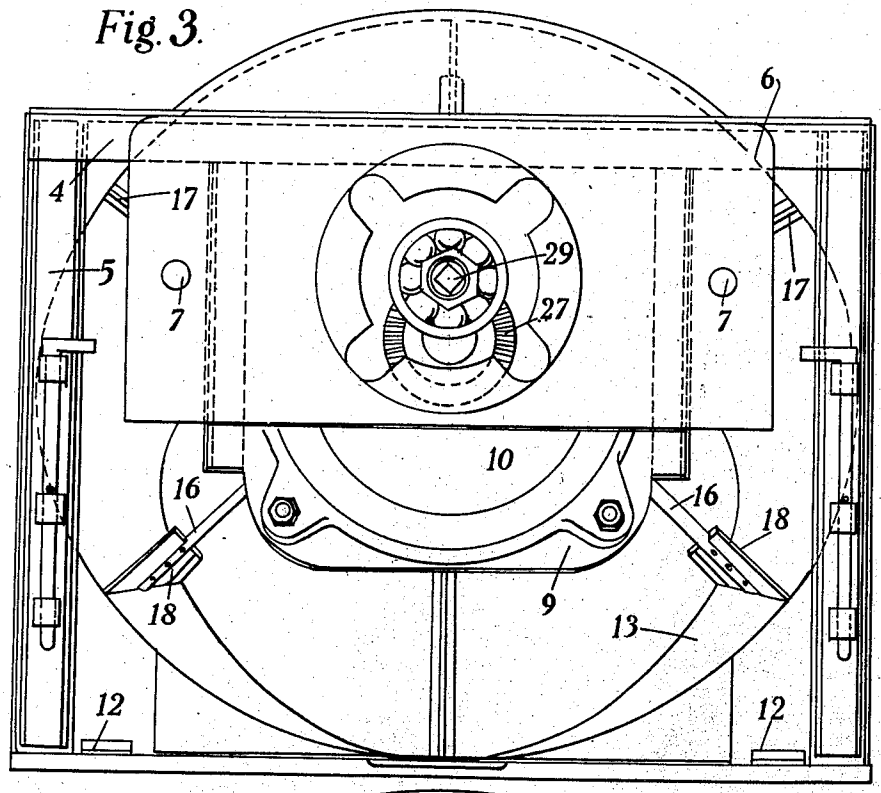
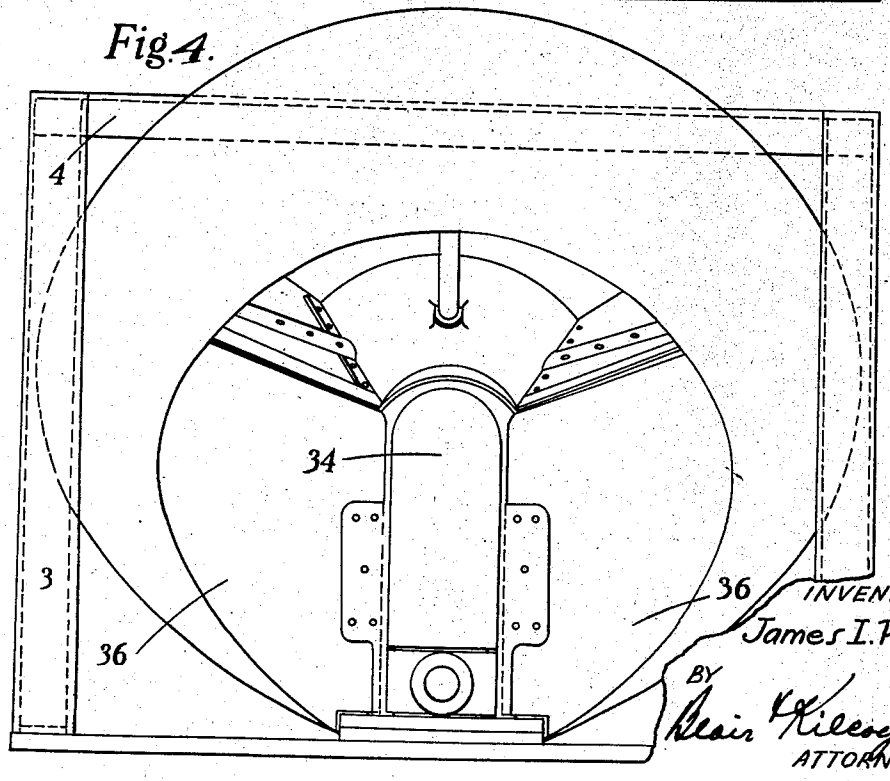


Fig. 4.



INVENTOR
James I. Philp
BY
Blair & Kilcoyne
ATTORNEYS

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Fig. 5.

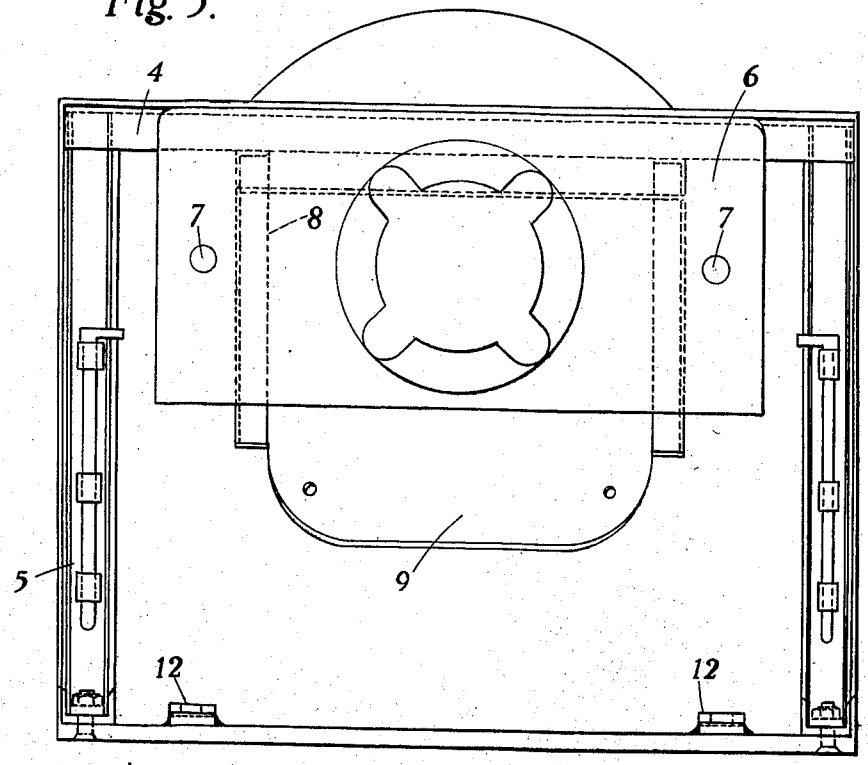
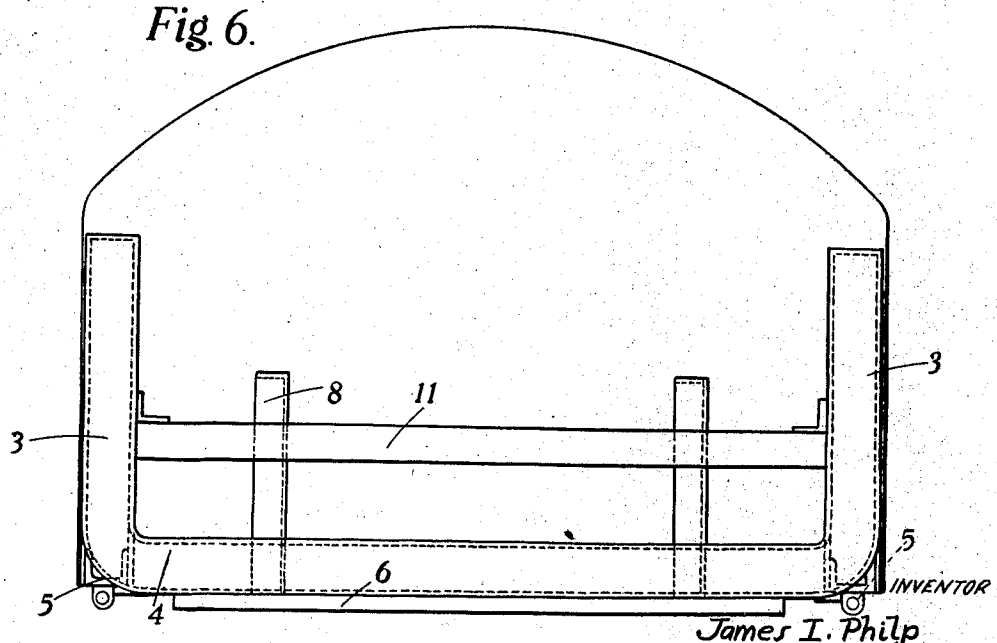


Fig. 6.



INVENTOR

James I. Philp

BY

Blair & Kilcoyne

ATTORNEYS

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Fig. 7.

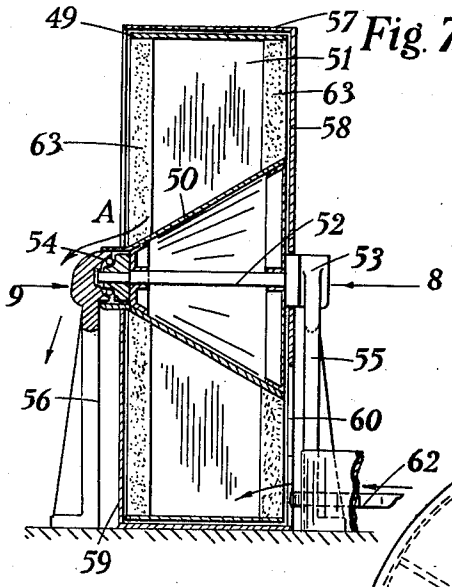


Fig. 8.

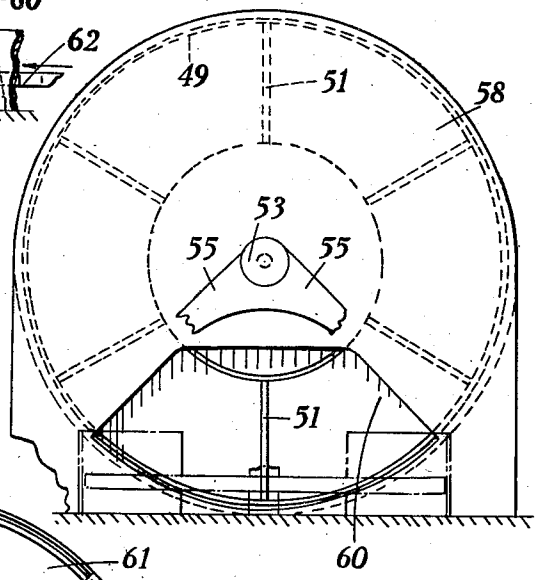
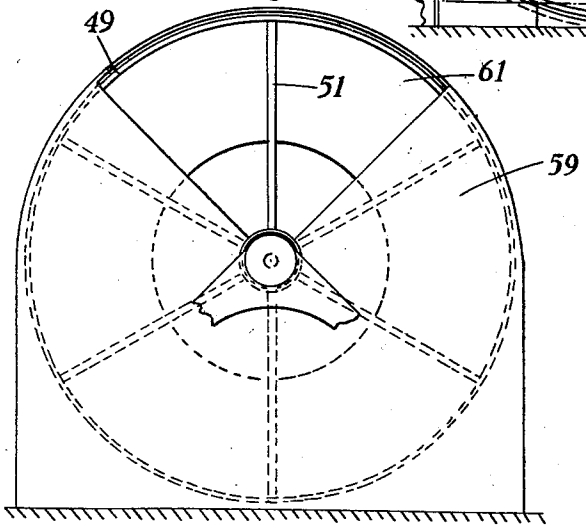


Fig. 9.



INVENTOR
James I. Philp
BY Blair & Kilcoyne
ATTORNEYS

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Fig. 10.

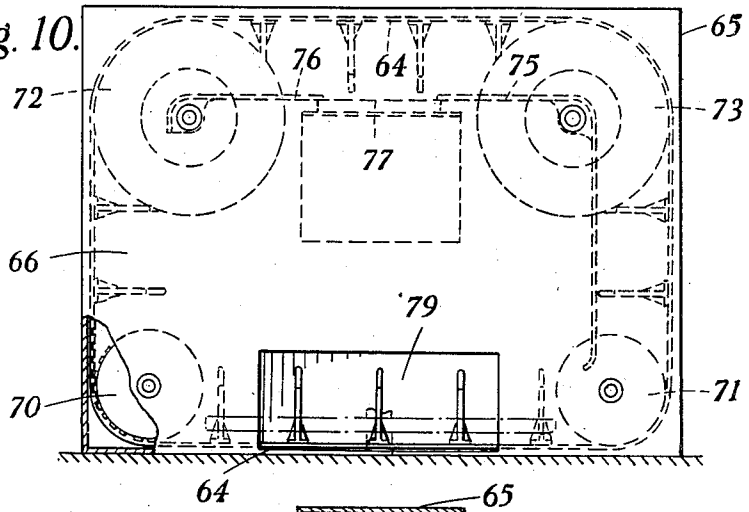


Fig. 11

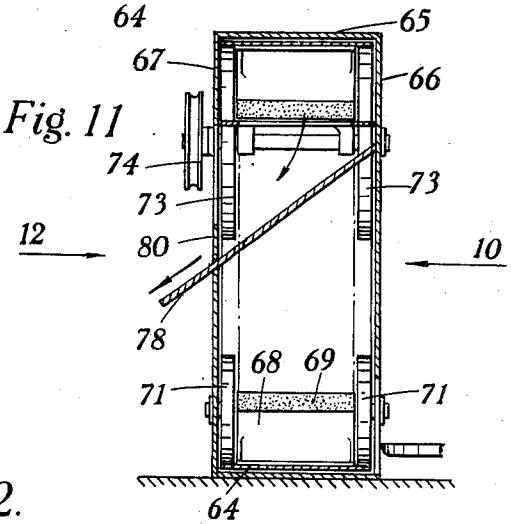
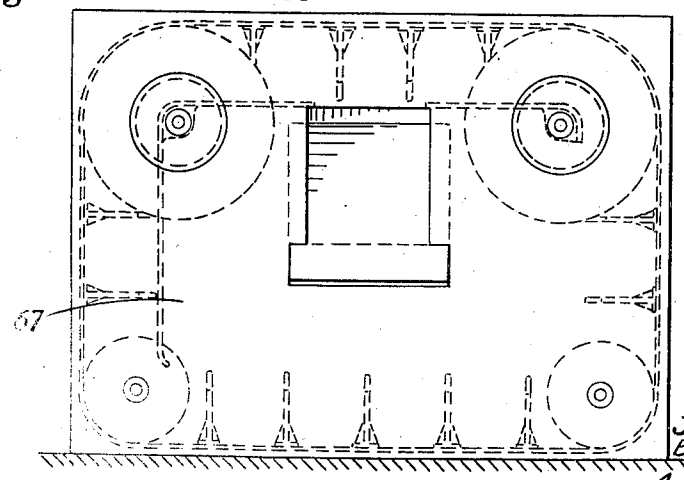


Fig. 12.



INVENTOR
James I. Philp
BY
Blair & Kilcoyne
ATTORNEYS

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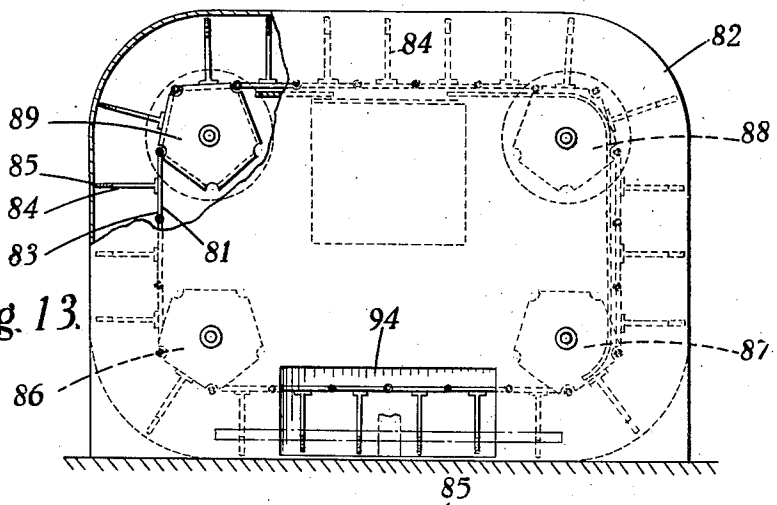


Fig. 13.

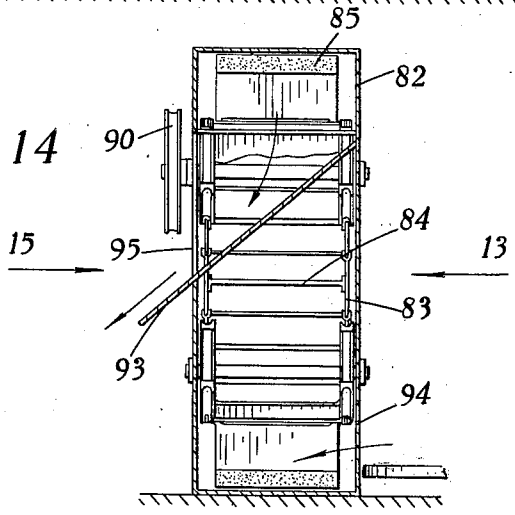


Fig. 14

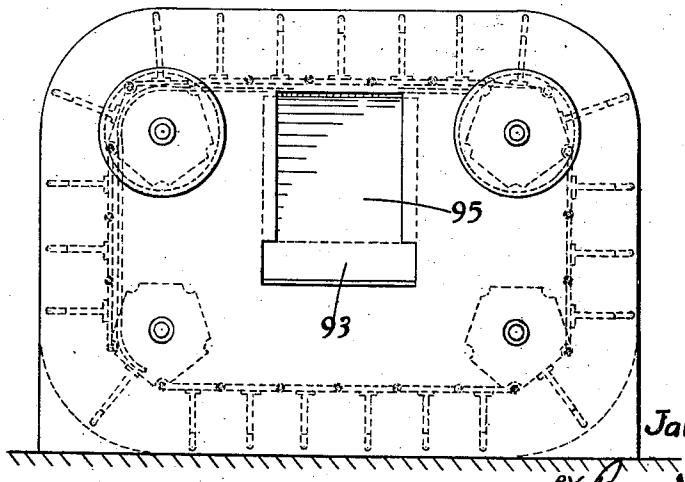


Fig. 15

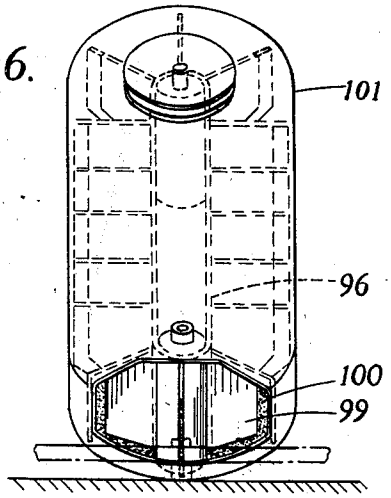
INVENTOR
James I. Philp
BY Blair & Kilcoyne
ATTORNEYS

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ELEVATOR MECHANISM

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Fig. 16.



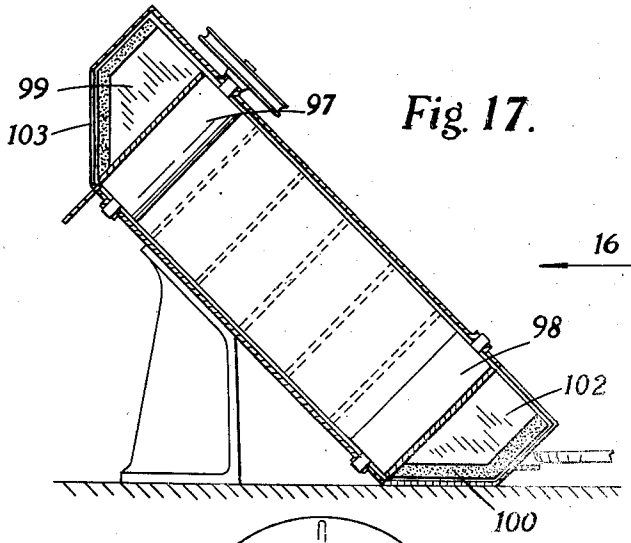


Fig. 17.

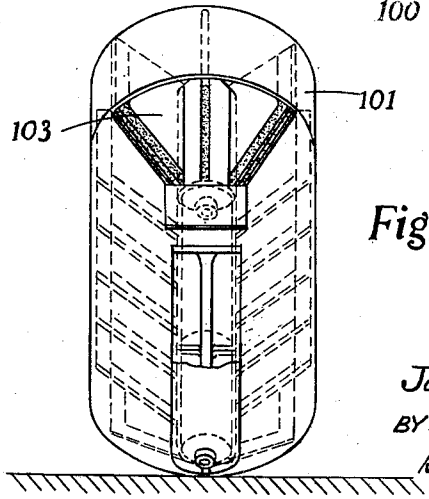


Fig. 18.

INVENTOR
James I. Philp
BY
ATTORNEYS

Patented Sept. 19, 1939

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UNITED STATES PATENT OFFICE

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ELEVATOR MECHANISM

James Isaac Philp, Grove Park, London, England, assignor to Austin Hoy and Company Limited, Aldwych, London, England, a British company

Application August 11, 1937, Serial No. 158,616
In Great Britain August 15, 1936

26 Claims. (Cl. 262—1)

The present invention relates to improvements in or relating to means for elevating loose material, especially granular or powdery materials, such for example as coal, stones, fragments of rock, cement, dust and the like. The invention finds particular application in cases where it is desired to raise such materials a short distance, for example from substantially floor level on to a conveying device under conditions which make it impracticable to sink any part of the apparatus below floor level. Thus for example, the invention is especially adapted for use in connection with the removal of cuttings, kirvings, holings, dust or the like produced in the operation of a chain mining machine, from the neighbourhood of the cutter chain driving sprockets of such machines when undercutting a low kerf.

It is an object of the invention therefore, to provide an improved form of elevating device which does not have to be sunk below floor level and which is at the same time, capable of receiving material at substantially floor level and delivering it at a high level.

It is a further object of the invention to provide an improved form of elevating device in which there is little or no danger of jamming of the moving parts by lumps of the material being handled.

It is a further object of the invention to provide an improved form of elevating mechanism which is capable of a continuous uninterrupted throughput.

According to the present invention I provide a device for elevating loose materials comprising a plurality of vanes, blades, paddles or the like mounted for circulatory movement in a closed path wholly in a vertical plane or a plane inclined to the horizontal, and one or more casing or like members for, as far as possible, preventing escape of material carried or propelled by said blades or the like, an inlet aperture or space being provided to admit material between successive blades or the like at or near the bottom of the said path and an outlet aperture being provided at a suitable height, the inlet and outlet being on opposite sides of the plane of circulation.

The said blades or the like may project outwardly from a rotary hub or shaft or from an endless single or multiple band, chain or the like in which case they may, during the whole or part of their path, bear at their outer edges against one or more suitable casing members serving to confine the material in the spaces between successive blades or the like.

It is preferred however, that the blades should extend inwardly from a rotary rim or shell or from an endless band as, in that event the material supplied to the elevating device may be supplied on to the moving surface of the rim, shell or band and can, therefore, be removed continuously from the place of supply. This is of particular advantage where the material is discharged into the elevating device by centrifugal force from a rotary disc.

A particularly simply and advantageous form of the invention may be described as a rotary shovel and comprises a wheel, or rotor having a plurality of radial or curved blades or vanes and a rim or shell rotatable with the said blades or vanes, said rotor being mounted for rotation about a horizontal or inclined axis, and one or more casing members adapted to prevent or reduce undesired escape of material while it is being elevated, an inlet aperture or space being provided to admit material on to the rim or shell at or near the bottom of the rotor and an outlet aperture being provided to permit discharge of the material at a suitable height.

If the wheel or rotor is mounted for rotation about a horizontal axis the rim or shell is preferably cylindrical and a hub of substantially conical, pyramidal or like form is preferably provided, the apex of the cone, pyramid or the like being directed towards the discharge side in order to provide a sloping surface down which the material can slide when being discharged. Moreover it is in general, necessary to provide casing members on both sides of the wheel or rotor to prevent undesired escape of material.

The rotor is preferably however, mounted for rotation about an axis inclined to the horizontal and the rim or shell is, in that case, preferably in the form of a truncated cone so arranged that the lowest generating line of the cone is substantially horizontal. The inlet to the device is at the wider end of the cone and the discharge is above the axis at the narrower end. This arrangement is especially advantageous in cases where the material is flung into the inlet for example by centrifugal force from a rotary disc or the like disposed only slightly above the lowest point of the rim as the available inlet area is increased as compared with the case where the rotor is rotatable about a horizontal axis. Moreover, the inclined arrangement is of advantage in cases where the rotary shovel is to discharge on to a mechanical conveyor as the discharge point of the rotor can be arranged to extend over the conveyor. A further advantage is that

the rotor can rotate at such a peripheral speed that the material is discharged from the rim or shell at or about the highest point of its edge on the discharge side. Moreover, if the rotor is arranged at a suitable inclination, casing members on the inlet side can be dispensed with since the material being elevated will then naturally travel, during the operation of the elevator, towards the outlet side and the need for confining said material on the inlet side is thereby obviated. Moreover, if the speed of rotation is suitably chosen it can be arranged that all the material after being elevated is discharged clear of the casing on the outlet side and practically no material is carried around so as to contact with the casing on that side. By these means substantially all danger of jamming of the rotor can be obviated, a matter which is of considerable importance having regard to the conditions under which such elevators are frequently required to operate and one which has been a fruitful cause of failure in hitherto known types of elevators.

In any or all of the forms of construction according to the invention the blades and/or any casing or like members may be made capable of yielding in the event of a jam, for example they may be made wholly or partly of rubber or other suitable material, for example sheet metal which possesses sufficient springiness to enable it to bend under the stress due to a jam and so relieve the jam but to return to its original shape after relief.

According to a modification of the rotary shovel above referred to, the blades, vanes or the like are dispensed with. Such a modified form of device must of course be rotated at sufficient speed to cause the material to be carried round within the rim and means such for example as one or more scrapers or the like must be provided for causing the material to leave the rim when it has been elevated to the desired height. The inside of the rim may in any event be roughened or provided with shallow grooves, ribs, projections or depressions to reduce the tendency of the material to slide back along the rim while it is being elevated.

In order that the invention may be well understood several preferred embodiments thereof will now be described by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a semi-diagrammatic elevational view showing such parts of the present mechanism and associated mechanisms as is necessary to understand the invention and its application.

Fig. 2 is a side sectional elevation of one form of elevating device or rotary shovel according to this invention suitable for attachment to the rear of the gear head of a chain mining machine and for having attached to it a mechanical conveyor,

Figure 3 is a front end elevation of the device shown in Figure 1,

Figure 4 is a rear end elevation,

Figure 5 is a front end elevation of the frame,

Figure 6 is a plan of the frame,

Figure 7 is a diagrammatic side sectional view of a modified form of rotary elevator according to this invention,

Figure 8 is a diagrammatic end elevation of the device shown in Figure 7 (partly broken away) as seen from the inlet side in the direction of the arrow 8 in Figure 7.

Figure 9 is a diagrammatic end elevation as seen from the discharge side in the direction of the arrow 9 in Figure 7,

Figure 10 is a diagrammatic end view of a further form of elevating device according to this invention as seen in the direction of the arrow 10 in Figure 11,

Figure 11 is a diagrammatic side sectional view of the device shown in Figure 10,

Figure 12 is an end elevation as seen in the direction of the arrow 12 in Figure 11,

Figure 13 is a diagrammatic end view of a further form of elevator according to this invention as seen in the direction of the arrow 13 of Figure 14,

Figure 14 is a diagrammatic side sectional view of the device shown in Figure 13,

Figure 15 is a diagrammatic end view as seen in the direction of the arrow 15 in Figure 14,

Figure 16 is a diagrammatic end view of yet another form of elevator device according to this invention as seen in the direction of the arrow 16 in Figure 17,

Figure 17 is a diagrammatic side sectional view of the device shown in Figure 16,

Figure 18 is a diagrammatic end view as seen in the direction of the arrow 18 of Figure 17.

In the accompanying drawings, Fig. 1 illustrates diagrammatically the relative location of the elevator forming the subject matter of the present application and its associated parts. This chain of mechanism comprises a main driving shaft A which in turn drives the gear head of the coal cutter designated at B. This coal cutter is of standard construction and forms no part of the present invention, except insofar as it may enter into the general combination. At one side of the coal cutter mechanism is an overload slipping clutch C mounted in the gear head B. This is coupled in any desired manner with the elevator mechanism broadly indicated at D and illustrated and described hereinafter. This elevator discharges its material to an inclined belt conveyor E which in turn delivers the material to a face conveyor, cars or otherwise as may be convenient or desirable.

With this general arrangement in mind, reference is now made to Figures 1 to 6 of the drawings, the elevating device or rotary shovel there shown comprises a base or skid plate 1 and a frame 2. The frame 2 comprises a continuous bar of channel section bent to provide side frames 3 and a front upper transverse member 4. The upper and lower limbs of the side frame members are connected at the front ends by uprights 5 of channel section. Secured to the front upper transverse member 4 is a plate 6 which has a pair of internally screw-threaded holes 7 for attachment of the device to the gear head of a mining machine. The plate 6 carries two triangular members 8 which in turn, carry an apertured plate 9 and a casing 10 is secured on the one hand to the plate 6 and on the other hand, to the plate 9. The members 8 are also supported by means of a transverse member 11 secured to the side frames 3.

The skid plate 1 is provided at its front edge with a pair of brackets 12 for attaching the rotary shovel to the gear head of a mining machine.

The movable parts of the elevating device or rotary shovel are carried by the frame above described and comprise a wheel 13 having a rim 14 in the form of a truncated cone, a hub portion 15, six radial spokes 16, three full blades 17 and three intermediate partial blades 18, the

blades and partial blades being riveted to the spokes 16. At their rear edges the blades 17 and 18 may be provided with rubber strips 19. The hub portion 15 is keyed to a sleeve 20 running in a bearing 21 in the casing 10 and loosely mounted on a shaft 22 which is inclined to the horizontal at an angle which, in this instance is of about 30°. Mounted on the shaft 22 is a sun-gear 23 meshing with planet wheels 24 carried by a spider 25 rigidly secured to or integral with the sleeve 20. Integral with the planet wheels 24 are gear wheels 26 engaging with an internal gear on the casing 10. The shaft 22 has at its upper ((front) end a bevel gear 27 driven by a bevel gear 28 carried by a short shaft 29 mounted in bearings 30, 31 carried by the casing 10. The shaft 22 is carried by an upper bearing 32 supported by the casing 10 and a lower bearing 33 carried by a pillar-like hollow casing 34 mounted on the skid plate 1. The shaft 29 has a squared end for engagement in a corresponding recess in the end of a driving shaft which may for example be driven from the gear head of a chain mining machine. Alternatively of course, the end of the shaft 29 could carry a suitable gear wheel or pulley and could be driven in any suitable way. It will be seen that the wheel 13 will rotate in the opposite direction to the shaft 29.

It will be seen that in the embodiment shown which is adapted for attachment to a mining machine, the skid plate 1 is recessed to receive the rim 14 of the elevator wheel for the purpose of keeping the lowest part of the rim as low as possible. Also it will be seen that the angle of the cone of which the rim 14 forms a part is so selected that the lowest part of the rim is horizontal. The device is provided with a removable cover 35.

Rear casing plates 36 (Figure 4) are secured to lugs 37 on the casing 34 and fit closely against the rear edges of the blades 17 to prevent undesired discharge of material until it has been elevated at least to the height of the hub 15. The aforesaid rubber strips 19 are to prevent any large pieeces of material from becoming jammed between the blades 17 and the casing plates 36.

The casing 34 houses a vertical shaft 38 in bearings 39, 40. The shaft 38 has at its upper end a bevel gear 41 meshing with a bevel gear 42 carried at the lower end of shaft 22. At its lower end the shaft 38 has a bevel gear 43 meshing with a bevel gear 44 carried by a shaft 45.

A sleeve 46 is rotatably mounted within the casing 34 and has a tubular extension or boss 47 which projects through an arcuate slot in the casing 34 and surrounds the shaft 45 so that the shaft 45 and the boss 47 can swing about the central axis of the vertical shaft 38. The boss 47 has a circumferential groove 48 and serves for the attachment of a belt or chain conveyor to be driven by the shaft 45.

It will be apparent that if the elevator wheel is rotated any material fed on to the lower part of the rim 14, for example by centrifugal force from a rotary disc will be raised at least as far as the top of the casing 36 and can be discharged on the opposite side (i. e. the left hand side in Figure 2). If the speed of rotation of the wheel is suitably chosen, the material may wholly or partly fall from the upper part of the rim of the wheel. The material may of course be discharged on to a suitable conveyor which may be attached to the boss 47.

Referring now to Figures 7 to 9 in which a modified form of rotary elevator is illustrated diagrammatically, an elevator wheel comprises a cylindrical rim 49, a hub portion 50 of substantially conical shape, and radial blades 51 all carried by a shaft 52. The shaft is carried in front and rear bearings 53, 54 supported by suitable standards 55, 56. The wheel is mounted in a casing 57 having front and rear plates 58, 59. The front plate 58 is provided at the lower part with an inlet aperture 60 and the rear plate 59 is provided with an outlet or discharge aperture 61. The wheel may be rotated by any suitable means (not shown). Material may be supplied through the inlet aperture 60 in any suitable manner, for example it may be flung in by centrifugal force from a rotary disc or plate. The edge of such a disc is indicated diagrammatically at 62. The material supplied will be carried round and upwards by the wheel, being constrained in its upward movement by the front and rear plates 58, 59 and when it reaches the level of the outlet aperture 61 it will slide down the inclined surface of the hub 50 and the inclined surfaces of the blades 51, and so will be discharged approximately as indicated by the arrow A. The angle of inclination of the upper surface of the conical hub 50 should be sufficiently great that the material will overcome frictional resistance and slide down it. The front and rear edges of the blades 51 may be provided with strips 63 of rubber or other suitable yieldable material to prevent lumps of material from becoming jammed between the blades and the casing plates.

In the form of elevating device diagrammatically illustrated in Figures 10 to 12, an endless belt or band 64 is mounted for circulatory movement in an approximately rectangular path in a casing 65 having front and rear plates 66, 67. The band 64 may be made of rubber, canvas or other flexible material, suitably reinforced if desired. The band carries inwardly directed blades 68 each provided at its free inner edge with a strip 69 of rubber or other suitable material. The blades 68 are so mounted that they normally extend at right angles to the band. The blades do not extend quite to the edges of the band 64 which are engaged by pairs of suitable guiding rollers or wheels 70, 71 and further pairs of rollers or wheels 72, 73. Either or both of the pairs of rollers 72 or 73 may serve as driving rollers and may be driven in any suitable manner, for example by means of a pulley 74. If desired, of course, one or both pairs of the lower rollers could be the driving rollers. Suitable internal casing or guide members 75, 76 are supported between the plates 66, 67 and the edges 69 of the blades 68 bear against these casing members 75, 76. An outlet aperture 77 is provided between the ends of the casing members 75, 76 through which material may be discharged on to a discharge chute 78. The front casing plate 66 has an inlet aperture 79 and the rear plate 67 has a discharge aperture 80.

Assuming that the band 64 is driven in a counterclockwise direction, then material delivered on to the band 64 through the inlet aperture 79 will be carried upwards by the blades 68 and the casing 75 will act to retain the material on the blades. At the upper part the material will be supported by the casing 75 as far as the aperture 77 and will then be discharged down the chute 78.

In the apparatus diagrammatically illustrated in Figures 13 to 15, an endless openwork chain 81 is mounted for circulation in a casing 82.

The chain is made up of open links 83 carrying blades 84 projecting outwards from the chain at right angles. The blades 84 are provided at their edges with strips 85 of rubber or other suitable material. The chain passes over pairs of polygonal wheels 86, 87, 88, 89, any one or more of which may be driven by suitable means, for example through a pulley 90. The blades bear against the external casing 82 and also against an internal casing member 91 which is provided with a discharge aperture 92 through which the material may fall on to a discharge chute 93. The casing 82 is provided with inlet and discharge apertures 94, 95.

Referring to Figures 16 to 18 an endless band 96 is mounted for circulation in a closed path inclined to the horizontal and passes round rollers 97, 98 of which one or both may serve as a driving roller. The band 96 carries outwardly projecting blades 99 having an edging 100 of rubber or other suitable material. The blades bear against an external casing 101 having an inlet aperture 102 and a discharge aperture 103. The lower edges of the blades are cut away so that the lower edge of each blade is horizontal when the blade is in its lowest position.

Any or all of the embodiments above described may be used in conjunction with a chain mining machine having if desired a rotary disc or plate below the cutter chain driving sprocket and/or means for causing material to be fed to the elevating device, for removing cuttings, kirvings, holings or the like from the neighbourhood of the gear head. Also any or all of these embodiments may be combined with a conveyor for conveying away the material after it has been elevated.

It will however be appreciated that my invention is not to be limited to the precise embodiments described as regards the form of the casing the arrangement of the rotor and the number and form of the blades therein since these features may be varied within wide limits depending upon the situation of the mechanism, the service it has to perform and the materials upon which it is intended to operate.

I claim:

1. A device for elevating loose material comprising a rotary hub, a rim supported by said hub concentrically therewith and spaced therefrom, radially disposed blades carried by said rim means for supporting said rotor for rotation about a central axis at an angle to the vertical, casing means for preventing undesired escape of material from said rim during elevation thereof, an inlet space being provided on the larger side of the rotor through which to supply material on to said rim at the lower part thereof, and an outlet space being provided on the opposite side of the rotor at the upper part thereof, the said hub decreasing in thickness in the direction from the inlet side to the outlet side.

2. A device for elevating loose material comprising a base, an open sided rotor carried thereby, comprising a rim in the form of a truncated cone, radially positioned blades extending inwardly from said rim and rigidly secured thereto and a central hollow hub supporting said rim, means for supporting said hub for rotation about an axis so inclined to the horizontal that the lowest generating line of the truncated cone is horizontal and substantially coincident with the bottom of the base, drive transmitting means extending through said hub for operating another mechanism and casing means open at the front extending upwards from the bottom of the rotor on the rear side thereof for preventing undesired escape of material during elevation thereof but leaving a discharge aperture at the upper part of the rotor on the rear side thereof.

3. A device for elevating loose material comprising a rotary hollow hub, an annular truncated conical shell carried by said hub, means for supporting said hub for rotation about an inclined axis, casing means on the under open side of said shell to prevent undesired escape of material while it is being elevated in said shell, a discharge aperture on the under open side of said shell, and drive transmission means extending through said hollow hub comprising a rotary shaft extending through said hub, a bevel gear carried by said shaft, a second shaft, a bevel gear thereon meshing with said first bevel gear, a rotatable sleeve surrounding said second shaft, a lateral extension on said sleeve, a rotary shaft in said extension, and means for driving said third shaft from said second shaft.

4. A device for elevating loose material comprising a hollow rotary hub, an annular shell in the form of a truncated cone carried by said hub, radially positioned blades extending inwards from said shell, means for supporting said hub for rotation about an inclined axis so that the narrower end of said shell is on the lower side, casing means on the under open side of said shell leaving a discharge aperture at the upper part, a high speed driving shaft extending through said hollow hub for driving both the cone and an associated mechanism, a sun wheel carried by said shaft, a planet wheel carrier connected to said hub, planet wheels carried by said carrier engaging with said sun wheel, gear wheels carried by said planet wheels and a stationary gear engaging with said gear wheels whereby the cone is driven at reduced speed.

5. A device for elevating loose materials comprising a base, a rotary hub supported therefrom, a shell in the form of a truncated cone carried by said hub, means for supporting said hub for rotation about an inclined axis so that the lowest generating line of the truncated cone is horizontal and substantially coincidental with the bottom of the base, casing means at the under open side of said shell leaving a discharge aperture at the upper part, drive transmitting means extending through said hub and means for pivotally supporting a conveyor in position to receive material discharged from said discharge aperture and means for connecting said transmitting means to said conveyor.

6. A device for elevating loose materials comprising a rotor having a rim or shell of the shape of a surface of revolution of a line about an axis and at an angle thereto, blades extending radially inwardly from said rim or shell and fixed thereto, means for supporting said rotor for rotation about said axis so that the lowest generating line of said surface is horizontal, stationary casing means adjacent to said rotor for preventing undesired escape of material while it is being elevated, said blades having yieldable edges adjacent to said casing means, an inlet for admitting material to the inside of said rim or shell at the lower front part of the rotor and an outlet at the opposite side for permitting discharge of material after elevation thereof.

7. In combination with a chain mining machine, a device for elevating material brought out of the kerf by the cutter chain comprising a rotor, a rim or shell of the shape of a surface of revolution of a line about an axis carried by said

rotor, means for supporting said rotor for rotation about said axis so that the lowest generating line of the surface is horizontal, casing means adjacent to said rotor for preventing undesired escape of material while it is being elevated, an inlet for admitting material on to the rim or shell at the bottom of the rotor and an outlet permitting discharge of material after elevation thereof.

8. In combination with the gear head of a chain mining machine, a device for elevating material brought out of the kerf by the cutter chain to remove it from the immediate vicinity of the cutter chain driving sprocket, comprising a rotor having a rim or shell of the shape of a surface of revolution of a line about an axis, blade members extending inwardly from said rim or shell, means for supporting said rotor for rotation about said axis so that the lowest generating line of the surface is horizontal, casing means adjacent to said rotor for preventing undesired escape of material while it is being elevated, an inlet for admitting material on to the rim or shell at the bottom of the rotor and an outlet permitting discharge of material after elevation thereof.

9. In combination with a chain mining machine, a device for elevating material brought out of the kerf by the cutter chain comprising a rotor, a rim or shell of the shape of a surface of revolution of a line about an axis carried by said rotor, means for supporting said rotor for rotation about said axis so that the lowest generating line of the surface is horizontal, casing means adjacent to said rotor for preventing undesired escape of material while it is being elevated, an inlet for admitting material on to the rim or shell at the bottom of the rotor and an outlet permitting discharge of material after elevation thereof, and means for driving said device from the driving gear of the cutter chain.

10. In combination with the gear head of a chain mining machine, a rotary disc mounted below the cutter chain driving sprocket, a device for elevating material brought out of the kerf by the cutter chain comprising a rotor having a rim in the form of a truncated cone, blades extending inwards from said rim, means for supporting said rotor for rotation about an inclined axis so that the smaller end of the truncated cone is on the under side remote from said disc and stationary casing means at the lower part of the open under side of the rotor for preventing discharge of material until it has been elevated, and means for driving said elevating device from the cutter chain driving gear.

11. A device for handling and elevating loose material comprising a hollow rotor of truncated conical form, means for supporting said rotor for rotation about an inclined axis so that the lowest generating line of the cone is horizontal, means for constraining discharge from said rotor to the upper part of the under side thereof, means for supporting said conveyor to receive discharge from said rotor, drive transmitting means extending through said rotor and coupling means for coupling said drive transmitting means to the conveyor.

12. A device for elevating loose material comprising a base, a hollow rotor of truncated conical form supported from said base, means for supporting said rotor for rotation about an inclined axis so that the lowest generating line of the truncated cone is horizontal and substantially coincident with the bottom of the base, means for constraining discharge from said rotor to the upper part of the under side thereof, a high speed shaft passing through said rotor and drive transmitting means including an epicyclic gear for driving said rotor whereby said rotor is driven at reduced speed.

13. A device for elevating loose material comprising a base, a hollow rotor of truncated conical form supported from said base, radial blades within said rotor, means for supporting said rotor for rotation about an inclined axis so that the lowest generating line of the truncated cone is horizontal and substantially coincident with the bottom of the base, means for constraining discharge from said rotor to the upper part of the under side thereof, a high speed shaft passing through said rotor and drive transmitting means including an epicyclic gear for driving said rotor whereby said rotor is driven at reduced speed.

14. A device for elevating loose material comprising a supporting frame, a high speed horizontal driving shaft carried by said frame, an inclined shaft driven by said driving shaft, a vertical shaft driven by said inclined shaft, a horizontal shaft mounted for movement about the axis of said vertical shaft and driven thereby, a hollow hub carried loosely on said inclined shaft, a gearing for driving said hub at reduced speed from said inclined shaft, spokes carried by said hub, a rim of truncated conical form carried by said spokes, the narrower diameter of said rim being on the lower side, blades extending inwards from said rim, casing means for preventing discharge of material at the lower part of the under side of said rim, and means for connecting a conveyor in driving engagement with said last named horizontal shaft.

15. In combination with the gear head of a chain mining machine, a device for removing material brought out of the kerf by the cutter chain comprising a hollow rotor of truncated conical form, means for supporting said rotor for rotation about an inclined axis so that the lowest generating line of the cone is horizontal, means for constraining discharge from said rotor to the upper part of the under side thereof, means for supporting a conveyor to receive discharge from said rotor, drive transmitting means extending through said rotor and coupling means for coupling said drive transmitting means to the conveyor.

16. A device for elevating loose coal adapted to be associated with a coal cutter on one side and a conveyor on the other, comprising a base, a truncated conical rotor mounted on said base with its lower portion substantially coincident with the bottom of said base, a high speed drive shaft adapted to be connected with the coal cutter and passing through the elevator to the conveyor and reducing gear between the high speed shaft and the elevator.

17. A device of the character set forth in claim 16 in which the reducing gearing is completely enclosed to protect the same from dust and dirt.

18. A device for elevating loose material such as coal adapted to be associated with a coal cutter at one side and a conveyor at the other, comprising a casing, a truncated conical elevator within the casing provided with a plurality of radially disposed blades, said conical elevator having its larger side adapted to face towards the coal cutter to receive coal therefrom and its smaller side towards the conveyor and to elevate and deliver coal thereto, high speed shafting passing through the central larger face of said elevator from the cutter to the conveyor, and reducing gear between

said high speed shaft and the elevator whereby the elevator is driven at reduced speed.

19. A device for elevating loose material such as coal adapted to be associated with a standard coal cutter at one side and a conveyor at the other, comprising a stationary casing, a truncated conical elevator within said casing, the lower part of which is substantially at floor level, and including a plurality of radially disposed fixed blades, said elevator having its larger side adapted to face upwardly and towards the coal cutter and open at the lower side to receive coal from the cutter and its smaller side towards the conveyor, and open at its upper side to deliver coal thereto, a high speed driven shaft connected with the elevator at its larger face and passing through said elevator to the conveyor, reducing gearing between the high speed shaft and the elevator, and a substantially dust-proof housing enclosing said reducing gearing.

20. A device of the character set forth in claim 19, in which a slip connection is introduced between said high speed shaft and its source of power.

21. A device of the character set forth in claim 19, in which the lower end of said high speed shaft is provided with a swivel connection.

22. A device of the character set forth in claim 19, in which the high speed shaft and reducing gearing are substantially enclosed throughout the entire length of the high speed shaft and in which said high speed shaft terminates in a swivel connection to permit relative movement of the elevator with respect to the conveyor.

23. A device for elevating loose material adapted to be associated with a material cutter on one side and a material conveyor at the other, comprising a base at substantially floor level, a stationary casing mounted thereon, an elevator within the casing including a rim the lower part of which is substantially coincident with said base and a plurality of blades positioned substantially normal to the rim and carried thereby, said elevator having an open face towards the cutter adapted to receive the material and an opening in its opposite face for delivery towards the conveyor, and means for moving the rim with its blades including a drive shaft passing inwardly through the casing to the elevator from the side towards the cutter and terminating at the opposite side, bearings for said shaft between the elevator and the casing, and means for protecting the bearings from the dust and dirt from the material to be elevated.

24. In combination with a cutter chain mining machine having driving means, a rotary disc mounted below the cutter chain, a device for elevating material brought out of the kerf by the cutter chain mounted at the trailing end of the machine, said device comprising a reversibly operative rotor having a rim in the form of a truncated cone, means for supporting said rotor for rotation about an inclined axis with the lowest generating line of the truncated cone substantially horizontal at the level of the edge of the disc with the lowest part of the rim close to the disc, casing means at the lower part of the open side of the rotor for preventing discharge of material until it has been elevated, a driving shaft extending coaxially through said rotor for driving said rotor, means for driving said driving shaft from the cutter chain machine and a speed reduction gear to drive said rotor from said driving shaft.

25. A device for elevating loose materials adapted to be connected with associated mechanisms comprising a base, a reversibly operative elevating rotor carried by said base, having inlet and discharge apertures to and from said rotor on opposite sides of the plane of rotation, a high speed driving shaft extending coaxially through said rotor for driving both the rotor and the associated mechanisms, and speed reduction gearing through which to drive the rotor from said shaft, comprising a gear wheel on said shaft, a second gear wheel driven thereby, a third gear wheel rotatable with said second gear wheel, and a gear engaging with said third gear wheel.

26. A device for elevating loose material adapted to be connected with associated mechanisms comprising a base, an open sided rotor carried thereby, comprising a rim in the form of a truncated cone, radially positioned blades extending inwardly from said rim and a central hollow hub supporting said rim, means for supporting said hub for rotation about an axis inclined to the horizontal with the lowest generating line of the truncated cone substantially horizontal and coincident with the bottom of the base, casing means on the underside of the rotor for preventing undesired escape of material during elevation thereof having a discharge aperture at the upper part, a high speed driving shaft extending through said hub for driving both the rotor and the associated mechanisms, and speed reduction gearing interposed between said driving shaft and said rotor comprising a gear wheel on said shaft a second gear wheel engaging therewith, a third gear wheel rotatable with said second gear wheel and a gear engaging with said third gear wheel.

JAMES ISAAC PHILP.