March 12, 1968 A. B. KENNEDY, JR 3,372,791

MOBILE ELEVATOR TOWER

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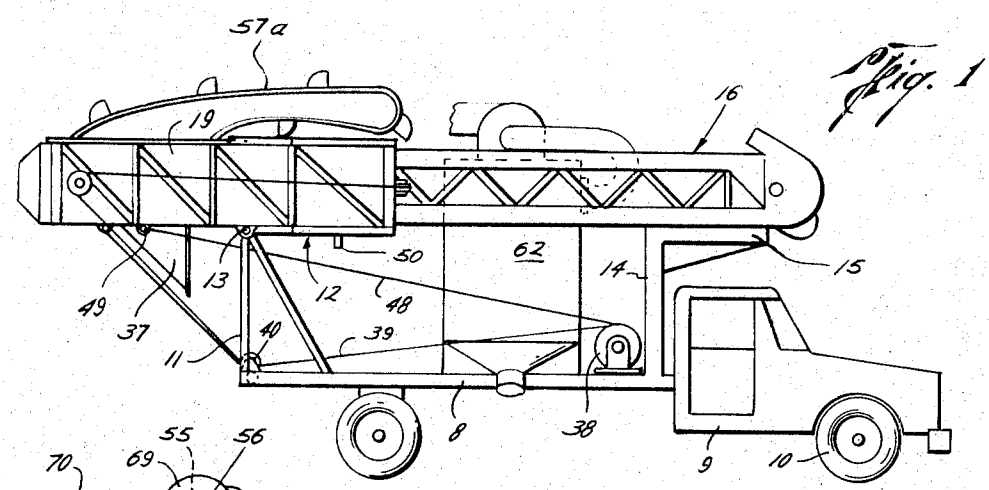


Fig. 1

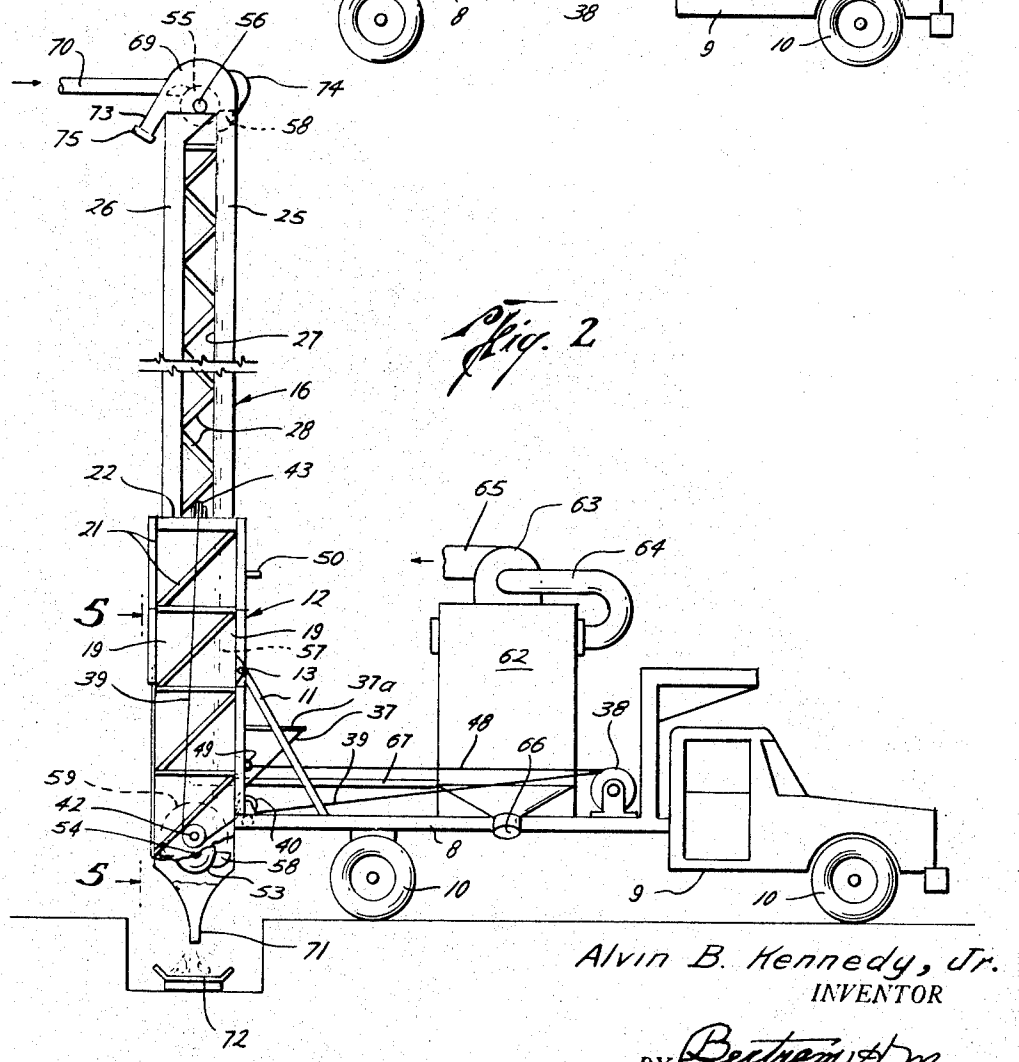


Fig. 2

Alvin B. Kennedy, Jr.
INVENTOR

BY Bertram & Mann

ATTORNEY

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Fig. 3

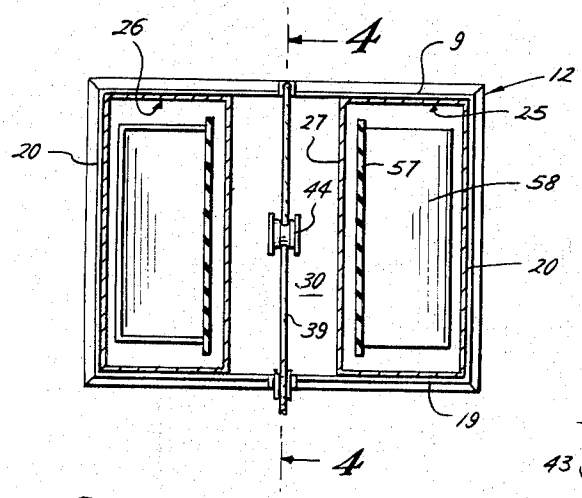


Fig. 4

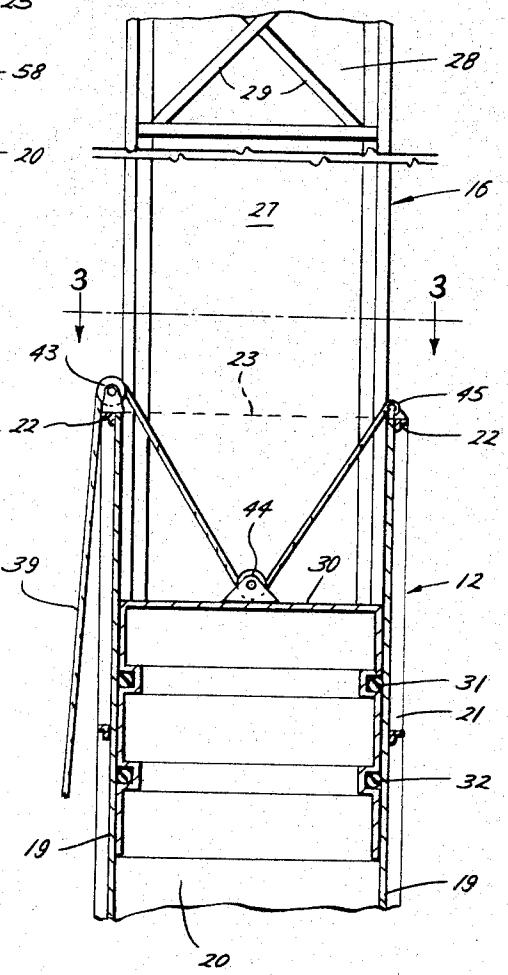
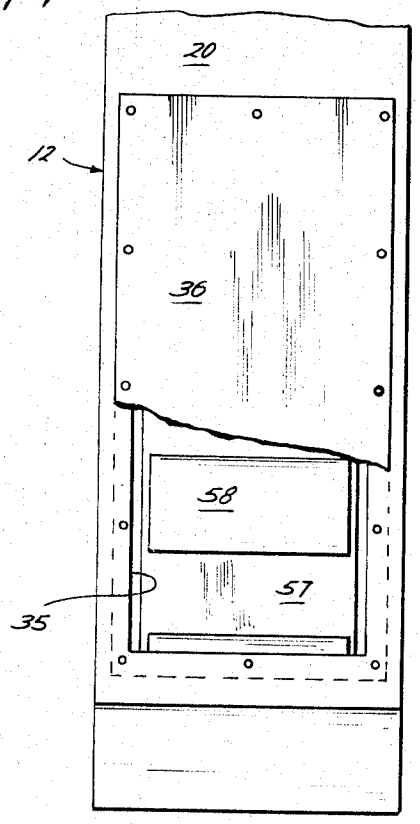


Fig. 5



Alvin B. Kennedy, Jr.
INVENTOR

BY Bertram N. Mann

ATTORNEY

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MOBILE ELEVATOR TOWER

Alvin B. Kennedy, Jr., 1802 Meadowview,
Alvin, Tex. 77511

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ABSTRACT OF THE DISCLOSURE

An elevator for particulate material including a powered, continuous belt conveyor mounted in sealingly telescoping, enclosed casing parts pivotally mounted on a truck chassis and which can be collapsed for compact carriage on the chassis, and means to cause a gaseous flow through the casing parts to separate dust from material being elevated.

This invention relates to conveyors particularly of the elevator type for gently raising and lowering particulate material.

In many industries, more especially the chemical industry, there is need for a device to elevate and lower different kinds of dry, particulate products, for instance, in charging a chemical reactor and removing spent material therefrom. Frequently, the distance which such material must be lowered and/or elevated is such that special conveyor structures must be provided which are of such size as to prevent convenient mobility throughout the plant or over highways. Moreover, such material often is fragile and accompanied by dust which contains valuable ingredients and/or the release of which into the atmosphere is undesirable for other reasons.

Accordingly, an object of the present invention is to provide an elevator for particulate material which can be substantially reduced in size for convenient storage or transportation and which can be readily elevated and/or expanded to its normal operating position.

Another object is to provide a telescoping type of conveyor with means for confining and disposing of dust accompanying the material being conveyed.

Another object is to provide a telescoping elevator and lowering device including a flexible belt or chain type conveyor and means for conveniently accommodating slack in the conveyor resultant from collapse of the elevator framing.

Still another object is to provide a mobile conveyor for particulate material which may be readily transported about the plant grounds and over streets and highways, yet which may be substantially increased in length when erected to its elevating position.

These objects and others hereafter appearing are attained by the apparatus illustrated in the accompanying drawings in which

FIG. 1 is a side view of a truck with the novel elevator device mounted thereon in recumbent position;

FIG. 2 is a similar view of the apparatus showing the elevator erected and expanded for normal use;

FIG. 3 is an enlarged horizontal section taken substantially on line 3—3 of FIG. 4;

FIG. 4 is a vertical section of a detail taken on line 4—4 of FIG. 3; and

FIG. 5 is an enlarged elevation of a detail taken on line 5—5 of FIG. 2.

The apparatus is shown mounted on the bed **8** of a truck chassis having an operator's cab **9** at the front end thereof and provided with rubber-tired wheels **10** for mobility both around the buildings and grounds of a plant and over the highway, as needed. Projecting upwardly from the rear end of the chassis bed is a rigid, generally triangular stanchion frame **11** at the top of which the

bottom section **12** of the novel telescoping tower is pivotally secured, as at **13**. At the front end of the chassis bed **8** there is provided an upstanding structure **14** including a horizontal shelf **15** projecting over cab **9** and upon which the upper section **16** of the elevator structure may rest, as shown in FIG. 1.

Lower section **12** of the elevator is of rectangular section including side and end wall sheeting **19** and **20** reinforced by external ribs as at **21**. Reinforcing angle bars **22** and **23** surround the open upper end of section **12**. Telescopingly received within the lower section is the upper section **16** which is formed of a pair of parallel, elongated boxes **25** and **26** open at the bottom and forming a slot **27** therebetween extending substantially the length of the section and reinforced by diagonal plates or truss work **28**. FIG. 4 shows these bracing plates reinforced by diagonal ribs **29**. Reinforcements **28**, **29** terminate substantially short of the bottom extremity of upper section **16** for a purpose to be described. Near the lower end of section **16** there is provided a transverse plate **30** and the section below this transverse plate is provided with peripheral sealing grooves and rings **31** and **32** which slide along the inner faces of lower section walls **19** and **20**. One of the end walls **20** of lower section **12**, as shown in FIG. 5, is provided with an opening **35** and a removable cover plate **36**. Opposite opening **35** there is provided a feed chute **37** having a removable cover **37***a*.

A powered winch **38** is mounted near the front end of the chassis bed for operating a suitable cable line **39** which is guided by free pulleys **40**, at the rear end of the chassis bed, **42** at the bottom of one side wall **19** of the bottom section, **43** at the upper edge of this wall **19**, and **44** at the center of internal transverse wall **30** on the upper section to an anchor **45** at the upper edge of the other bottom section side wall **19** opposite guide pulley **43**. This arrangement is such that reeling in of cable **39** by means of powered winch **38** will raise upper elevator section **16** relative to outer or lower section **12**.

For erecting and lowering the elevator device, powered winch **38** is provided with a second operating line **48** which is secured to a ring **49** on forward end wall **20** of lower section **12**. A ring or handle **50** projecting from the upper part of the last-mentioned wall **20** is for application of clockwise rotating force to the tower to recline it from the erect position shown in FIG. 2 to the recumbent position shown in FIG. 1. Powered winch **38** may act as a brake for controlling this movement. It will be understood that lines **39** and **48** may be operated by separate sheaves or drums on the same powered winch, or by separate winches, or by the same drum to which the lines could be selectively connected, one at a time.

Near the lower end of lower section **12** there is provided a conveyor wheel or sprocket **53** mounted on a powered shaft **54**. A similar wheel **55** is rotatably mounted near the upper extremity of inner tower section **16** upon a shaft **56**. Received about wheels **53** and **55** is a conveyor belt **57** having scoops **58** mounted serially therealong. The belt extends upwardly through one box leg **25** of the upper section and downwardly through the other box leg **26**. A separate motor **59** is shown mounted at the lower end of the tower for powering the conveyor in either direction.

A dust trap tank **62** is mounted intermediately on chassis **8** and at the side thereof. A pair of such traps may be provided, if desired. Mounted on top of tank **62** is an air pump **63** provided with suitable powering means, as an individual motor (not shown). FIG. 2 shows the pump arranged as a suction pump and connected by inlet piping **64** to dust separator tank **62** and exhausting at **65**. A hopper **66** at the bottom of tank **62** provides for release of collected dust and other solid

material. Tank 62 is also connected by piping 67 to lower tower section 12 for applying suction thereto and thence to upper tower section 16. For suction operation, the cap 69 at the upper end of the tower is secured to a pipe or hose 70 which may lead to the particulate material to be handled for drawing the same into the tower. At the lower end of the tower there is provided an air lock nozzle device 71 for discharging the product from the lower end of the tower, as on to a conveyor 72 or a suitable receptacle.

When the tower is to be used for elevating product introduced through feed chute 37, pump connection 65 can be connected directly to the same fitting on lower tower section 12 as is used for connection of suction line 67 which, of course, will be disconnected from the tower, while piping 64 will be disconnected from the dust separator 62 and utilized as an air inlet. The tower will be pressured for aiding in the discharge of product dumped from scoops 58 into discharge nozzle 73. Suction line fitting 74 on tower cap 69, of course, will be closed during such pressuring operation, as will pressure discharge fitting 73 and feed chute 37, as by caps 75 and 37*a*, when the tower is subjected to suction.

In order to stow the tower upon the truck chassis in permissible condition for transport thereby, upper section 16 will be lowered and telescoped within lower section 12. At the same time, resultant slack in conveyor belt 57 will be drawn outwardly through opening 35 in the lower section, plate 36, of course, being removed, and this conveyor slack can be folded upon the top of the recumbent tower, as shown at 57*a* in FIG. 1. The tower is then rotated clockwise about pivoting support 11, powered winch 38 being utilized to control this motion, as explained above. The open lower portion of slot 27 in upper section 16 is of sufficient length to accommodate elevating cable 39 for whatever telescoping movement of the upper section is desired. In the recumbent position of the tower, the overall length of the truck and load from the overhanging end of the telescoped tower to the front end of the truck, of course, must be maintained within permissible and legal limits for transport.

Preparatory to use of the novel elevator tower, the truck will be positioned with its rear end immediately adjacent the desired position of the tower. For instance, the tower may be used to lower spent particulate material from an elevated chemical reactor to a conveyor 72, as shown in FIG. 2. With cable 48 secured to ring 49, winch 38 is operated to rotate the tower counterclockwise about its pivotal support 13. With the tower fully erected, tension will be applied to elevating cable 39 to raise inner section 16 to the desired extent. With discharge nozzle 73 and inlet chute 37 capped, pump 63 will be placed in operation to apply suction to dust separator tank or tanks 62, thence through duct 67 to the bottom of the expanded tower and to "snorkel" tube or pipe 70. The material drawn through tube or pipe 70 will be deposited upon scoops 58 at the right-hand side of upper section 16, and conveyor 57 will be rotated to cause these scoops to descend through leg 25 of the tower, gently depositing their transported material through air lock 71 upon conveyor 72. Any dust released from the transported particulate material will be drawn through duct 67 into the dust separator 62 and thence collected from the bottom of the conveyor. Frequently, these dusts are valuable and well worth reclaiming. In any case, their discharge into the atmosphere is usually undesirable.

In case the tower is to be used for elevating material, pump discharge 65 will be connected, as explained, to the tower fitting from which suction duct 67 has been

removed, for pressuring the tower. If desired, suction pipe 64 may be disconnected from the dust separator 62. The entire elevator, accordingly, will be placed under superatmospheric pressure, and conveyor 57 will be rotated in the direction to transport material spilled on to the right-hand scoops in the tower upwardly through leg 25, discharging such material into nozzle 73 from which cover 75 has been removed. At the same time, of course, suction connection 74 will be covered. The flow of air upwardly through the tower and outwardly through nozzle 73 will facilitate the flow of material through the outlet nozzle where, if desired, a dust separator may be inserted.

The apparatus, accordingly, is readily transportable to any desired point of use and may be expanded to increase its operating length substantially over its recumbent length. While only two telescoping sections are shown, of course, additional telescoping sections may be utilized or, in some cases, merely a rigid tower may be provided with means for moving it between erect and recumbent positions on a transport vehicle. The device, thus, has great versatility. The invention may be modified in various respects as will occur to those skilled in the art, and the exclusive use of all modifications as come within the scope of the appended claim is contemplated.

I claim:

1. A combination mobile elevator and dust separator for particulate material comprising a mobile chassis, spaced, upstanding supports on said chassis, and elevator means mounted on said chassis, said elevator means including upper and lower elongated and enclosed casing structures assembled in sealed, telescoping relationship, delivery ducts for particulate material sealingly communicating with the opposite extremities of said casing structures, an endless conveyor mounted in said structures, said lower structure having a pivotal mount on one of said supports whereby said elevator means may be shifted between an erect position extending above said chassis and a recumbent position resting on the other of said supports, said casing structures and said conveyor being longitudinally expansible from a contracted overall length permissible for transport in its recumbent position to a substantially greater length according to elevator requirements in its elevated position, dust collection means including gaseous flow producing means connected to said lower casing structure adjacent said pivotal mount, an opening in a wall of one of said structures for accommodation of slack portions of said conveyor in the contracted condition of said elevator, and a door for sealingly closing said opening when the elevator is in extended operation.

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EVON C. BLUNK, *Primary Examiner.*

M. L. AJEMAN, *Assistant Examiner.*