Jan. 27, 1953 A. J. STOCK 2,626,719

CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

Filed Jan. 24, 1946 8 Sheets-Sheet 1

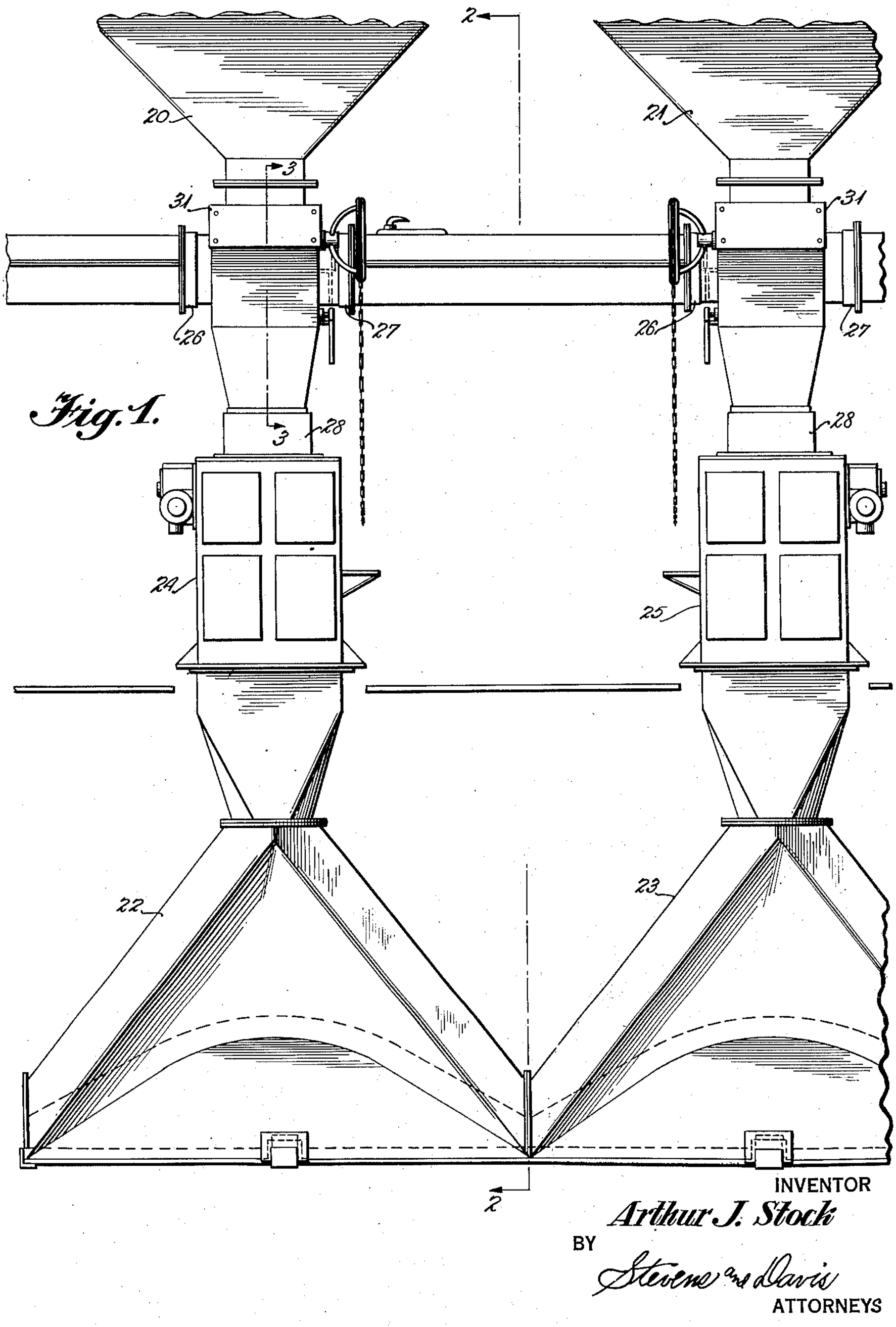


Fig. 1.

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Filed Jan. 24, 1946 8 Sheets-Sheet 2

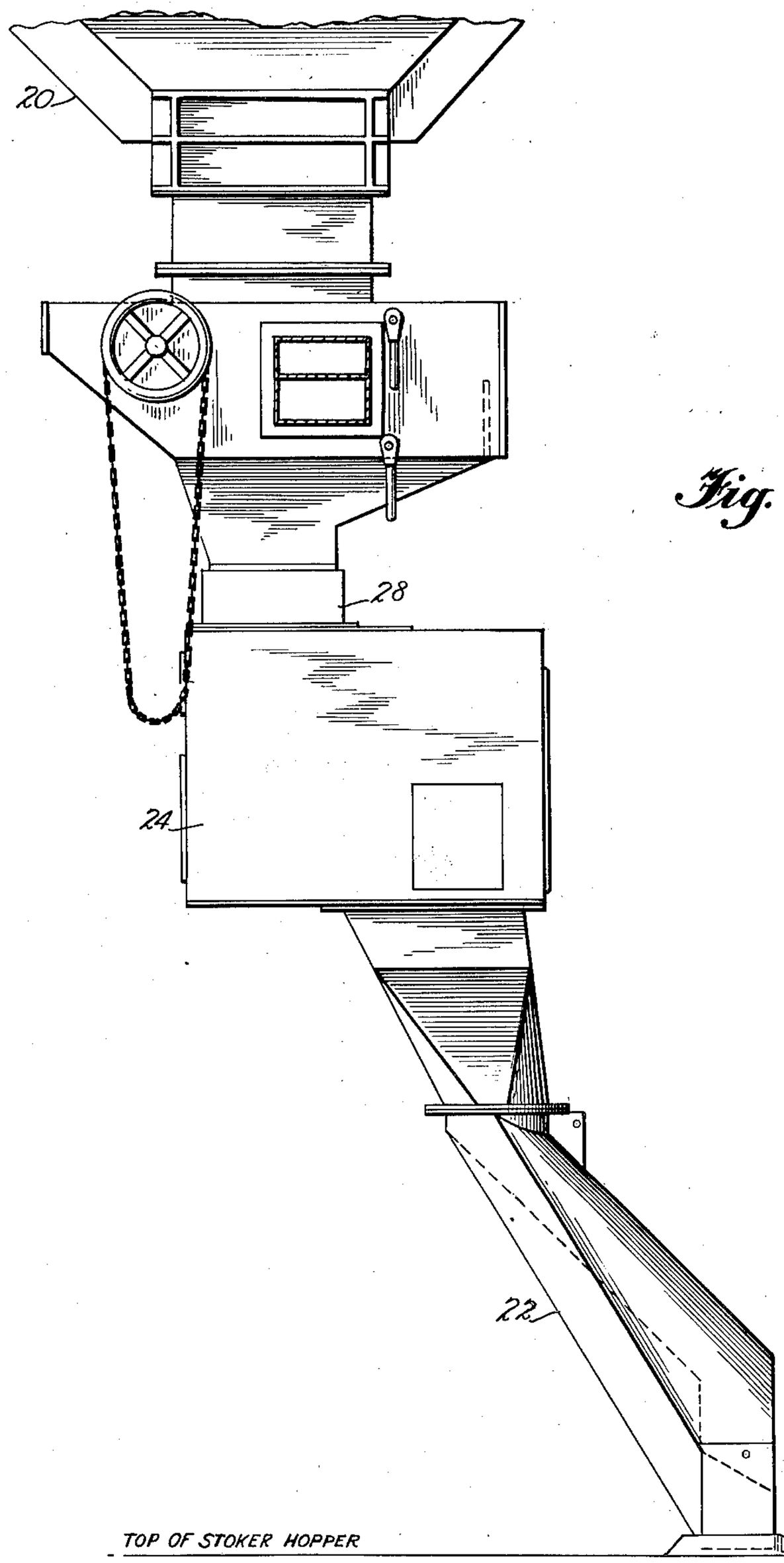


Fig. 2.

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CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

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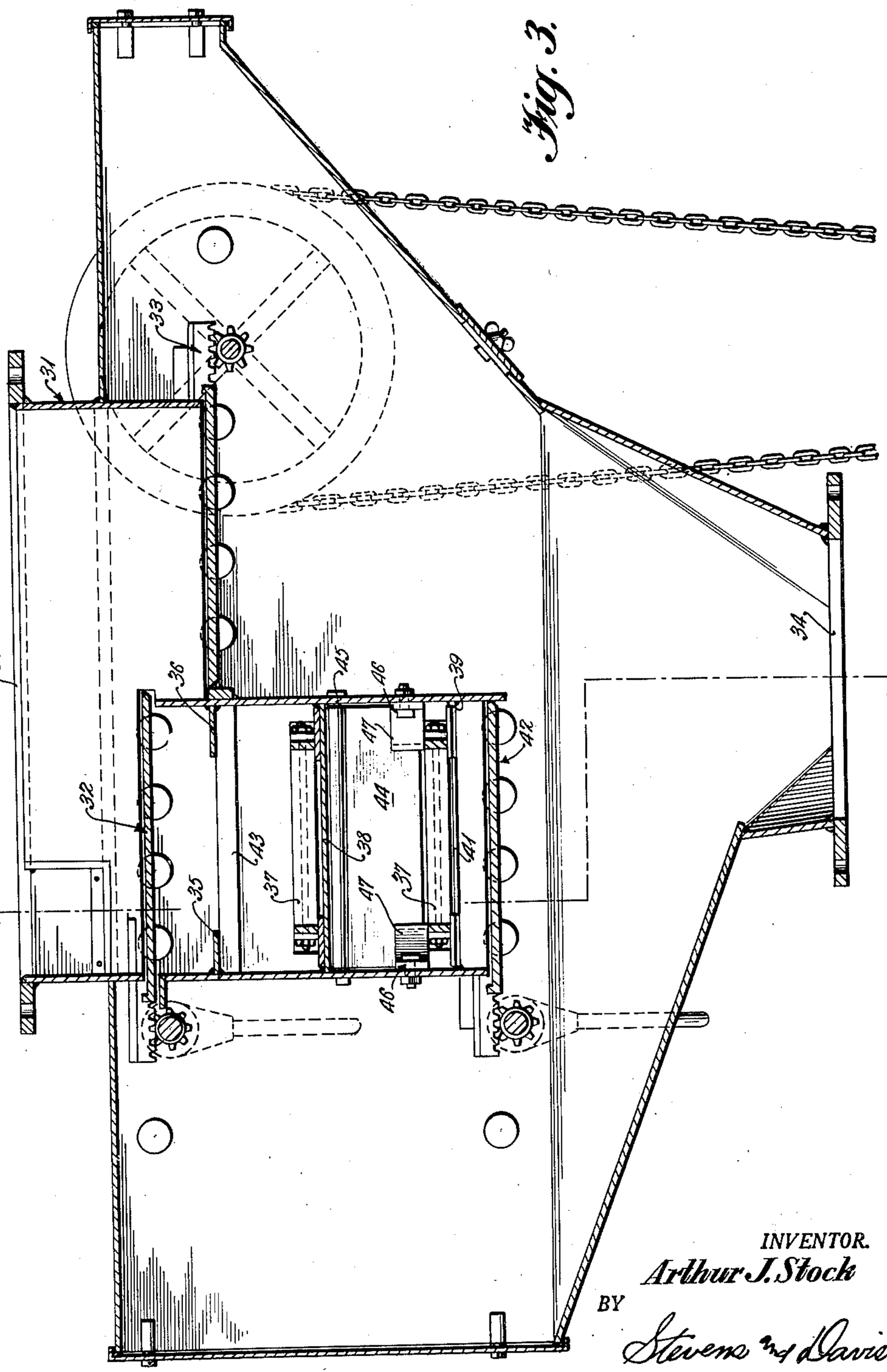
Fig. 3.

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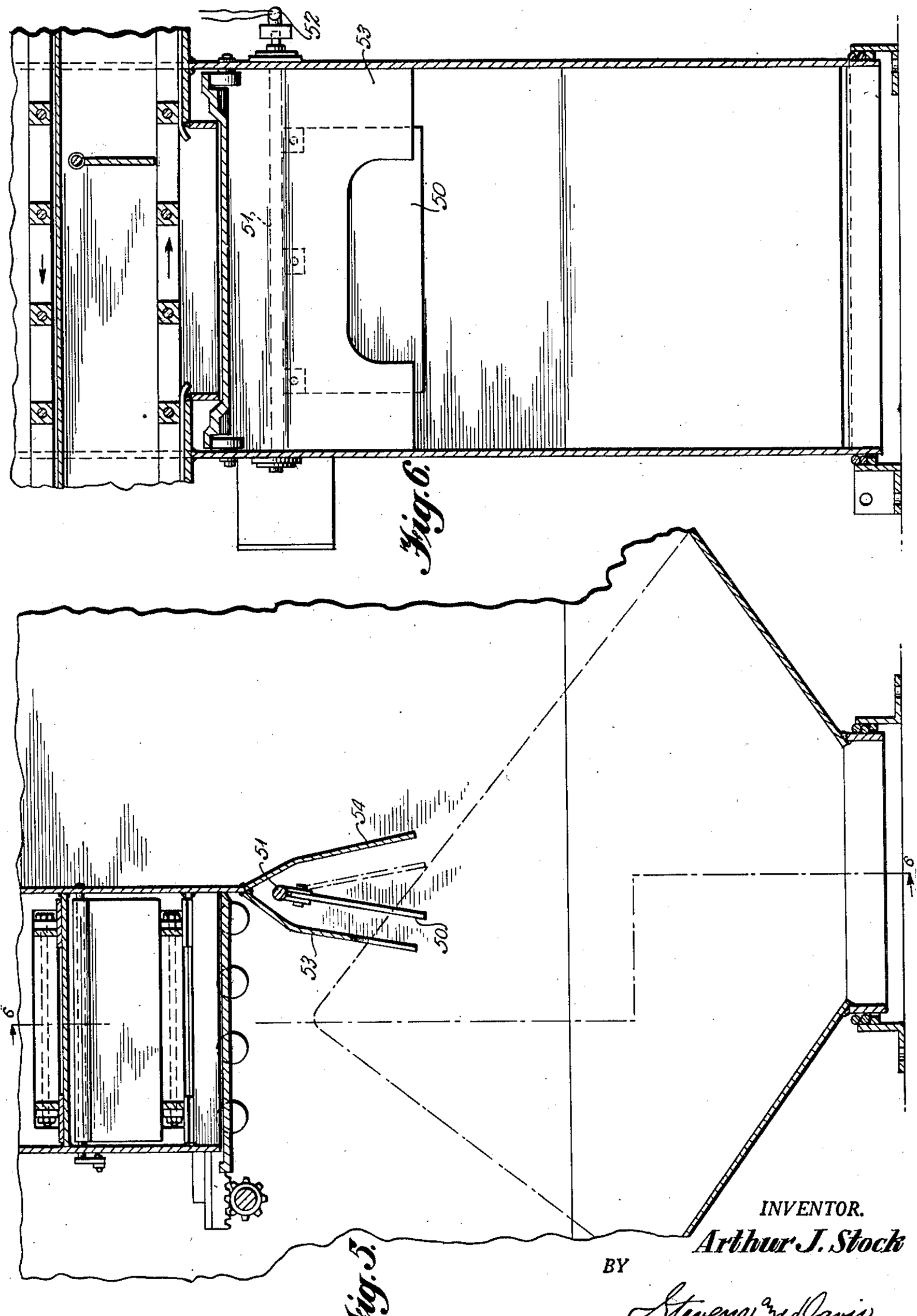


Fig. 6.

Fig. 5.

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CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

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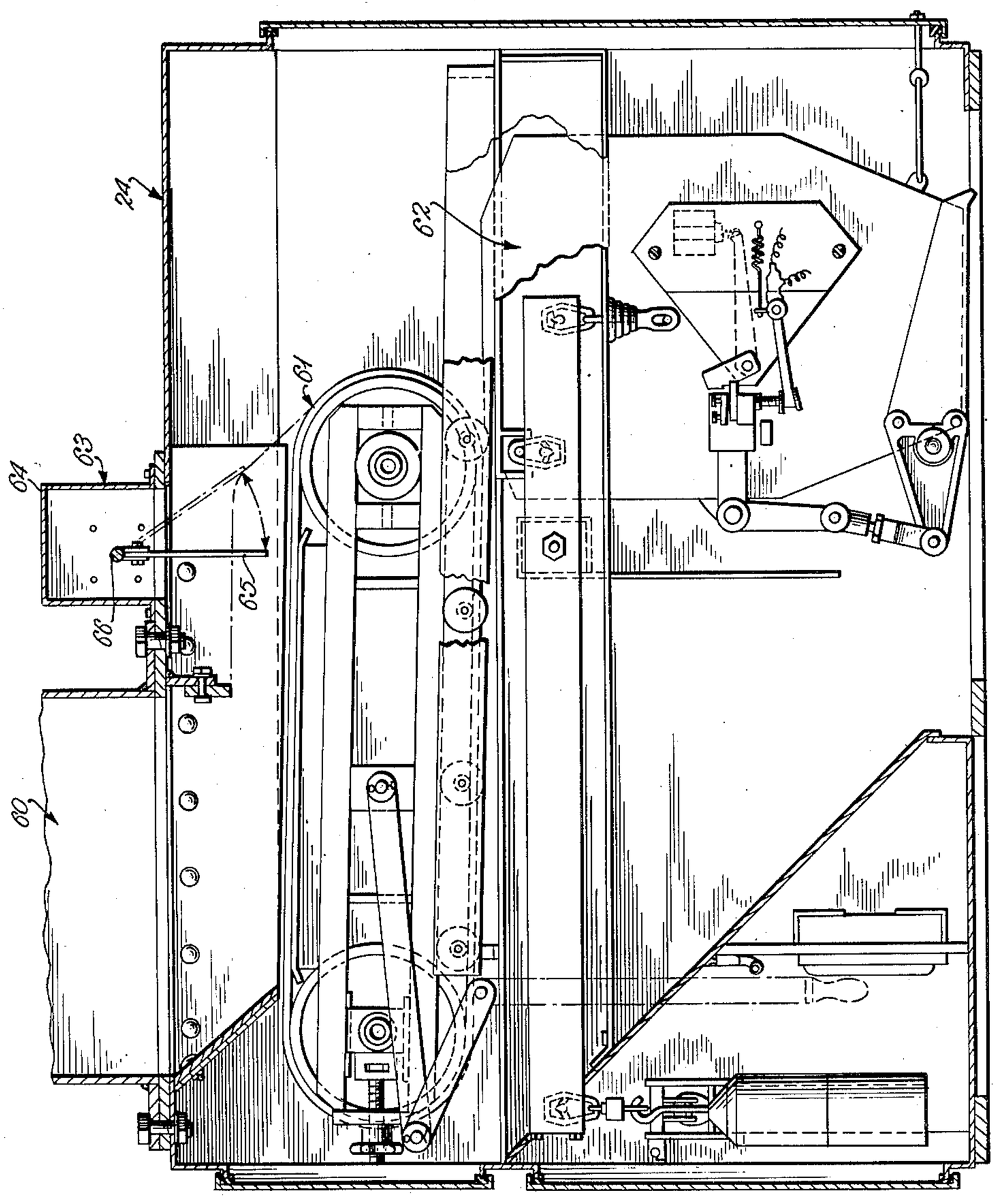


Fig. 7.

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CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

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Fig. 8.

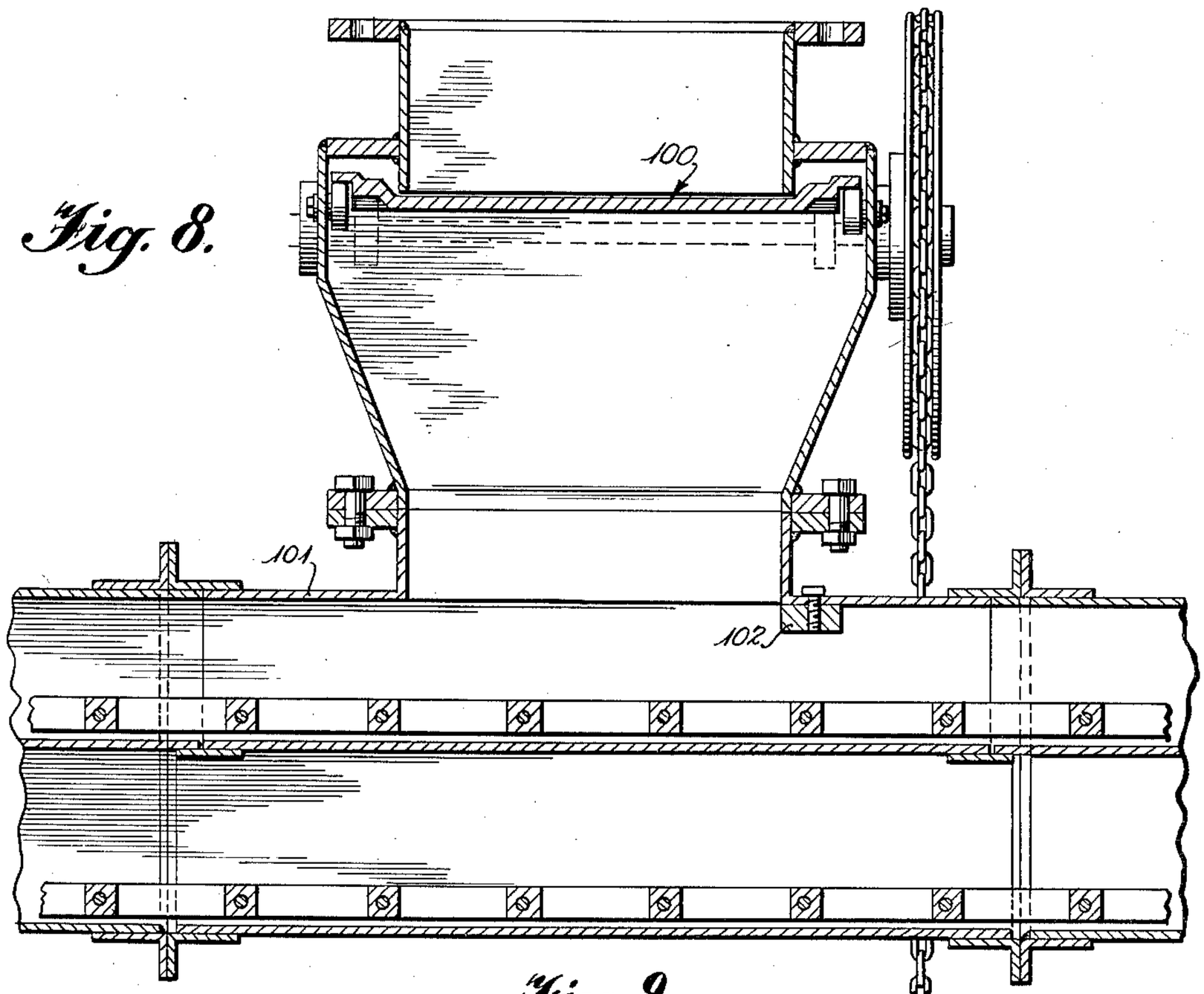
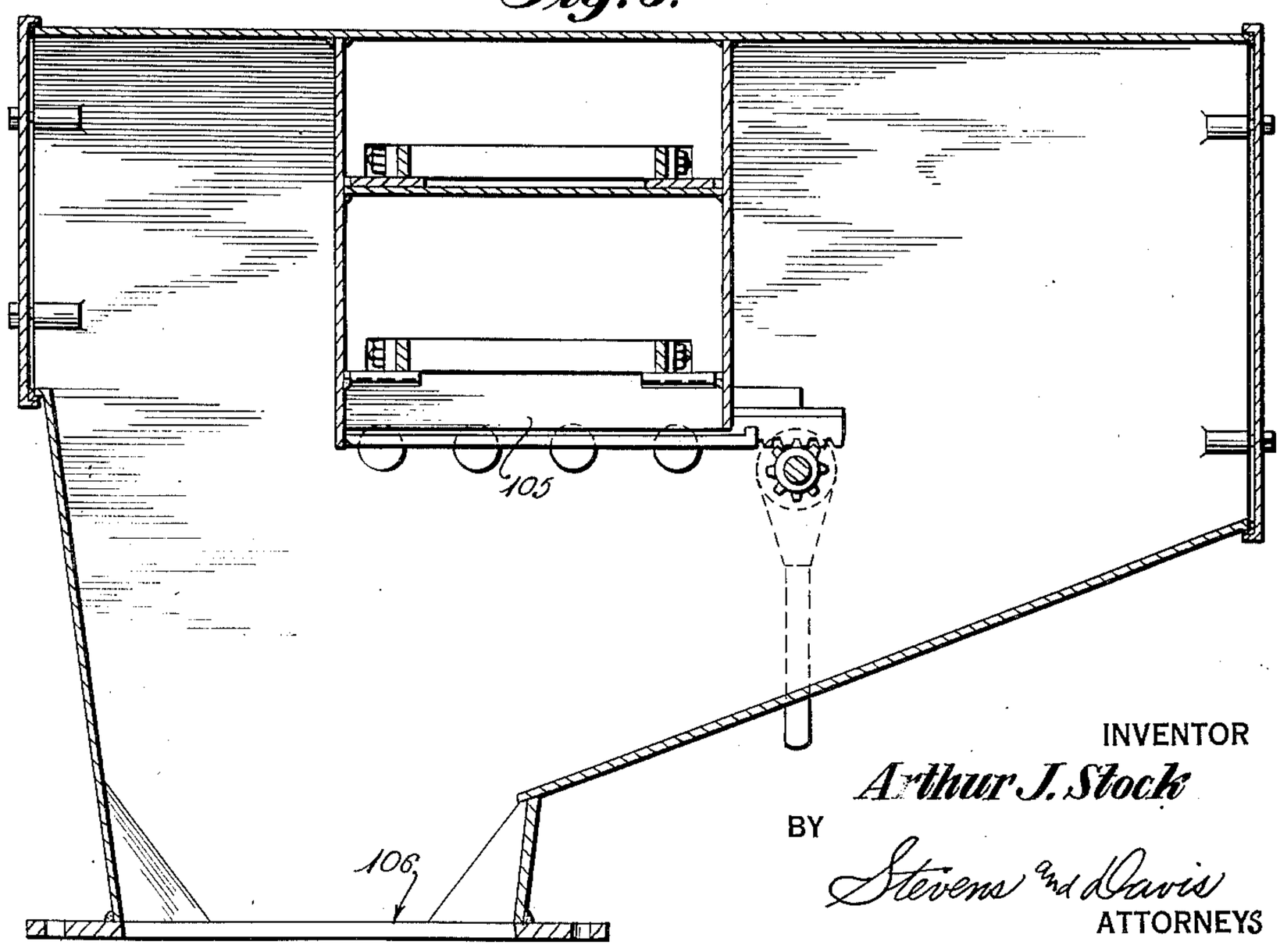



Fig. 9.

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CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

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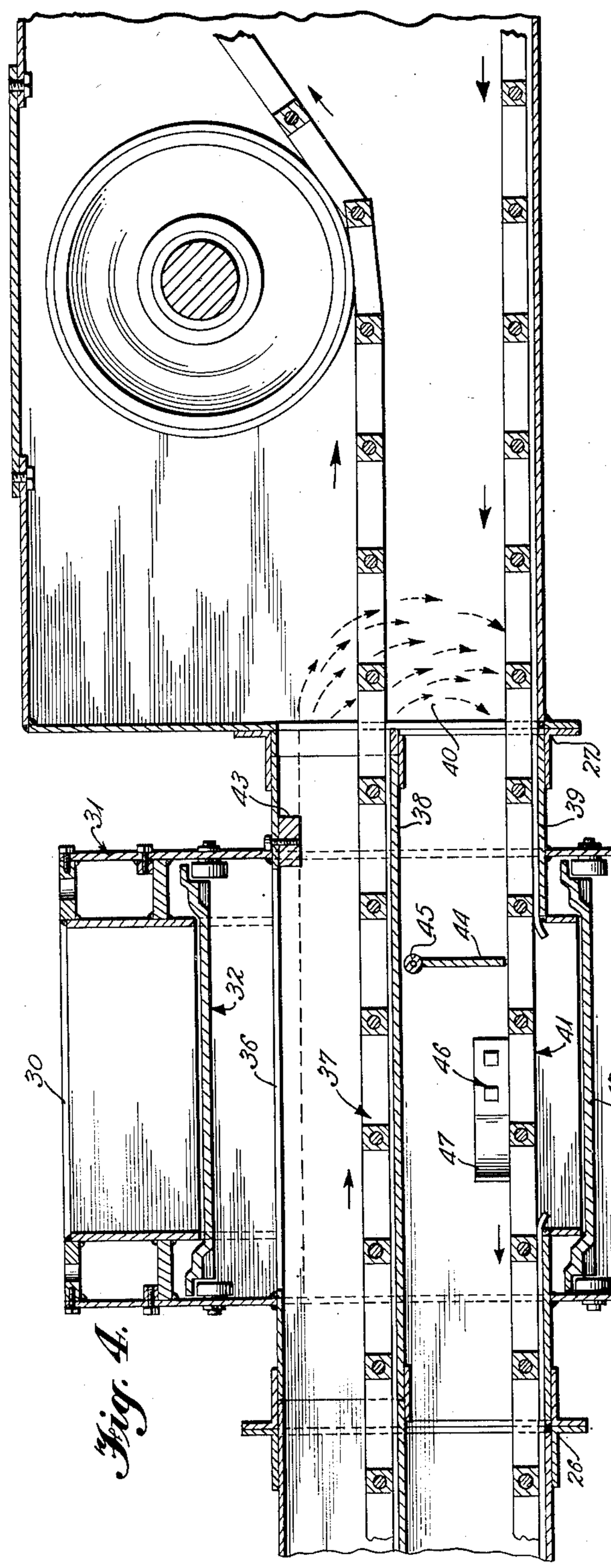


Fig. 4.

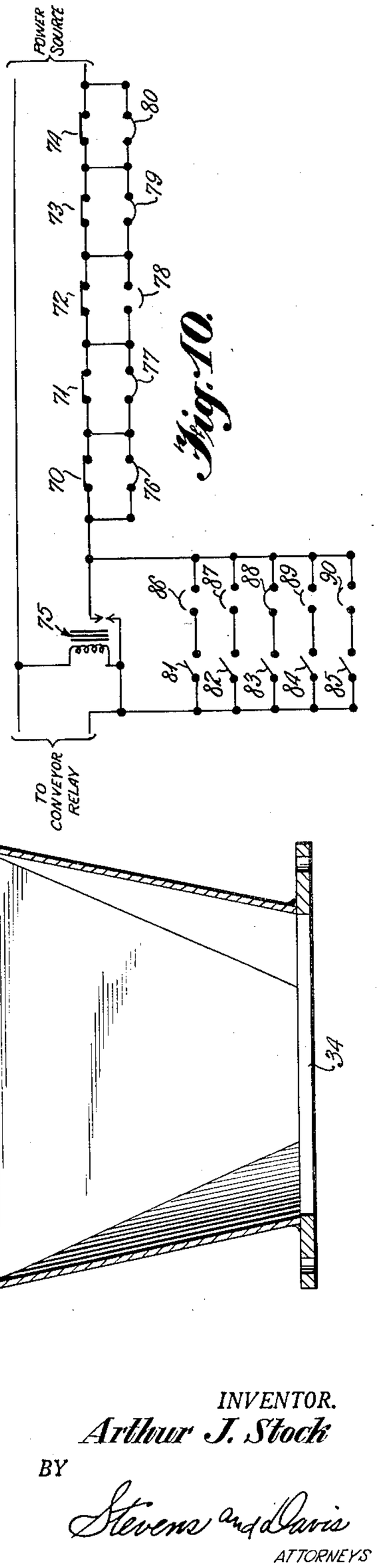


Fig. 10.

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CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

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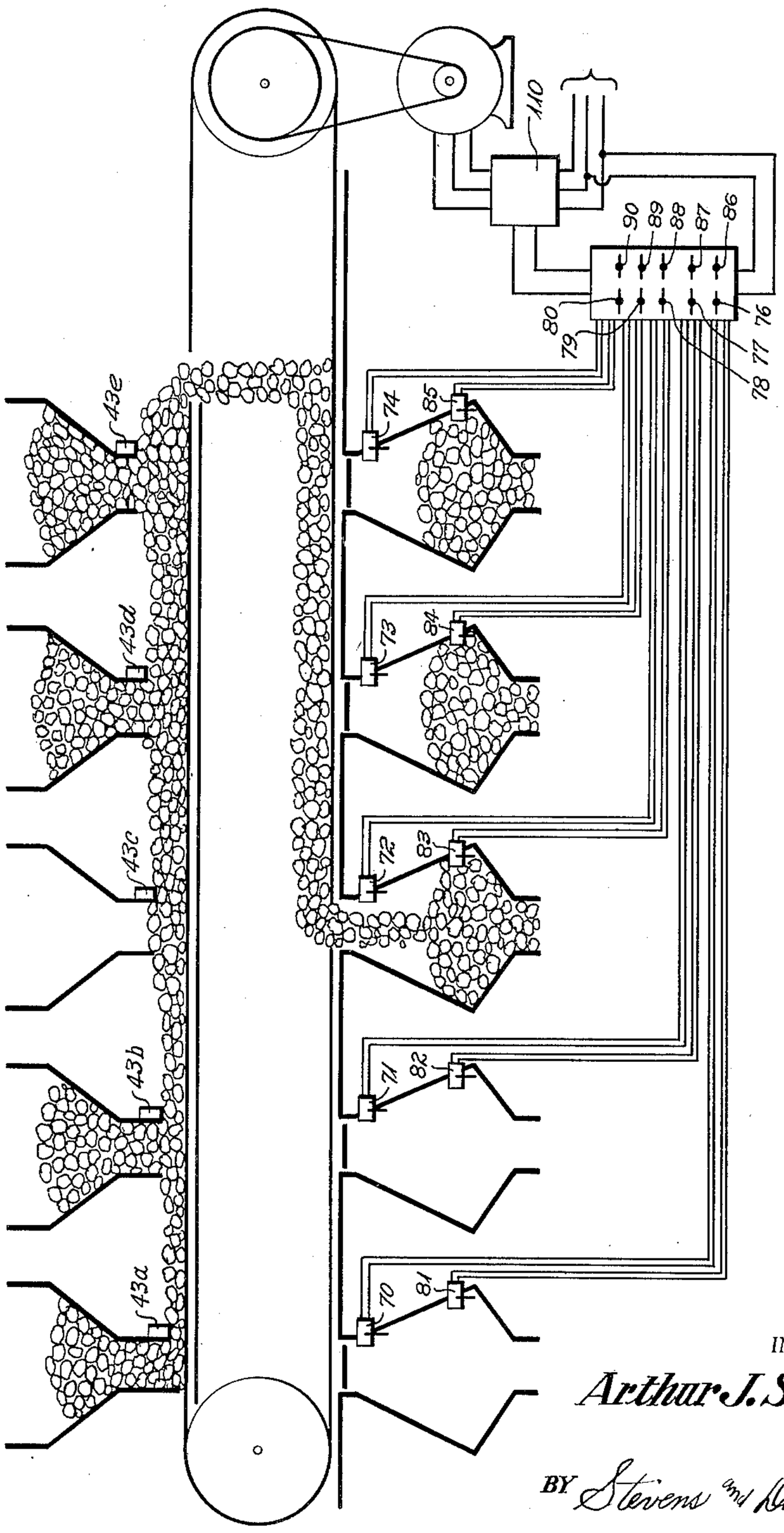
Fig. 11.

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Patented Jan. 27, 1953 2,626,719

# UNITED STATES PATENT OFFICE

2,626,719

## CONVEYER DISTRIBUTION SYSTEM FOR AGGREGATE MATERIALS

Arthur J. Stock, Rocky River, Ohio

Application January 24, 1946, Serial No. 643,039

6 Claims. (Cl. 214—17)

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This invention relates to improvements in distribution systems for aggregate materials. More particularly, this invention relates to improvements in the type of coal handling equipment that is used in a boiler plant to feed coal from an overhead bunker or bunkers to a stoker or pulverizer, or series of stokers or pulverizers, for one or more boilers. The principles of this invention, however, may be applied in any situation in which similar problems are involved in the feeding of aggregate material.

In many installations of the type exemplified by a coal burning power plant, coal or some other aggregate material is stored in one or more overhead bunkers or hoppers and fed by gravity to one or more points below where it is to be utilized. In the case of a coal burning power plant, the overhead storage is usually called a bunker, or bunkers, and the points of use of the coal are usually either the boiler stokers or pulverizers.

If the bunker, or bunkers, had but a single outlet and the coal or other material was all used at a single point below, the problem would be relatively simple. For practical reasons, however, this is not usually the case. If there are a series of bunkers above, there must be an outlet for each bunker, and even if there is only a single bunker, it usually must have a plurality of outlets to make the entire bunker capacity effective. Thus, in most installations, it is necessary to take the coal or other aggregate material, not from a single opening but from several openings. It is preferable also to be able to take the coal selectively from any desired opening or openings so that a relatively even flow of coal through all parts of the bunker may be maintained, the effective capacity of all parts of the bunker thereby utilized, and the stagnation of coal in any particular part of the bunker prevented. As is well known, the stagnation of coal in any one part of the bunker makes that part of the bunker a potential source of spontaneous combustion.

As to the point or points where the coal or other material is to be used there is often more than one, because there is often more than one boiler or other material consuming unit in the construction. It may be that one or more of these points of use is in alignment with one or more of the outlets from the bunker or bunkers and it may be that others are not. The demand for material at these points of use may vary widely and may change widely with relation to each other during the operation of the system. For example, two boilers may be installed side-by-side and one may require twice as much coal as the other

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under normal operating conditions. One of these boilers may be shut down for one reason or another, in which case it requires no coal and the other boiler continues to require coal.

It is the purpose of this invention to provide means for efficiently and expeditiously withdrawing coal or other aggregate material from one or more bunker outlets and delivering it to one or more points of use, which may or may not be aligned with the bunker outlets, in such a manner as to provide an adequate supply of coal or other material at any point or points of use from any bunker or outlets. Thus the supply of coal at any point of use need never fail as long as there is any coal available at any outlet from the bunker or bunkers, and coal from any bunker outlet may be used whenever it is desired.

In addition, the present invention provides an automatic control arrangement to govern the feeding of materials to the points of use in such a manner that material will be delivered at each point of use in accordance with the requirements of that point of use. Thus, when the supply drops below a predetermined minimum, additional material will be delivered and when the supply reaches a predetermined maximum the supply to that point of use will cease.

It is a further purpose of this invention to provide a distribution system of the type described that is compact enough to be installed in already existent power plants without necessitating major modifications such as the raising of the bunkers and the roof, and that can be installed in new power plants without adding height and hence cost to the installation as a whole.

It is also an object of this invention to provide a unitary construction that is efficient and at least substantially dust-tight and that is completely reliable, so that the cleanliness, reliability and efficiency of the plant in which it is installed will be correspondingly enhanced.

For an understanding of the details of this invention, reference may be had to the appended drawings and the following detailed description of the construction shown therein.

In the drawings:

Figure 1 is a front elevational view of a portion of a distribution system constructed in accordance with the principles of this invention. This view shows two bunker outlets and connections to two stokers;

Figure 2 is a sectional end view taken on line 2—2 of Figure 1;

Figure 3 is a partial sectional view taken along line 3—3 of Figure 1;

Figure 4 is a sectional view taken along line 4—4 of Figure 3;

Figure 5 is a sectional view of a part of the structure shown in Figure 3 incorporating a modification for the purpose of controlling the supply of coal;

Figure 6 is a sectional view taken on line 6—6 of Figure 5;

Figure 7 is a sectional view of a coal weighing device which may be used with the distribution system of this invention. This view illustrates the incorporation of a second control device for controlling the operation of the distribution system;

Figure 8 is a sectional view of a portion of a distribution system in which a bunker outlet is connected to the system without there being a discharge point directly below it;

Figure 9 is a sectional view of a portion of a distribution system in which an outlet is provided at a point which is not in alignment with a bunker opening; and

Figure 10 is a schematic circuit diagram illustrating the manner in which the operation of the distribution system may be automatically controlled.

Figure 11 is a diagrammatic illustration of a distribution system in accordance with this invention, showing particularly the arrangement of the scraper or leveling bars and the level controlling switches.

In Figures 1 and 2 there is shown a part of a boiler plant including two bunker outlets 20 and 21 and two stoker feed chutes 22 and 23, one positioned beneath each of the bunker outlets. Between the bunker outlets and the stoker feed chute is positioned a portion of a distribution system constructed in accordance with the principles of this invention. In order that the quantity of coal being consumed at each stoker feed chute may be measured, a pair of automatic coal scales 24 and 25 are shown as included in the distribution system, one immediately above each of the stoker feed chutes.

Before a detailed description of the distribution system illustrated in Figures 1 and 2 is begun, it should be pointed out that while the embodiment of this invention illustrated in Figures 1 and 2 will be found satisfactory in many instances, it is subject to relatively major modifications still within the scope of this invention, when such modifications are required to fit the system to a plant of different design.

For example, it will often happen that the bunker opening or openings are not in alignment with the points at which the aggregate material is to be used, or that some of the bunker openings are in vertical alignment with the points at which the aggregate material is to be used and other bunker openings are not. In such cases, some or all of the bunker openings may lead to the distribution system at points that are not aligned with the points of discharge from the distribution system. Such an arrangement is illustrated in Figures 8 and 9.

Further modification in the distribution system may be made by eliminating the automatic coal scale and feeding directly to the point of use, and, of course, the outlets from the distribution system do not necessarily have to lead to feed chutes for coal stokers but may instead lead to pulverizers or any other equipment that requires a supply of the aggregate material being distributed.

As illustrated generally in Figures 1 and 2, the distribution system proper is a substantially dust-tight construction joining all of the bunker outlets



with all of the automatic coal scale inlets included in the system. This housing encloses a lateral conveyor that carries the coal or other aggregate material being distributed in a lateral direction from any bunker outlet to a position above any coal scale inlet or inlets to which the material is to be fed. It also includes valves for controlling the flow of material being distributed from the bunker outlets onto the conveyor and from the conveyor to the coal scale inlets. In addition, this housing encloses a valve and bypass chute for controlling the flow of material being distributed around the conveyor and directly to a coal scale inlet at each place where there is a coal scale inlet in substantial alignment with a bunker outlet.

In order to provide for expansion and contraction and allow for greater freedom in manufacturing tolerances and still maintain a substantially dust-tight construction, the housing of the distribution system proper is formed in sections with sliding dust-tight connections 26 and 27 on the opposite sides of each group of valves, that is on each side of each inlet or outlet to the distribution system. A sliding dust-tight connection 28 is also provided at the inlet to each automatic coal scale. This gives the whole installation sufficient flexibility so that it will not be strained by the contraction or expansion of the structure of the plant in which it is installed or by the contraction or expansion of the parts of the housing itself.

Details of the internal construction of the distribution system proper are illustrated in Figures 3 and 4. The coal or other aggregate material enters the distribution system from the bunker outlet through an opening 30 in the housing, which housing is generally designated as 31. From this opening it passes downward under the control of valves 32 and 33. One of these valves, 32, controls the entrance of coal to the conveyor section of the housing and the other valve, 33, controls the flow of coal directly through the housing and out of the bottom of the housing at the opening 34, which leads to a point of use for the coal, either directly or through a coal scale. The coal valves used for this purpose are described in United States Patent No. 1,547,284, granted to Arthur J. Stock on July 28, 1925, and hence will not be further described here.

Upon entering the conveyor section of the housing 31, the coal passes downwardly between a pair of baffle plates 35 and 36, one mounted on each side of the conveyor section of the housing and arranged to direct the coal onto the center of a bar-flight or drag type of conveyor 37, which conveyor extends laterally across the entire installation. The baffle plates 35 and 36 may be included in or omitted from the structure, depending upon whether or not they are required for the particular type of conveyor being used.

As usual, a floor member 38 is provided under the upper span of the conveyor and a floor member 39 under the lower span. The aggregate material is thus carried laterally until it reaches the end of the floor member under the upper span of the conveyor at a point designated as 40, at which point it drops down onto the lower span of the conveyor and is carried in the opposite direction laterally through the system until it reaches a point where it can fall through an opening in the floor 39. Sometimes, when there are no points of use under a section at one end of the conveyor, but only points of supply, it is desirable to provide an opening or openings in the floor member 38 under the upper span of the conveyor

at some point other than at the end thereof. This arrangement will short circuit the coal flow in that section and save operating power and wear.

An opening **41** is provided in the lower floor of the conveyor above each point where it is, or may be, desired to supply coal, and flow through each of these openings is controlled by a coal valve **42** similar to those already described. Coal which is permitted to pass the valve **42** drops downwardly and out of the opening **34** as does coal which is bypassed by the bypass valve **33**.

By extending the floor member **38**, under the upper span of the conveyor, to a point which is beyond the last possible point to which coal is to be fed, all coal entering the conveyor section will be carried to this point and then returned by the lower span of the conveyor across all of the outlet openings, unless, of course, it is discharged at some opening along the way. This makes it possible to feed any point of use from any bunker outlet.

In order to regulate the amount of coal carried by the conveyor, a leveling bar **43** is provided adjacent each point where coal is supplied to the conveyor. This bar is so positioned that it acts to scrape off any excess coal supplied to the conveyor and retain it at the point of supply.

By making the leveling bars progressively higher from one point of supply to the next, as they progress in the direction of travel of the conveyor, it is possible to prevent coal supplied at one point from being scraped off at the next or some subsequent point of supply and tending to accumulate at one or more of those points. The increase in height of the leveling bars does not have to be great, usually an increase in height of from one-sixteenth to one-fourth inch from one supply point to the next being found sufficient. This is illustrated by the positioning of the leveling bars **43***a*, *b*, *c*, *d*, and *e* in Figure 11.

In order to expedite the discharge of the coal at the discharge openings from the conveyor it has often been found desirable to install a free-swinging plate **44** pivotally connected at its upper edge **45** to the conveyor portion of the housing, and so positioned that its lower edge will normally ride along the top surface of the lower span of the conveyor and brush excess coal from the conveyor chain if the valve below it is open. If the valve below it is not open the swinging plate merely rides the top of the coal being carried by the conveyor and has no function.

It has also often been found desirable at the points of discharge to mount small extending plates **46** on the sides of the housing and bend the ends **47** of these plates out over the edge of the conveyor so that they will scrape the coal off of the edges of the conveyor and into the openings between the bars of the conveyor so that this coal will also discharge into the chute.

A "bar-flight" or "drag" type of conveyor has been described. It is to be understood, however, that numerous other types of conveyors are available and can be used in place of a conveyor of the bar-flight type. For example, one other type of conveyor that may be used comprises a series of bucket elements mounted on a driving chain which travels in a horizontal plane so that the return span of the conveyor is alongside rather than under the first span. Still other types are available.

Although it is theoretically possible to operate the conveyor of this invention continuously and to remove any unused coal from the lower span of the conveyor and either return it to the top



span of the conveyor or to the bunkers, such operation has not been found satisfactory in practice. It involves excessive power waste, tends to clog up and jam the conveyor and produces excessive wear on the system in general.

By hand operation, the conveyor can be started and stopped as it is needed, but it has been found more expedient to provide automatic means for stopping and starting the conveyor as required, and a part of this invention consists of the provision of such automatic means.

For the purpose of stopping the conveyor when a sufficient quantity of coal has been supplied to a point from which it will pass to the automatic scale or point of use by gravity, there is shown in Figures 5 and 6 a new type of paddle-switch so arranged as to be operated when the coal or other aggregate material reaches a predetermined level in the lower part of the distribution system housing immediately above one of the points of discharge to the automatic scale or other point of use. This paddle-switch comprises a paddle-blade **50** rigidly mounted on a rod **51** which extends through and is journaled in the walls of the housing. An electrical switch **52** which will be operated by the rotation of the rod may be mounted on the outer end of the rod **51** outside the housing.

A small mercury switch is a good example of the type of switch which may be used for this purpose. Alternatively, of course, any other type of switch may be mounted on the outside of the housing and operated by the rotation of the rod **51**.

By properly positioning the paddle **50** and its attendant parts, the switch can be caused to operate when the coal or other aggregate material in the housing has reached a predetermined level. However, difficulty is encountered in the use of such a switch because particles of coal or other aggregate material tend to bounce around the blade, wedge behind it and prevent its proper operation. To avoid this, it has been found highly advantageous to mount on the housing and between the blade and place where the coal enters the lower part of the housing, a baffle plate **53**. By so shaping this baffle plate that it extends downwardly along the edges of the paddle member **50** and is open for a considerable distance upwardly near its center, the baffle member tends to prevent coal or other aggregate material from passing around the paddle member **50** and wedging in back of it. Thus, with the baffle member **53** in place, the paddle switch has been found to operate with great regularity while without the baffle member the action of the paddle switch is undependable.

At points in the installation where bypassed coal is likely to strike the back of the paddle member **50** it has also been found desirable to insert a second baffle member **54**, also mounted on the housing, and in such a position as to protect a paddle member **50** from coal which is falling into the bottom of the housing through the bypass valve.

By properly connecting the paddle switch just described into the operating circuit for the motor that drives the conveyor, the conveyor may be stopped when the supply of coal in the housing at the particular point where the paddle switch is located has reached a predetermined maximum.

If the conveyor is supplying coal to several points along the distribution housing it will be found desirable to have the conveyor continue to operate until the predetermined amount of coal

is supplied to the last point of supply along the line of conveyor travel for by that time a sufficient quantity of coal will have been delivered at all other points. Hence, it will be desirable to have the stopping of the conveyor motor controlled by the paddle switch at that point. By proper switching arrangements the stopping of the conveyor motor can be controlled by the paddle switch at any one of the several points of supply so that if some of the possible points of supply are shut down and do not require a supply, the stopping of the conveyor can still be controlled from the last point which does require a supply. The supply to intermediate points can always be controlled by the operation of the valve 42 under the conveyor at the point where control is necessary.

Although the stopping of the conveyor can be controlled by the paddle switch already described, it is generally unsatisfactory also to control the starting of the conveyor by the same paddle switch, for if material is being used at the controlling point the level will quickly fall to a place where the paddle switch will operate in the reverse direction and the conveyor would be started and stopped at such short intervals as to subject it to a great amount of unnecessary wear and excess power consumption would also result. Consequently, it is usually desirable to start the conveyor by the use of another switch, or set of switches, which operates when the supply of coal at the point of supply falls below a predetermined minimum. Such a switch can be of the same type as the paddle switch already described but placed lower in the housing at the point of supply. It has been found desirable, however, when an automatic coal scale is used with the distribution system of this invention to place the starting switch for the conveyor in the automatic coal scale as illustrated in Figure 7.

The coal scale illustrated in Figure 7 is of the type described in United States Patent No. 2,372,-746, granted to Arthur J. Stock, and hence will not be described here in detail. Incoming coal enters through an opening 60 and is carried to the right as shown in the drawings by a conveyor 61 and dropped into a weighing bucket 62, from the bottom of which it passes out of the scale.

In accordance with this invention this scale may be modified by including therein a swing switch 63 for controlling the starting of the conveyor of the distribution system. As illustrated this swing switch 63 comprises a small housing 64 mounted on the top of the coal scale. A paddle member 65 is mounted in and fixed to a rod 66 which extends through the sides of the housing 64. The paddle member 65 extends downwardly to a point just above the conveyor 61 of the coal scale. When the conveyor 61 is conveying a normal amount of coal, the paddle member 65 will be rotated to the right by the coal being carried by the conveyor. However, if the supply of coal to the scale is inadequate and an insufficient amount of coal is being carried by the conveyor, the paddle member 65 will tend to resume its vertical position.

The movement of the paddle member 65 controls the rotation of the rod 66 which extends through the sides of the housing 64 and operates an electrical switch, either of the mercury-tilt type or of some other kind. By properly connecting this switch and the stopping switch already described into the operating circuit of a conveyor, the conveyor may be caused to start whenever there is an inadequate supply of coal at the coal scale and stop whenever there is an adequate head of coal in the distribution system above the coal scale. This gives the system a relatively long cycle of starting and stopping, lessens the wear on the system and the power consumption of the system and at the same time provides an adequate, reliable supply of coal.

As illustrated in Figures 10, and 11, the stopping switches 70, 71, 72, 73 and 74 of a series of supply points may be connected in series with a power source and also in series with the contacts of a relay 75, and the conveyor motor starter 110. Shorting switches 76, 77, 78, 79 and 80 may then be connected respectively across the contacts of the stopping switches 70, 71, 72, 73 and 74 so that these switches may be selectively shorted out of operation. Ordinarily, all but one of these switches will be shorted out of operation since, as pointed out above, it is desirable to stop the feed of material when the level reaches a predetermind maximum at one particular point of discharge. Accordingly, the shorting switches 76–80, inclusive, may be constructed as a single switch so arranged as to short out all except one selected switch in the series of stopping switches. As illustrated, all of the stopping switches except switch 72 are shorted out.

The relay 75 has its operating circuit connected across the input circuit to the conveyor motor starter 110 so that once the circuit is energized the relay 75 will be energized and its contacts will close and the conveyor will continue to operate until the circuit is broken by the opening of one of the stopping switches 70–74, inclusive. As shown in the drawing, this will be switch 72. Once the stopping switch is opened, however, current will be cut off from the relay 75 and its contact will also open so that the conveyor cannot thereafter be started merely by the closing of the stopping switch that opens it.

As the level of the material falls, the stopping switch will close but the conveyor will not again be started until the appropriate starting switch operates. A series of starting switches 81, 82, 83, 84 and 85 have been shown, corresponding respectively to the series of stopping switches illustrated. These switches are connected in parallel across the contacts of the relay 75 through a series of controlling switches 86, 87, 88, 89 and 90. When these switches are open the corresponding starting switch is inoperative. Accordingly, only one of these controlling switches is closed thus making only one of the starting switches operative. As shown, the controlling switch 88 is closed and thus the starting of the conveyor depends upon the operation of starting switch 83. If we assume that the level of coal in the portion of the system corresponding to stopping switch 72 and starting switch 83 has fallen to a point where starting switch 83 is closed, the coal will of course also have fallen to a place where the stopping switch 72 is closed and thus the circuit will be completed through these switches to start the conveyor and energize the relay 75 thus shorting out the starting switch 83 so that when coal starts to flow and the switch 83 opens the conveyor will continue to operate until the stopping switch 72 opens.

An alarm system may be operated from the starting switches if so desired in order to give an alarm if an adequate supply is not main-

tained, or a separate system of alarm switches may be incorporated. It has usually been found desirable to incorporate alarm switches at the outlets of the coal scales, or the outlets of the distribution system if no coal scales are employed.

Figures 8 and 9 are included to illustrate the construction utilized where there is a bunker outlet with no point of use in alignment below it and also to illustrate the construction utilized where there is a point of use with no bunker outlet in alignment above it.

As illustrated in Figure 8, a flow of material from a bunker outlet is controlled by a coal valve 100 and under the control of this valve permitted to pass downwardly into the conveyor housing 101 and onto the top flight of the conveyor. A leveling bar 102 is used, as in the construction shown in Figures 3 and 4. The construction is substantially like the construction of Figures 3 and 4 except that the bypass valve, bypass chute and outlet are omitted.

In Figure 9 there is shown a construction in which there is no bunker outlet above the discharge point for the system. In this construction there is no inlet to the system, but there is a conveyor outlet 105 and an outlet 106 which permits coal or other material to float downwardly to a coal scale or some point of use.

Removable plates are provided throughout the system at appropriate places to give access to the working parts of the system and permit inspection and the removal of any material that may accumulate and tend to clog the system.

Many types of conveyor may be used in accordance with the principles of this invention, but it has been discovered that there is a definite advantage to using a type of conveyor that may be described as a "full-width" conveyor. Such a conveyor is one in which the coal or other aggregate material is loaded on the conveyor across the full-width of the conveyor, and is carried across the full width of the conveyor, to the point or points of discharge. The "bar-flight" or "drag" type of conveyor which has been illustrated in the drawings of this application is an example of such a conveyor. A belt or link-belt type of conveyor is also a "full-width" conveyor. Many conveyors, however, are not "full-width" conveyors. Such conveyors are those which consist of a series of buckets carried around an oval path in a horizontal plane by driving chain positioned in the same plane, usually inside of the oval formed by the buckets. Similar arrangements have been proposed in which the driving chain forms a horizontal oval and the aggregate material is moved by fingers extending laterally therefrom. With aggregate material, such arrangements not only take up an excessive amount of space, but are apt to fail because of the jamming of aggregate material at the horizontal turns in the conveyor. Accordingly, a "full-width" type of conveyor is definitely preferred, in accordance with the present invention.

What is claimed is:

1. A system for supplying aggregate material from an overhead bunker system to a plurality of hoppers at a lower level that comprises a plurality of aligned bunker outlets, a conveyor having an upper and lower span in vertical alignment with said bunker outlets, a scraper bar located adjacent each outlet for limiting the amount of material carried from the outlet by said conveyor, successive scraper bars being positioned progressively higher from the surface of the conveyor in the direction of flow to prevent jamming of the material between the scraper bars and the conveyor, means to pass material from the upper span to the lower span after it has passed beyond the last bunker outlet, a plurality of aligned hopper openings lying beneath said lower span, means to pass material from said lower span into each hopper opening, a motor to drive said conveyor, switch means arranged to operate selectively when the material in each hopper falls below a predetermined minimum or rises above a predetermined maximum, and controlling means for said motor connected to said switch means for operation responsive thereto to supply material in accordance with the needs of the system.

2. A system as defined in claim 1 wherein said means to pass material from said lower span into each hopper opening includes a material valve aligned with each said hopper opening to control the flow of material therethrough into the hopper thereunder.

3. A system as defined in claim 1 which further includes a material valve over the conveyor at each bunker outlet to control the flow of material onto the conveyor.

4. An apparatus for supplying aggregate material from an overhead bunker system to a plurality of hoppers at a lower level that comprises a plurality of bunker outlets for said aggregate material aligned along the bottom of said overhead bunker system, a continuous bar-flight-type conveyor aligned under said bunker outlets and having the lower span of the conveyor lying directly beneath the upper, a floor plate under the upper span of said conveyor to prevent the aggregate material from passing downwardly therethrough, said floor plate extending lengthwise beyond the ends of the line of bunker outlets but not completely to the end of the conveyor, so that aggregate material conveyed by the upper span of the conveyor will fall therethrough onto the lower span of the conveyor after passing beyond the last bunker outlet, a second floor plate under said lower span of said conveyor, said second floor plate extending longitudinally beyond said first floor plate so as to prevent material that is dropped from said upper span of the conveyor at the end of said first plate from dropping through said lower span of the conveyor, said second floor plate having a plurality of hopper openings therethrough in alignment with and above a plurality of hoppers, an aggregate material valve aligned with each of said hopper openings to control the flow of aggregate material therethrough into the hopper thereunder, a power source for driving said conveyor, a switch for each of said hoppers arranged to be operated when the aggregate material therein falls below a predetermined minimum, a second switch for each of said hoppers arranged to be operated when the aggregate material in said hopper rises above a predetermined maximum, a control device connected to all of said switches and arranged to start and stop said conveyor in accordance with the positions of said switches so as to supply aggregate material in accordance with the needs of the system, and a series of supplemental hand operated switches for selectively nullifying the effect of the various level operated switches upon the control device, whereby the control device can be used to operate independently of the level of aggregate material in selected of the hoppers.

5. An apparatus as defined in claim 4 which

further includes an aggregate material chute also aligned under at least one of said bunker outlets and connected at its lower end to one of said hoppers, and an aggregate material valve in said chute for controlling the flow of aggregate material therethrough.

6. An apparatus as defined in claim 5 which further includes an aggregate material valve over the conveyor at each bunker outlet to control the flow of aggregate material onto the conveyor.

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