Aug. 2, 1938. G. P. COUGHLIN 2,125,547

SELF DUMPING ELEVATOR

Filed March 26, 1937 4 Sheets-Sheet 1

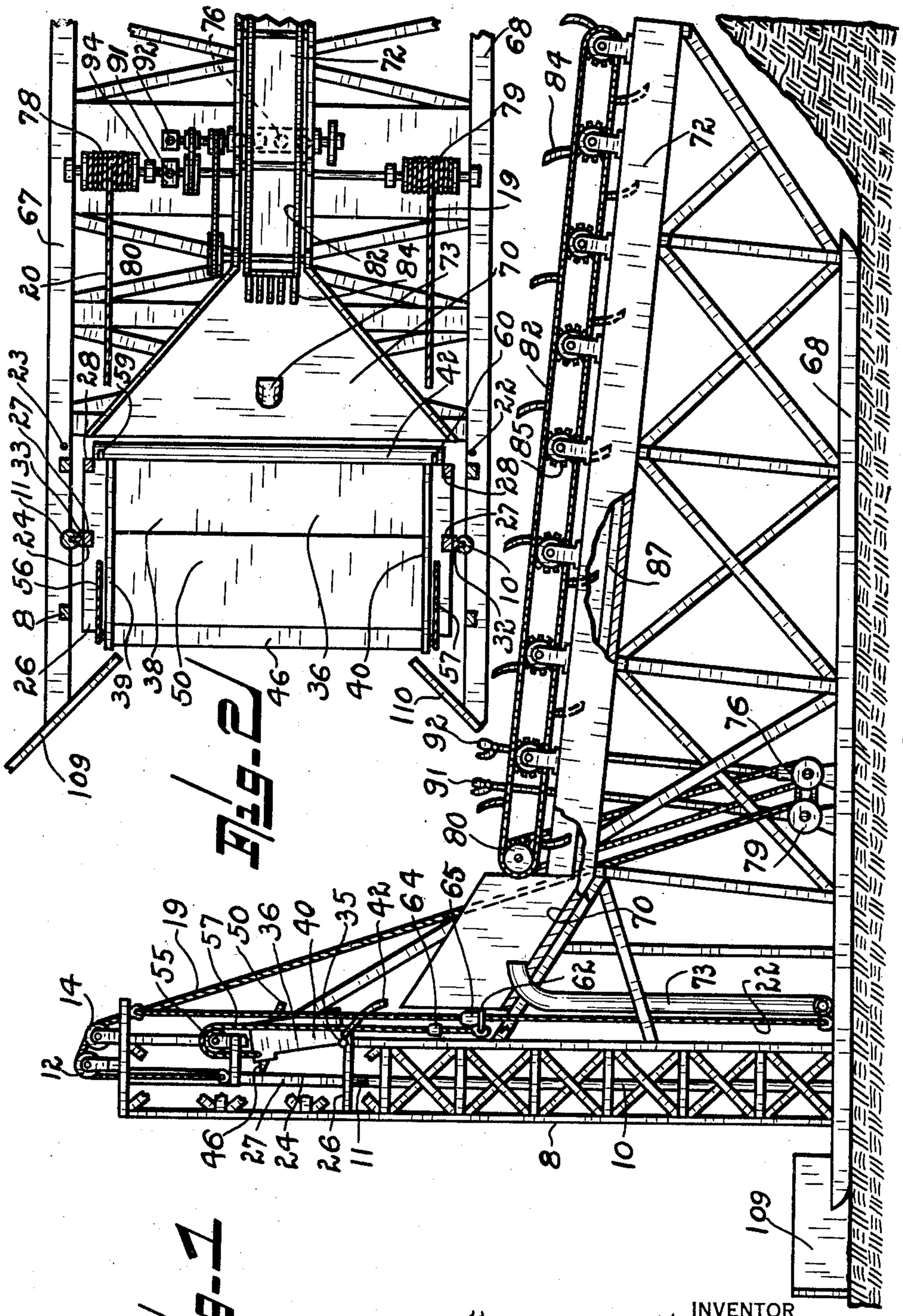


Fig. 2

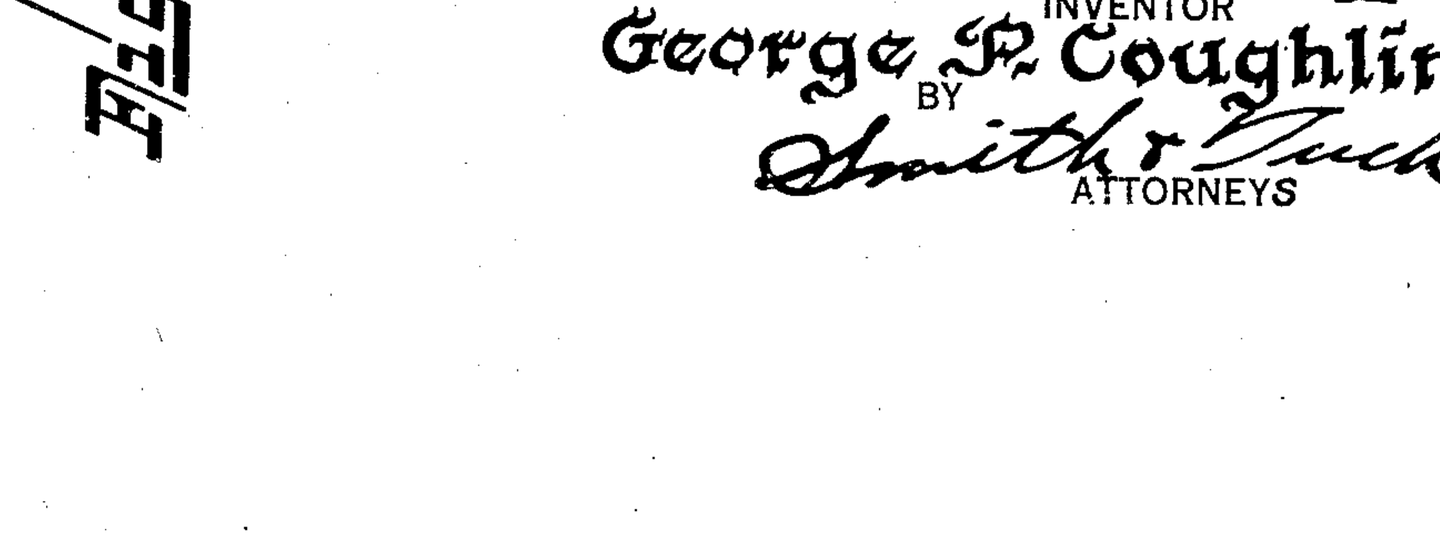


Fig. 1

INVENTOR
George P. Coughlin
BY
Smith & Peck
ATTORNEYS

Aug. 2, 1938. G. P. COUGHLIN 2,125,547

SELF DUMPING ELEVATOR

Filed March 26, 1937 4 Sheets-Sheet 2

Fig-3

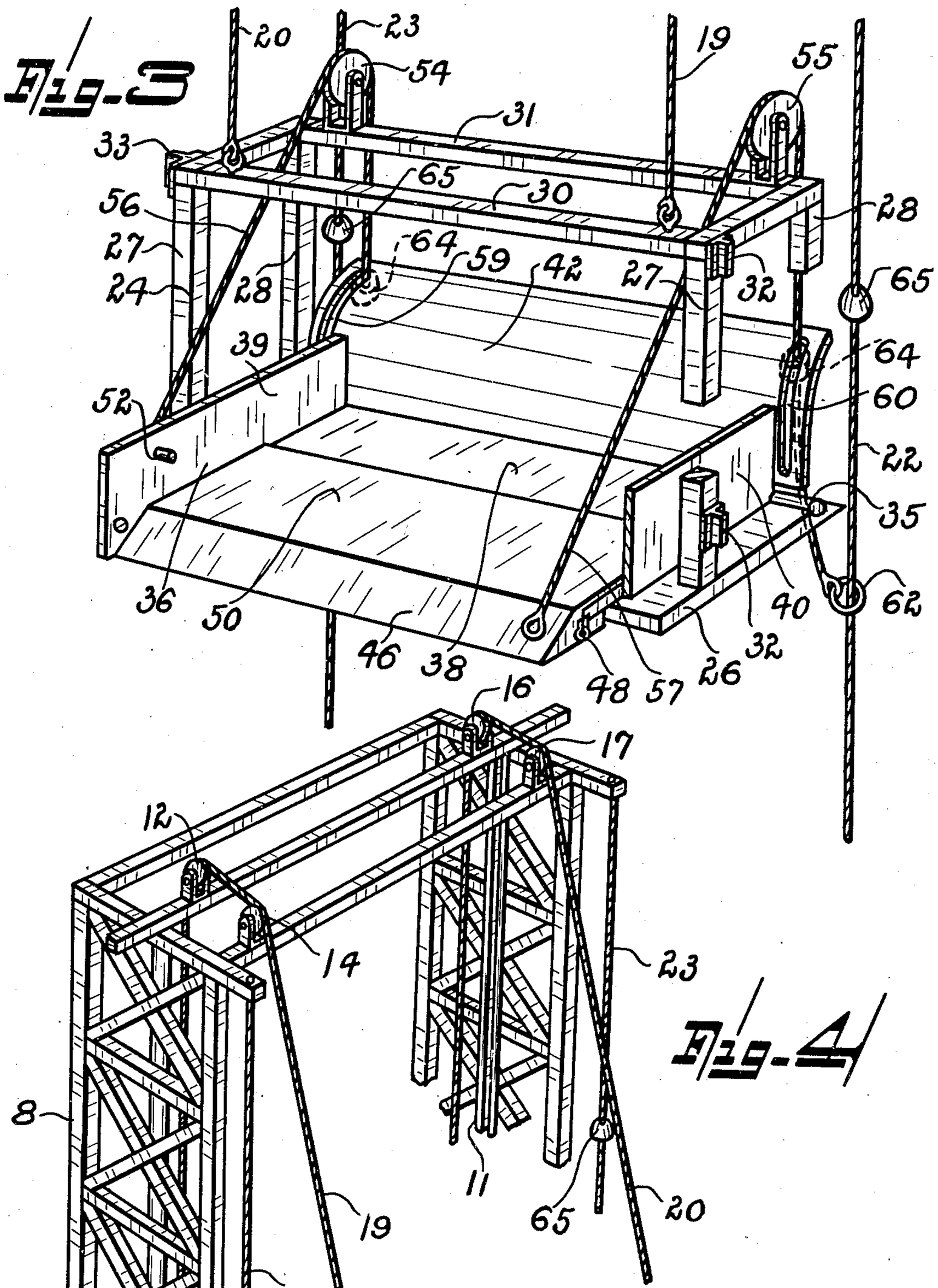


Fig-4

INVENTOR
George P. Coughlin
BY
Smith & Tuck
ATTORNEYS

Aug. 2, 1938. G. P. COUGHLIN 2,125,547

SELF DUMPING ELEVATOR

Filed March 26, 1937 4 Sheets-Sheet 3

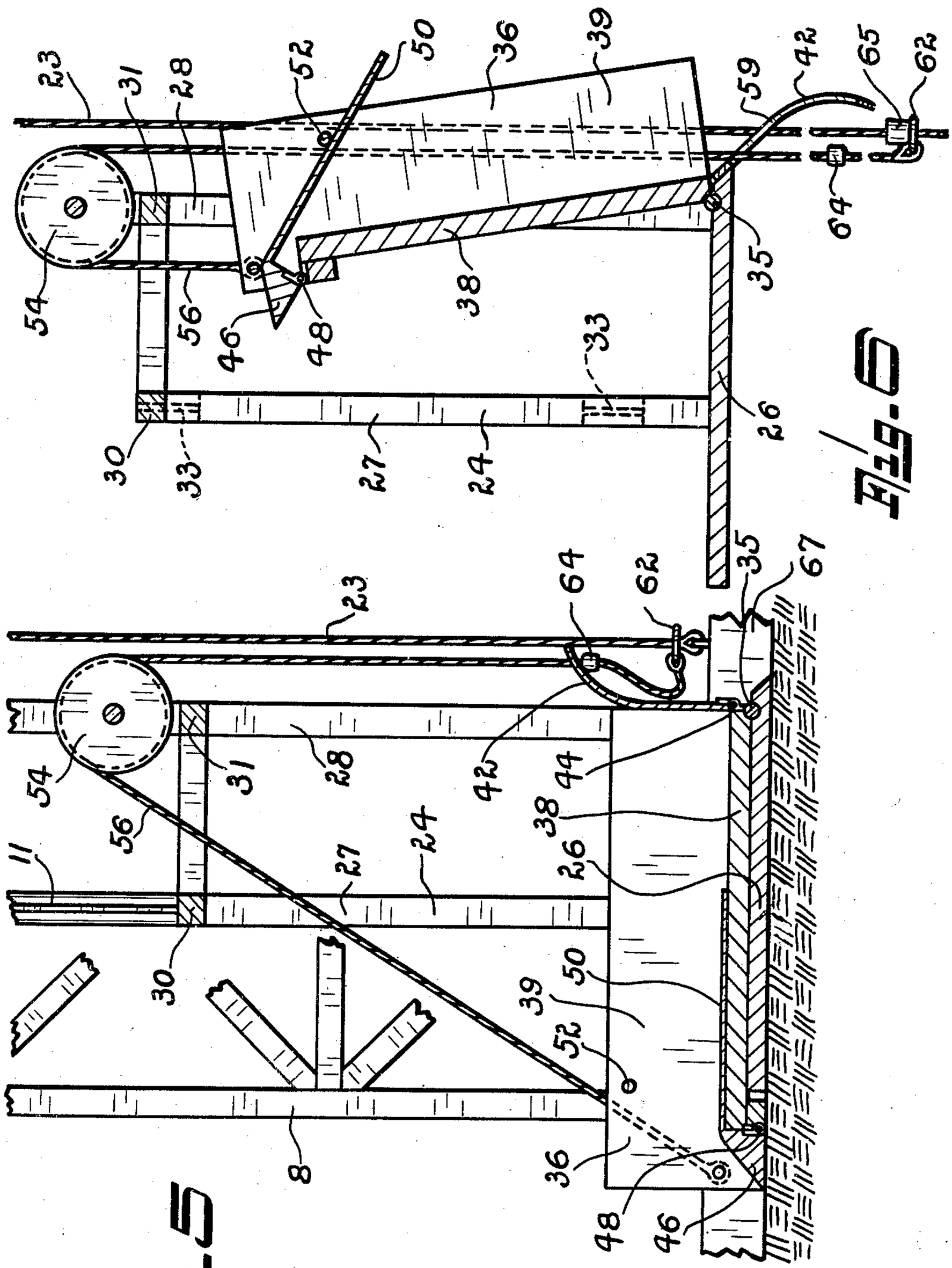


FIG. 6

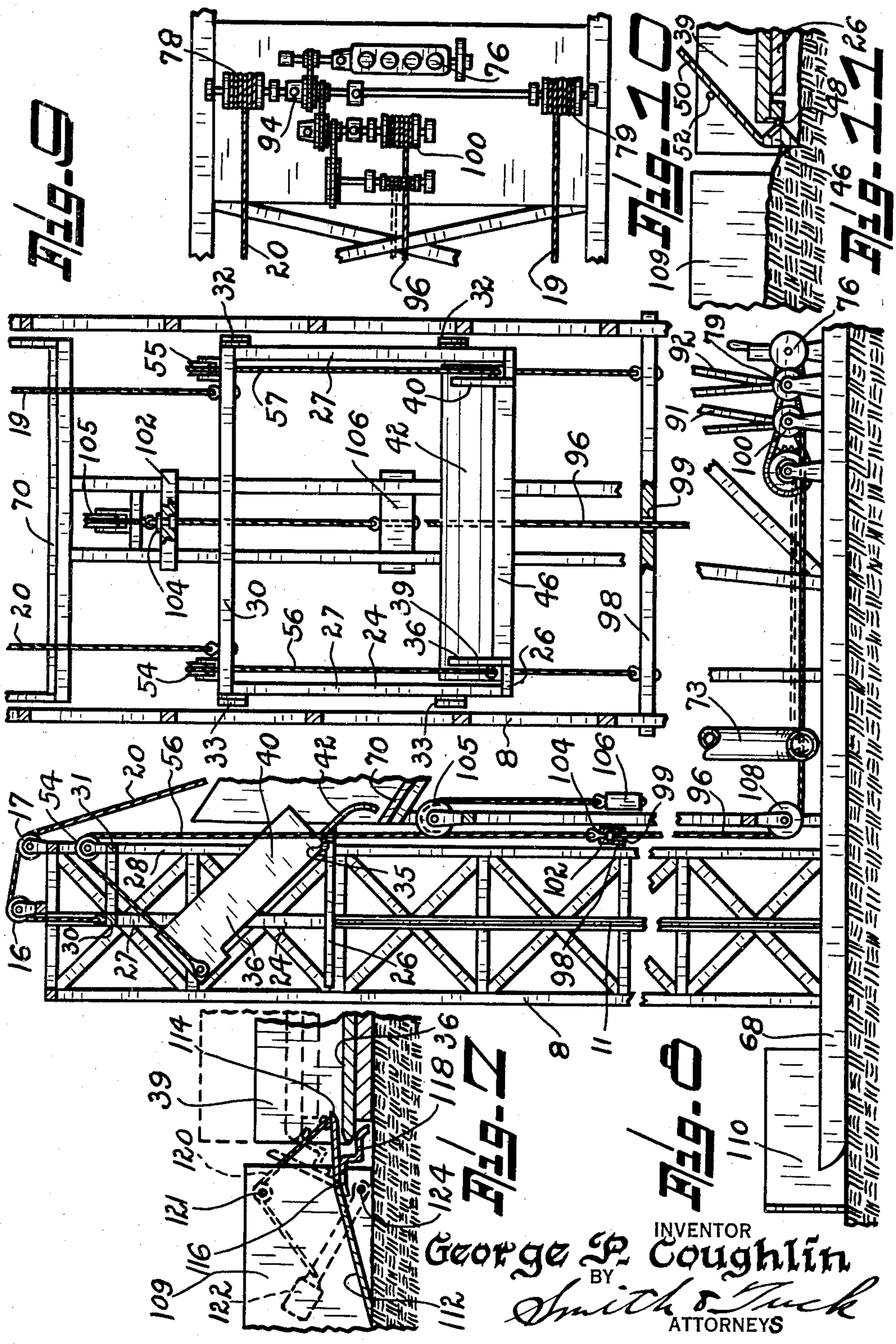
FIG. 5

INVENTOR
George P. Coughlin
BY
Smith & Tuck
ATTORNEYS

Aug. 2, 1938. G. P. COUGHLIN 2,125,547

SELF DUMPING ELEVATOR

Filed March 26, 1937 4 Sheets-Sheet 4



INVENTOR
George P. Coughlin
BY
Smith & Tuck
ATTORNEYS

Patented Aug. 2, 1938 2,125,547

UNITED STATES PATENT OFFICE

2,125,547

SELF-DUMPING ELEVATOR

George P. Coughlin, Fairbanks, Alaska

Application March 26, 1937, Serial No. 133,234

6 Claims. (Cl. 214—120)

My present invention relates to the general art of handling and hoisting equipment for bulk materials and more particularly to a self-dumping elevator.

My equipment is constructed to handle expeditiously relatively large quantities of bulk materials and, while it might be used in the handling of many different types of materials and commodities, has found particular adaptation and usefulness in the handling of sand and gravel, particularly in connection with mining operations. For clearness of explanation, therefore, I have elected to describe my equipment as it would be constructed and used in mining work.

In placer mining operations, particularly in low grade districts, it is necessary to handle large quantities of materials at a minimum cost. For this use my equipment is especially desirable in that it is easily and cheaply constructed; this of course lowers the overhead expense and, in turn, decreases the cost per yard of material handled. It makes possible the handling of large quantities of material more cheaply than the bucket, dipper, or drag line installations most generally in use at present, and the original cost of my equipment is but a fraction of these other methods.

For placer mining use I have provided in a single unit, mounted upon skids so that it may easily be moved over the necessary distances as the ground is worked, complete hoisting and recovery equipment.

The principal object of my present invention, therefore, is to provide a unitary structure which will raise, to the desired elevation, the gold bearing sand and gravels; and, to further provide in the same unit, the means for recovery of the metal which means are at a sufficient height so that the tailings can be easily disposed of.

An important object of my present invention is to provide means that are substantially automatic in their operation so that a single operator can tend the equipment and operate the same.

A further object of my invention is to provide a dumping arrangement that will assure all the materials being dumped in the desired place.

A still further object of my invention is to provide means so that, as the elevator cage is lowered to its receiving position, it will automatically scoop up the materials that may have sloughed down into the ground position of the cage, to the end that this material will not cause the receiving edge of the bucket to be raised above the ground level.

Other and more specific objects will be apparent from the following description taken in connection with the accompanying drawings, wherein

Figure 1 is a side elevation of my complete unit with the elevator in its upper, or dumping position.

Figure 2 is a top plan view of my equipment showing the elevator end thereof.

Figure 3 is a perspective view showing, in perspective, my elevator cage and elevator bucket in the position ready to receive material.

Figure 4 is a perspective view, showing the upper portion of my elevator tower.

Figure 5 is a side elevation, partly in section, showing my elevator cage and bucket in its loading position.

Figure 6 is a side elevation, partly in section, with parts of the supporting and guiding tower removed, showing the elevator bucket in its dumping position.

Figure 7 is a side elevation, partly in section, of a modified form of loading ramp.

Figure 8 is a fragmentary side elevation showing a modified form of my dumping arrangement.

Figure 9 is a fragmentary, front elevation, showing the dumping mechanism of Figure 8 before the cage and bucket have reached the dumping position.

Figure 10 is a fragmentary view showing the drive means connecting the source of power with the various operating units.

Figure 11 is a fragmentary view showing my loading ramp and apron in the position occupied when the bucket is lowered to the ground and showing how the same serves to scoop up material that might otherwise hold the edge of the bucket up off its normal position flush with the ground.

Referring to the drawings, throughout which like reference characters indicate like parts, **8** designates the tower of my elevator. This should be constructed with adequate bracing to stand the racking strains of hoisting and of movement. It should provide sufficient support for the base guideways **10** and **11**, for the head blocks **12**, **14**, **16**, and **17**, over which the hoisting cables **19** and **20** pass, and it should also furnish support for the trip lines **22** and **23**.

Adapted to vertical movement within tower **8** is the elevator cage **24**. This consists of a floor portion **26** and the upwardly extending frame work consisting of pairs of posts **27** and **28** which are joined together at their upper extent by tie members **30** and **31**. Posts **27** are provided with two, or more, guide shoes as **32** and **33** which are

adapted to operatively engage guideways 10 and 11. Hingedly supported from the rear edge of the lower platform of the cage, as at 35, is the elevator bucket 36. This is provided with a floor portion 38, ends as 39 and 40, a back wall 42, which is hingedly secured to the bucket proper as at 44, and has at its outer edge the hinged tram, or scoop portion, 46, which is hingedly secured to the floor 38 of the bucket as at 48. Formed as part of ramp 46 is an apron member 50. This apron extends the full width of the elevator bucket and is so constructed as to be lighter in weight than the wedge-shaped portion extending outwardly from hinge 48 so that when it is not loaded with material, the wedge-shaped ramp portion will raise the apron off floor 38 after the showing of Figure 6; its upward travel is arrested by stop bar 52. Supported from tie member 31 are two sheaves 54 and 55 which, in turn, operatively support dump lines, or cables, 56 and 57. These cables are secured to end members 39 and 40, respectively, and pass through slots 59 and 60 cut in member 42 and terminate in rings 62 which encircle guide lines 22 and 23, respectively. Each cable 56 and 57 is further provided with cable clamps or stop members 64 which are of such a size that they will not pass through slots 59 and 60. Adapted to arrest the upward movement of rings 62 upon guide lines 22 and 23, are clamps, or stop members, 65.

In order to provide a complete, workable unit I provide skids 67 and 68 upon which are mounted, in addition to tower 8, the inclined dumping platform 70, the riffle flume 72, the water supply line 73, together with a prime mover as the motor 76 which is operatively connected to the hoisting drums 78 and 79, and to the drive sprocket 80 which drives the agitator chain 82 to which, in turn, are attached a plurality of agitator attachments 84. Supporting and idler sprockets as 85 are provided to accurately position the agitator members whose function is to remove the heavy rock and material from flume 72. Flume 72 may carry any desired type of gold recovery devices as the riffle 87.

Attention is invited to the showing of Figure 1 in which sluice 72 is shown to extend well out beyond the end of skid 68. This is a desirable construction, in that it permits the tailings to pile up in their normal manner without covering up, by sloughing back thereon, the ends of skids 68.

Method of operation

When my present equipment is used in the handling of gold bearing sand and gravel, it is desirable that the elevator bucket 36 be of sufficient length so that the blade of a bull-dozer can enter into the bucket. In this way the bull-dozer which has been developed as a very economical means of handling large quantities of broken or loose material, can deposit upon the floor 38 of the elevator bucket, several yards of material in a single operation. When loaded the operator who normally stands convenient to operating levers 91 and 92, actuates clutch 94 which connects the power to the hoisting drums 78 and 79. This raises the two hoisting cables 19 and 20 so that the entire elevator cage 24 is raised up to the elevator tower to the dumping position. Just before the dumping position is reached, rings 62 engage stops 65 attached to trip cables 22 and 23, and this stops the ends of cables 56 and 57 while the elevator cage continues upwardly. The elevator bucket is then caused to revolve partially about pivots 35 until it assumes the position shown in Figures 1 and 6. In this position it will be apparent that the material will slide off floor 38 and onto the delivery floor 70. Any gap that might otherwise remain between the dumping edge of the elevator bucket and the edge of platform 70 adjacent the elevator, is bridged by the back wall 42 of the elevator bucket which is no longer held in its raised position by the abutment of stop 64 against the under edge of member 42.

As the material is deposited upon the inclined table 70 it is washed downwardly by the stream of water delivered through pipe 73 and washed over the riffles 74, or such other gold collecting device as might be used, and the tailings are discharged from the lower end of sluice boxes 72.

It has been found desirable to provide agitating means for this sluice to the end that a fast, deep flow of water may be avoided. To accomplish this I provide the driven chain, 82, which is provided at frequent intervals with agitator attachments 84. These serve to break any lumps of material that might occur, and particularly do they serve to carry down the sluice, any large rocks which the limited force of water might not be able to carry away.

As soon as the material has been dumped from bucket 38, cables 19 and 20 are slacked away and the elevator cage is lowered. As it is lowered away cables 56 and 57 are also slacked so that the elevator bucket can assume its normal position, substantially as shown in Figures 3 and 5, with the apron member 42 held in the position shown in Figure 3 by virtue of the fact that stop 64 again engages the under side thereof. From this position the extreme point of wedge 46 strikes the ground first and, as the cage continues to be lowered, it straightens out to the position shown in Figure 5. In so doing it picks up any loose material that has sloughed off the pile and which would, unless removed, prevent the loading edge of the bucket from resting firmly on the ground; this might cause serious difficulty in the subsequent repeating of the loading operation. As soon as the bucket is loaded and the material is deposited on apron 50, the weight of that material keeps it in the position shown in Figures 3 and 5.

It has been found that under certain conditions the construction of the automatic dump arrangements shown in Figures 1 to 7, inclusive, is not warranted. Therefore, in Figures 8 to 10, inclusive, I have illustrated a modified form of my dumping arrangement.

In this structure it is possible to hoist the elevator cage up slightly above the level of the dumping platform and to then lock that drum as by a brake or pawl such as is usually provided on winches and then to use an auxiliary line for actually dumping the bucket. This has a further advantage in that it is possible to dump the bucket more gradually, as is often required in smaller operations. In my modified form I still use cables 19 and 20 to hoist the elevator cage, but I now arrange my hoist so that it will stop the cage just slightly above the dumping platform 70 at which point the drum is locked with cables 19 and 20 holding the entire weight of the cage, bucket, and the pay load. I use a single cable 96 to dump the bucket which is still resting in its normal position on the now stationary elevator cage. In this manner the motive power can be considerably reduced in that its greatest load is the lifting of the cage and loaded bucket, and the actual dumping of the load, because of the pivotal arrangement at 35, requires less than

one-half the effort necessary to raise the entire cage and bucket to the dumping level. This is an appreciable saving in initial installation cost over that form shown in Figure 1, although it is at a sacrifice of operating speed.

Dumping is accomplished by providing that lines **56** and **57** terminate in a cross member as **98**. This member travels up and down with the elevator cage and has, at its center, a slot as **99** through which cable **96** passes. Cable **96** as it leaves the hoisting drum or nigger head **100**, is provided with a stop, or clamp arrangement, at **102**. For this purpose I have found convenient to use a relatively large wood block which is secured against movement on the cable by suitable clamps as **104**. The cable then passes up over a head block **105** and down to a compensating weight **106**. This weight must be sufficiently large so as to return cable **96** to its normal position after it has been drawn down toward the drum **100** in the dumping operation. It must be sufficient then to counterbalance the weight of clamp, or stop block **102**, and the vertical length of cable or rope used between the head block and the lower guide block **108**.

To dump my elevator bucket with the modified arrangement, the elevator cage is raised to a point just slightly above the elevator board and the hoisting cables locked. A strain is then taken on line **96** which at this stage of the operation, is virtually in contact with cross member **98**. A continued movement of block **102** carries member **98** with it which in turn operates the dumping cables **56** and **57** so as to dump the bucket after the general showing of Figure 8. In this operation, however, while it is slower than the method previously described, it does permit of partial dumping, or at least a more gradual dumping of the load, in that the operator has full and complete control of the bucket. As soon as the dumping operation is completed, line **96** is slacked off and weight **106** will restore block **102** to its raised, or normal position. The dead weight of the empty bucket will then be sufficient to return it to its horizontal position on the elevator cable where it may be again lowered away without in any way disturbing the dumping arrangement.

To facilitate loading of the elevator bucket, I provide sheer boards **109** and **110** which greatly aid in controlling the gravel as it is pushed forward and onto the elevator.

The modified ramp illustrated in Figure 7 is desirable where the gravel is not bound together as by earth or clay. It consists of ramp **112** which terminates in the apron portion **114** which is hingedly connected at **116** to the ramp. Secured to the underside of the apron is the cam member **118** which is disposed so as to engage the floor of the elevator bucket **38** and, to this, properly position the apron for use. When the elevator is raised the apron is also raised until it assumes the position shown in dotted lines in Figure 7. It is held in the position until the return of the bucket, by means of line **120** which runs over sheave **121** and is connected to the weighted lever **122** which in turn is pivoted at **124**.

The foregoing description and the accompanying drawings are believed to clearly disclose a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that such changes in the invention may be made as are fairly within the scope and spirit of the following claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An elevator adapted for vertical movement from loading to dumping positions and comprising a deck having forward and rear edges, a bucket pivotally mounted on the rear edge of said deck, means for tripping the bucket, and a gravity actuated scoop on the forward edge of the deck whereby material under the deck will be removed as the elevator approaches loading position.

2. An elevator adapted for vertical movement from loading to dumping positions and comprising a deck having forward and rear edges, a bucket pivotally mounted on the rear edge of the deck, means for tripping the bucket and a gravity actuated scoop mounted on and overhanging the forward edge of the deck whereby the material under the deck will be removed when the elevator approaches loading position.

3. An elevator adapted for vertical movement from loading to dumping positions and comprising a deck having forward and rear edges, a bucket pivotally mounted on the rear edge of the deck, means for tripping the bucket, and a gravity actuated scoop pivotally mounted on the forward edge of the deck and having an inclined front face whereby material under the deck will be removed when the elevator approaches loading position.

4. An elevator comprising a deck having front and rear edges, a bucket having a pivotal support at the rear edge and a gravity-dropped dumping wall hinged on said support, means for tripping the bucket to dumping position, a gravity actuated scoop mounted on and overhanging the front edge of the bucket, and means co-acting with the tripping means when the bucket returns to loading position for lifting the dropped back wall to closed position.

5. In a dumping-hoist, the combination with an elevator shaft, a pair of stationary guides, and a stop on each guide, of an elevator having front and rear edges, a bucket having a pivotal support on the rear edges, a slotted gravity-dropped discharge wall hinged on said support, a gravity-actuated scoop hinged at the front edge, a pair of dump-ropes anchored at one end to said scoop and guides for the ropes, said ropes passed through the slotted wall, trip-rings attached at the free ends of the ropes and loosely mounted on the stationary guides, and lifting-heads on said ropes adapted to engage the dropped slotted wall.

6. In a dumping-hoist, the combination with an elevator shaft, a stationary upright-guide, and a stop on the guide, of an elevator, a gravity-returned bucket having a pivotal support on the elevator and a gravity-dropped, slotted, discharge wall hinged on said support, a dump-rope operatively connected to a part of the elevator and passed through the slotted wall, a trip-ring on the free end of the rope and loosely mounted a lifting head on said rope to engage the dropped slotted wall.

GEORGE P. COUGHLIN.