

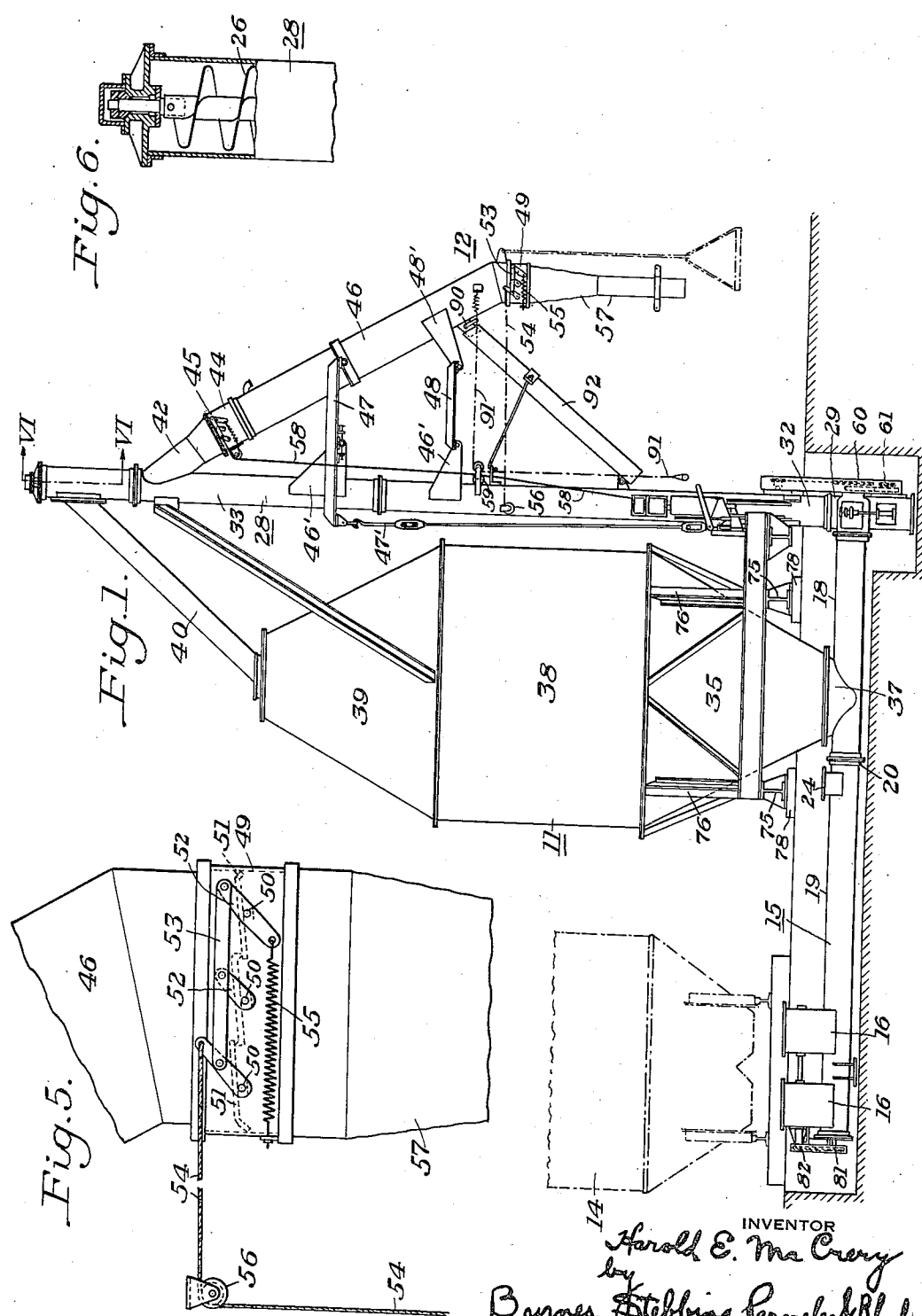
July 28, 1936.

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CEMENT HANDLING PLANT

2,048,877

Filed Sept. 12, 1933

4 Sheets-Sheet 1



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Fig. 2.

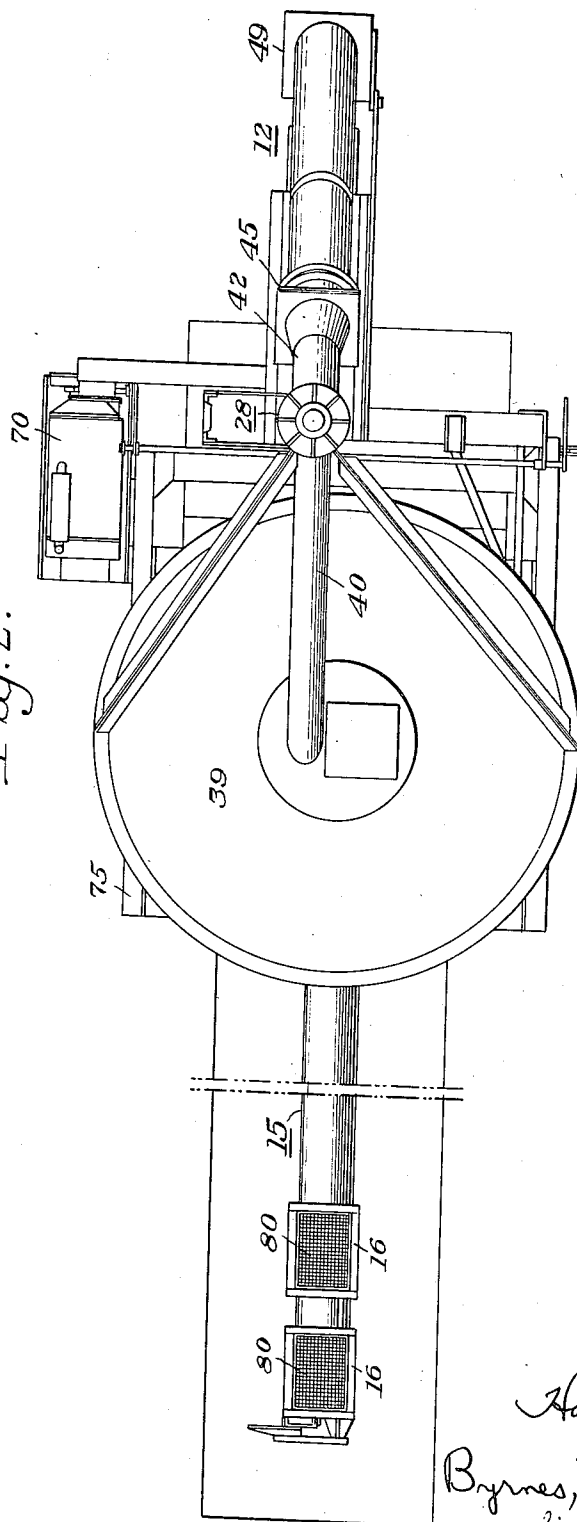
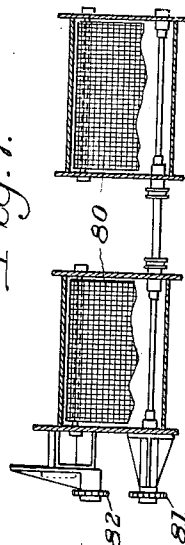


Fig. 7.



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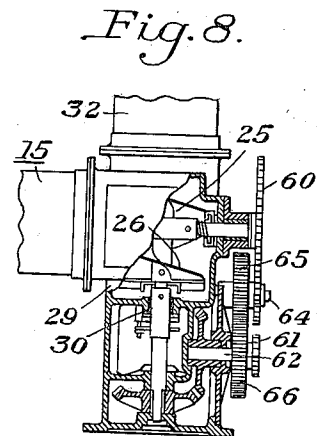
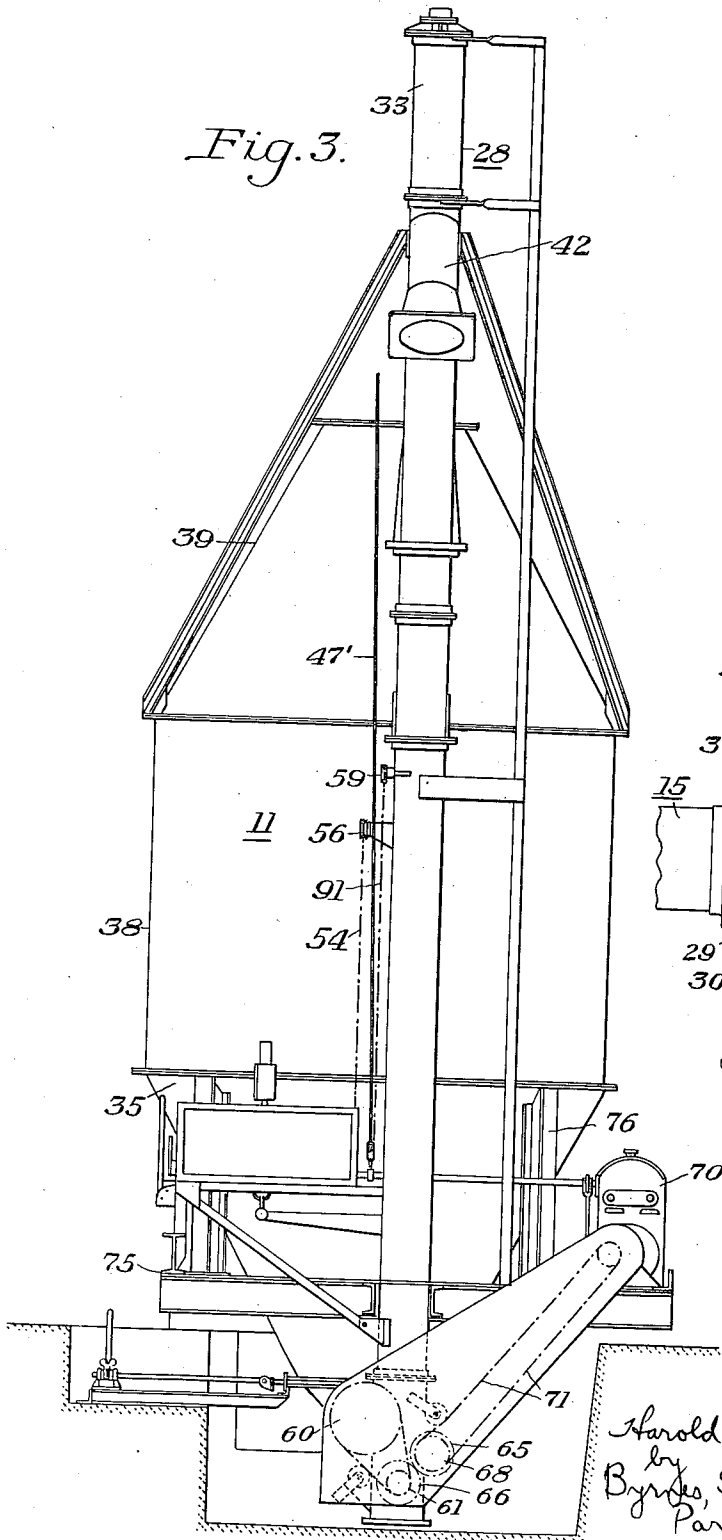
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4 Sheets-Sheet 3



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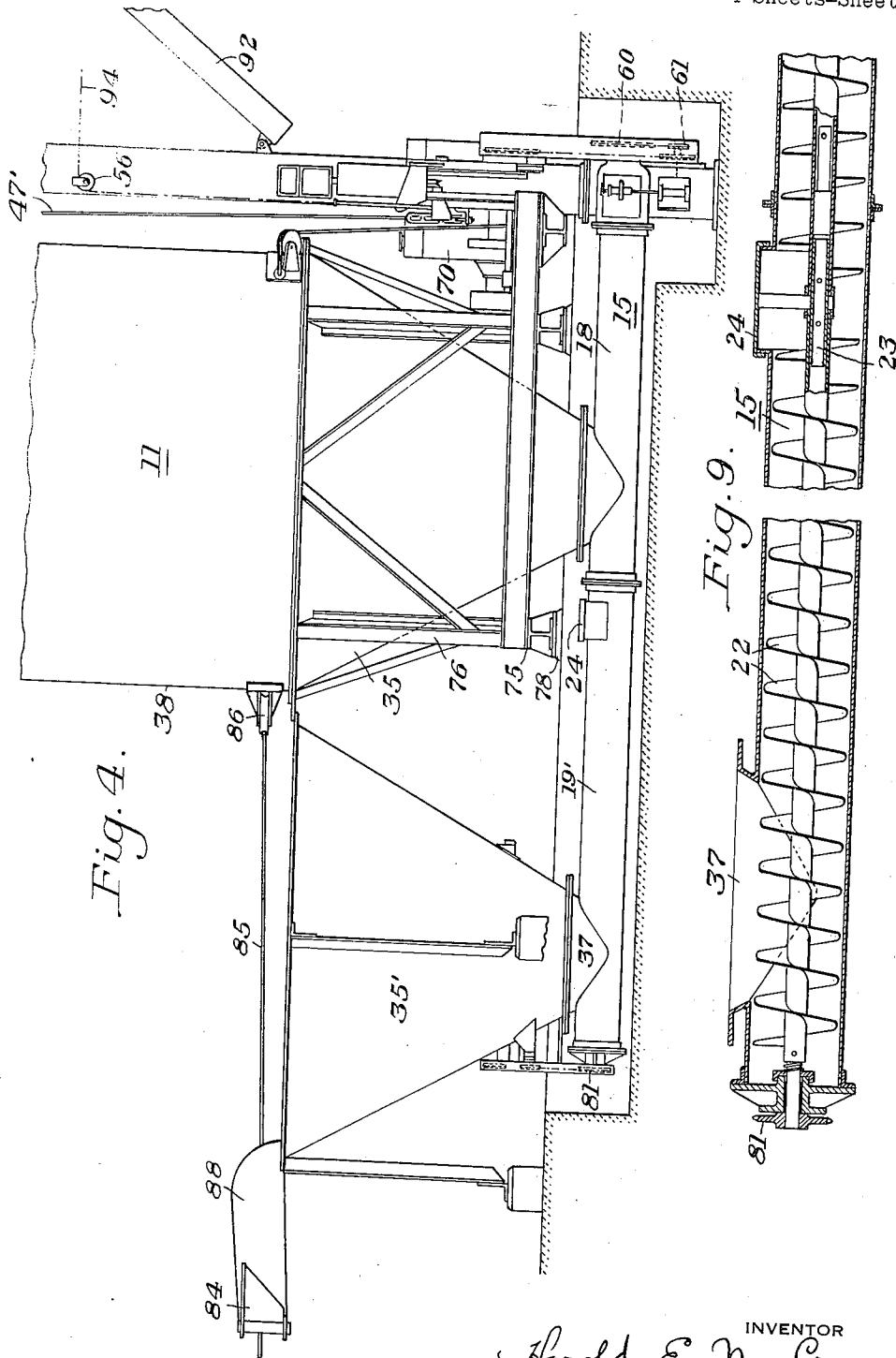
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CEMENT HANDLING PLANT

Filed Sept. 12, 1933

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,048,877

CEMENT HANDLING PLANT

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Application September 12, 1933, Serial No. 689,099

2 Claims. (Cl. 214-2)

This invention relates to the handling, storage and measuring of cement and other loose materials, more particularly such materials as enter into a mix to be poured in construction of concrete structures, such as roads. In certain of its aspects it is an improvement on my copending application Serial No. 654,866 filed February 2, 1933.

The apparatus to which the present application relates is adapted to receive the materials in a variety of different ways. For instance, in the construction of concrete roads it is frequently necessary to receive the material to be used for making concrete from a number of different sources. The material may be received by truck from the nearest point of rail delivery, or the handling apparatus to which this application relates may be located at a railway siding and receive the material from railroad cars, either of the box car type or of the hopper bottom type.

The contracts for such roads may be for a short stretch of a mile or two up to a stretch of twenty or more miles. It is frequently convenient to convey the material to the actual site of the portion of the road under construction and it is customary in such cases to employ portable apparatus which may be moved from place to place as the work progresses. The apparatus disclosed herein is adapted to have a small storage capacity if the source of supply of cement is reliable and continuous; or it is adapted to have considerable storage capacity where this is desirable, provision being made for an extension of the storage capacity without fundamental change in the installation previously employed.

In the drawings which are intended, not to limit my invention but to show as illustrations certain embodiments which my invention may assume,—

Fig. 1 is a view in side elevation of apparatus constructed in accordance with my invention and arranged to unload hopper bottom cars;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a front view in elevation of the apparatus shown in Figs. 1 and 2;

Fig. 4 is a fragmentary view similar to Fig. 1, on an enlarged scale, illustrating a modified form of apparatus embodying my invention;

Fig. 5 is a detail view of the gate for controlling discharge of material from the batcher;

Fig. 6 is a detail view partially in central vertical section on the line VI—VI of Fig. 1 showing

the construction of the top end of the vertical conveyor;

Fig. 7 is a detail view with parts broken away illustrating the construction of the shaker screens;

Fig. 8 is a detail view similar to Fig. 6 but illustrating the construction of the lower end of the vertical conveyor, where it receives material from the horizontal conveyor; and—

Fig. 9 is a central vertical section along the axis of the horizontal conveyor.

As is clearly evident from Fig. 1, when it is desired to have storage space available, the apparatus comprises a storage receptacle such as the storage bin 11, a batcher designated in general by the numeral 12 and equipment for receiving the material and delivering the same selectively to the bin 11 or to the batcher 12. In the form of apparatus shown in Fig. 1, the cement arrives on a siding in hopper bottom cars 14 and is dumped into the horizontal conveyor, designated in general by the numeral 15, through the hoppers 16. In this installation, the horizontal conveyor must be long enough to extend out beyond the bin 11 underneath the tracks of the siding; and as shown in Figs. 1 and 4 this horizontal conveyor comprises a casing 18 and an outer casing 19 with a connection at 20 between the two casings. The arrangement shown in Fig. 9 is a convenient one for the connection between these two casings. As shown in this figure, the screw 22 is in two sections united by a splice 23; and a manhole 24 affords access to the screw at this point when the second casing 19 is added to extend the length of the horizontal conveyor.

Loose material dumped from the car 14, is carried along by the screw 22; and as shown more particularly in Fig. 8, the horizontal conveyor 15 discharges material through a lateral port 25 adjacent the bottom of the screw 26 which operates within the casing of the vertical conveyor designated in general by the numeral 28. A bottom section 29 of the casing of the vertical conveyor affords a bearing at 30 for the screw 26. Additional sections 32, 33, etc. may be built up on the bottom section 29, the height of the vertical conveyor depending upon the extent to which these sections are built up. This is particularly desirable with portable installations where a different storage capacity may be required at one point from the storage capacity required at another point. As the storage capacity of the bin 11 is varied, the height to which the vertical conveyor is extended is varied to meet the require-

ment for elevating the material for discharge into the bin.

The bin 11 is sectional so that storage capacity to various extents may be afforded. The bottom section 35 converges in the form of an inverted cone and has flanges for connection to the flanges of an inlet 37 made integral with the casing 18 of the horizontal conveyor 15. In most cases a larger capacity than that afforded by the section 35 will be desirable; and in Fig. 1 a main section 38 is shown mounted on the bottom section 35. In addition, there is shown in Fig. 1 a conical top section 39 mounted on the main section 38. If the main section 38 be omitted, and the vertical conveyor 28 shortened by building up a less number of sections, an installation of smaller storage capacity is provided. From the top of the vertical conveyor 28, a branch or chute 40 directs the material downwardly at an angle into the top of the conical section 39, so that whatever material is elevated to the top of the vertical conveyor 28 is discharged by gravity into the bin 11.

When batching of the material is being carried out, a part or all of the material carried upwardly by the vertical conveyor 28 is discharged through the lateral branch or chute 42 into the batcher 12. Material is supplied to the batcher 12 through a fabric neck connection 44 under control of a gate 45. This gate may be of the rapid opening and closing type described and claimed in my copending application Serial No. 654,866, filed February 2, 1933. The neck connection 44 is a flexible connection to render the support of the batcher independent of the vertical conveyor or chute 42 and is of flexible material, fabric being preferred, although other flexible materials are available which may be used instead of fabric.

The batcher proper includes an elongated container 46 which, as shown in Fig. 1, may consist of a long tube. This container 46 is supported from the vertical conveyor 28 by gusset plates 46' through a lever 47 and a link 48. The lever 47 pivotally engages the container 46 and is fulcrumed on the upper gusset plate 46'. A connecting rod 47', whose length may be adjusted by a turn buckle, imparts a pull due to the weight of the container 46 and its contents to the scale mechanism. This scale mechanism may be operated in the usual manner to determine the weight of the batch. The link 48 is pivoted both to the lower gusset plate 46' and to a similar plate 48' on the container 46. The relative positions of the lever 47 and link 48 may be reversed if desired. At the lower end of the container 46 is a second lower gate 49 illustrated in more detail in Fig. 5. It will be understood that both the gate 45 and the gate 49 are substantially alike in principle of operation. A plurality of transverse rods 50 carry overlapping leaves or shutters 51, and a plurality of short levers 52 mounted on the ends of the rods 50 are operable simultaneously, through being connected together by a link 53, by a pull on the cord 54. Closing of the gate is brought about by a tension spring 55 connected to an extension of one of the short levers. The cord 54 is directed about a pulley 56 (see Fig. 1) and is led in such a direction that pulling on it to maintain the gate 49 open does not interfere with the proper balancing of the scale. When the gate 49 is open, the material is discharged through a flexible outlet pipe 57, this pipe being preferably of canvas and so constructed as to have its end readily insertible

into the compartment of the truck to which cement is to be delivered. The cord 58 leads from the gate 45 about a pulley 59 and is directed to the operator's position. Vibrator means (not shown) may be attached to the batcher 12 to cause the cement to run out freely when the gate 49 is open.

The gearing and driving means for the conveyors are illustrated more particularly in Figs. 3 and 8 of the drawings. A sprocket chain about a large sprocket 60 on the inner end of the screw 22 of the horizontal conveyor extends also about a smaller sprocket 61 (see Fig. 3) mounted on the drive shaft 62 for the vertical conveyor. To make the construction clearer, the sprocket chains are omitted from Fig. 8. In order to drive the shaft 62 and through it the sprocket 60, a jack shaft 64 is mounted parallel to the shaft 62, and a gear couple 65 and 66 provides for driving the shaft 62 from the jack shaft 64. The jack shaft 64 has secured thereto a sprocket 68 which is driven by a motor 70 through a sprocket chain 71. It may, under certain circumstances, be desirable to use a horizontal and a vertical conveyor having casings of the same diameter and screws of the same pitch; and the driving arrangement illustrated in Figs. 3 and 8 brings about a considerably higher rate of rotation of the vertical conveyor so that even though greater slippage of the material occurs in the vertical conveyor, its capacity is greater than the capacity of the horizontal conveyor, and this arrangement avoids blocking of the horizontal conveyor by material which might become packed in this conveyor if the vertical conveyor were not capable of carrying upwardly all of the material discharged through the opening 25.

The driving motor 70, the storage bin 11, and the conveyor system are all mounted on a common base structure 75. The legs 76 of the bin 11 rest on this common base structure; and it is evident from Figs. 1 and 3 that the conveyor system is likewise supported thereon. This makes it easy to erect the installation in the field, since it is merely necessary to provide piers at equal elevations so as to render the setting of the base structure 75 on these piers a simple matter.

When cement is received in bulk, there is a possibility that bolts, nuts, sticks or the like which would seriously damage the screw conveyors, may have found their way into the cement. I accordingly provide shaker screens 80 mounted in the hoppers 16 so as to separate out such foreign material. A further function of the shaker screens 80 is to prevent bridging of material such as cement over the hoppers 16, since such materials as cement, when passing into a restricted opening, tend to pack and bridge over such opening. A sprocket 81 on the end of the screw 22 of the horizontal conveyor actuates the shaker screens 80 through a sprocket and chain connection 82.

In the embodiment shown in Fig. 4, unloading may be effected from a box car. For this purpose, the horizontal conveyor 15 comprises a second section 19' formed with an inlet 37 to which is connected a hopper 35' substantially identical with the lower section of the bin 11 of the embodiment shown in Fig. 1. A drag scraper 84 is actuated through a cable 85 passed about a pulley 86 and actuated by a drum operated by the motor 70. A trough or chute 88 bridges the gap between the box car and the hopper 35'.

If desired, the batcher 12 may be enclosed within a shroud so as to prevent tampering by unauthorized persons and to protect the batcher

from the wind. It will be furthermore understood that if a more complete and highly perfected installation is desired, interlocking controls similar in function to those illustrated and described in my patents numbered 1,978,215 and 1,995,458 may be applied to the batcher so that the upper gate 45 cannot be opened unless the scale registers that the container 46 is empty and unless also the lower gate is closed, while the lower gate 49 cannot be opened unless the scale registers the proper weight in the container 46.

In operation, the material is received and dumped either directly into the horizontal conveyor 15 by way of the hoppers 16 or discharged first into a hopper such as the hopper 35' of Fig. 4, and thence into the horizontal conveyor 15. From this conveyor the material is discharged through the opening 25 and carried upwardly by the vertical conveyor 28. If batching is being carried on at this time; at least a part of the material is diverted through the branch or chute 42 into the batcher 12. Any surplus not required for batching operations is carried on upwardly and discharged through the branch or chute 40 into the bin 11. Should it be desired to carry on batching operations at a time when no material is being delivered, the material may be discharged from the bin 11 through a suitable gate or valve into the horizontal conveyor 19 and through the opening 25 into the vertical conveyor 28 for delivery to the batcher 12.

In operating the batcher, the upper louver gate 45 is opened and kept open until the proper batch of material has accumulated in the container 46. The operator will soon learn to release the cord 58 in time so that the last increment of material brings the batch up to the desired weight. Should, however, an excess of material be delivered into the container 46, an outlet such as a flap valve 90 may be opened by pulling on the cord 91, thereby discharging the surplus through a chute 92 to a point of disposal. As has been made evident from the description of the apparatus shown in the drawings, there is considerable latitude as to the make up of a given installation. If desired, the bin may be eliminated altogether and the cement delivered to a horizontal conveyor through hoppers such as at 16 in Fig. 1 or through a hopper such as shown at 35' in Fig. 4, or in other suitable manner. In this case, the material is all delivered to the batcher 12 and the conveyor system must be halted or kept in operation in accordance with the requirement of the batcher 12. Due to the sectional nature of the vertical conveyor 28 and the storage bin 11, considerable latitude is afforded in the extent to which storage space may be provided.

The apparatus here shown is relatively simple, cheap to build and easy to take down, transport and re-erect. This simplicity extends to the foundation upon which the apparatus is erected, the cost of such erection being reduced by such simplification.

Certain advantages of my invention arise from the use of an inclined batcher inasmuch as the

inclined batcher constitutes an inclined pipe or tube which discharges at a sufficient distance laterally from its inlet to render it feasible to use a vertical screw conveyor for elevating the cement. It will be noted that in the constructions illustrated, the lower end of the container 46 is sufficiently far away from the vertical conveyor to give clearance for trucks to drive beneath the outlet pipe 57. The inclined container 46 is in effect the hopper of a scale, being supported by a parallel link support. The extension of one of these links, such extension being linked to a scale, affords means for determining the moment tending to lower the container 46 and swing the parallel links about their pivots. In this connection it is noteworthy that the two inner pivots and the two outer pivots of the two links are in vertical alinement. This assists in obtaining accurate measurement of the weight of the container and contents.

Further advantages arise from the ability to circulate the material by means of the conveyor system, so that if only a portion of the material being delivered from the freight car or truck is needed for present purposes, the surplus may be stored and later put into circulation again for delivery to the batcher. Other advantages will be apparent from the description and will be more particularly pointed out in the claims.

While I have shown and described certain preferred embodiments which my invention may assume, it will be understood that various modifications may be made in the details of construction and in the arrangement of parts and that my invention may be variously embodied and practiced within the scope of the following claims.

I claim:

1. In combination with a vertical support, a tubular container, mechanism balancing the container on an axis so inclined as to dispose the lower end of the container in spaced relation to the support, and a gate at the lower end of the container, said balancing mechanism including a substantially horizontal lever pivoted intermediate its ends to said vertical support and at one end to the container, a link below the lever and substantially parallel thereto connecting the container and said support, a vertical rod connected to the other end of said lever, and scale mechanism connected to the lower end of said vertical rod for determining the weight of the batch in said container.

2. In a measuring device, in combination, a tubular container, and mechanism for balancing the container on an inclined axis including a vertical support, a substantially horizontal lever pivoted intermediate its ends to said support and at one end to the container, a link below the lever and substantially parallel thereto, a gusset plate on the container, said link connecting said gusset plate and said support by pivots in vertical alignment with the pivots of said lever, and scale mechanism connected to the other end of said lever for determining the weight of the batch in said container.

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