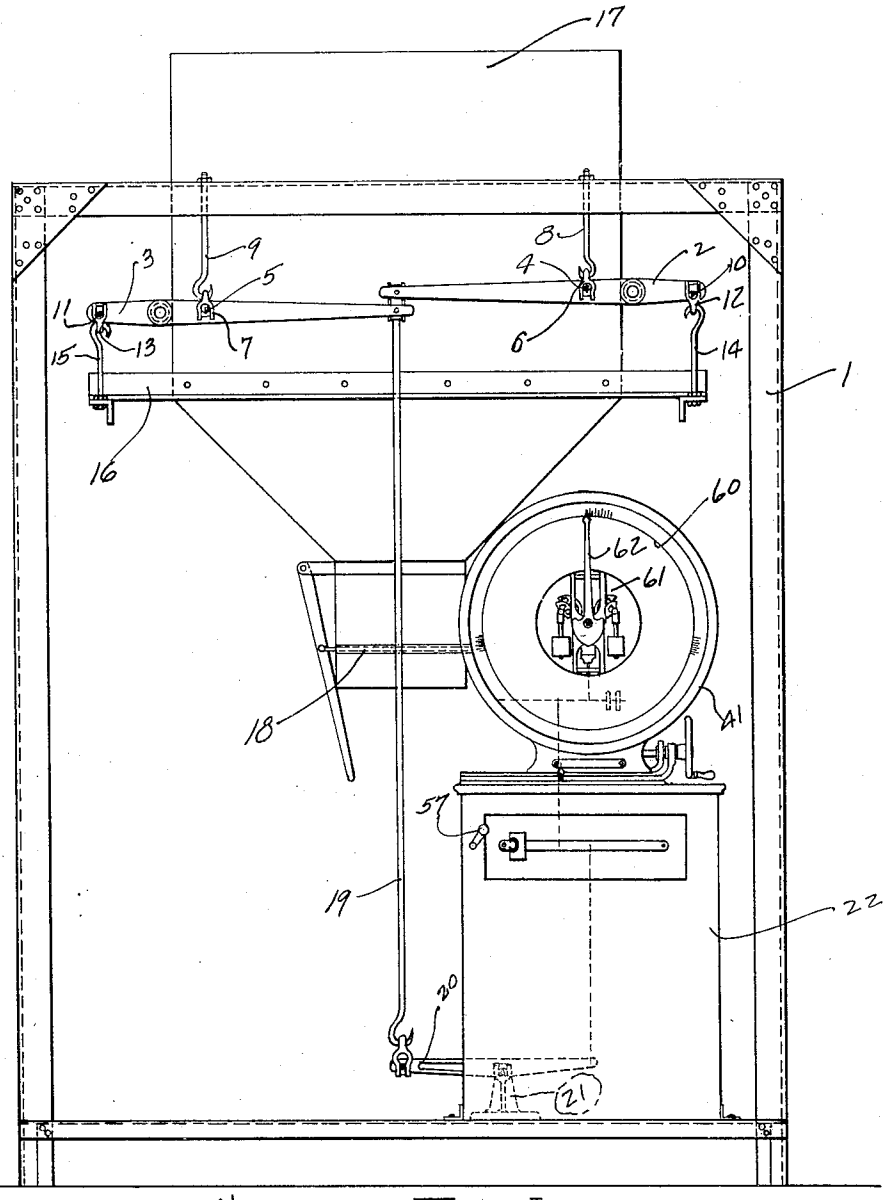
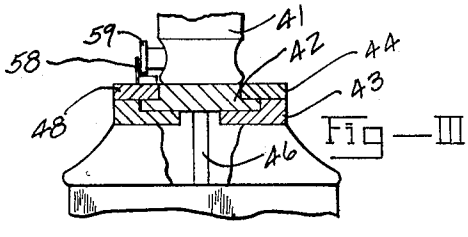
Oct. 4, 1932. E. G. THOMAS 1,880,574

VARIABLE RATIO COMPOUNDING SCALE

Filed April 21, 1930 2 Sheets-Sheet 1



Fig—I



Fig—III

Edward G. Thomas
INVENTOR

BY
C. O. Marshall ATTORNEY

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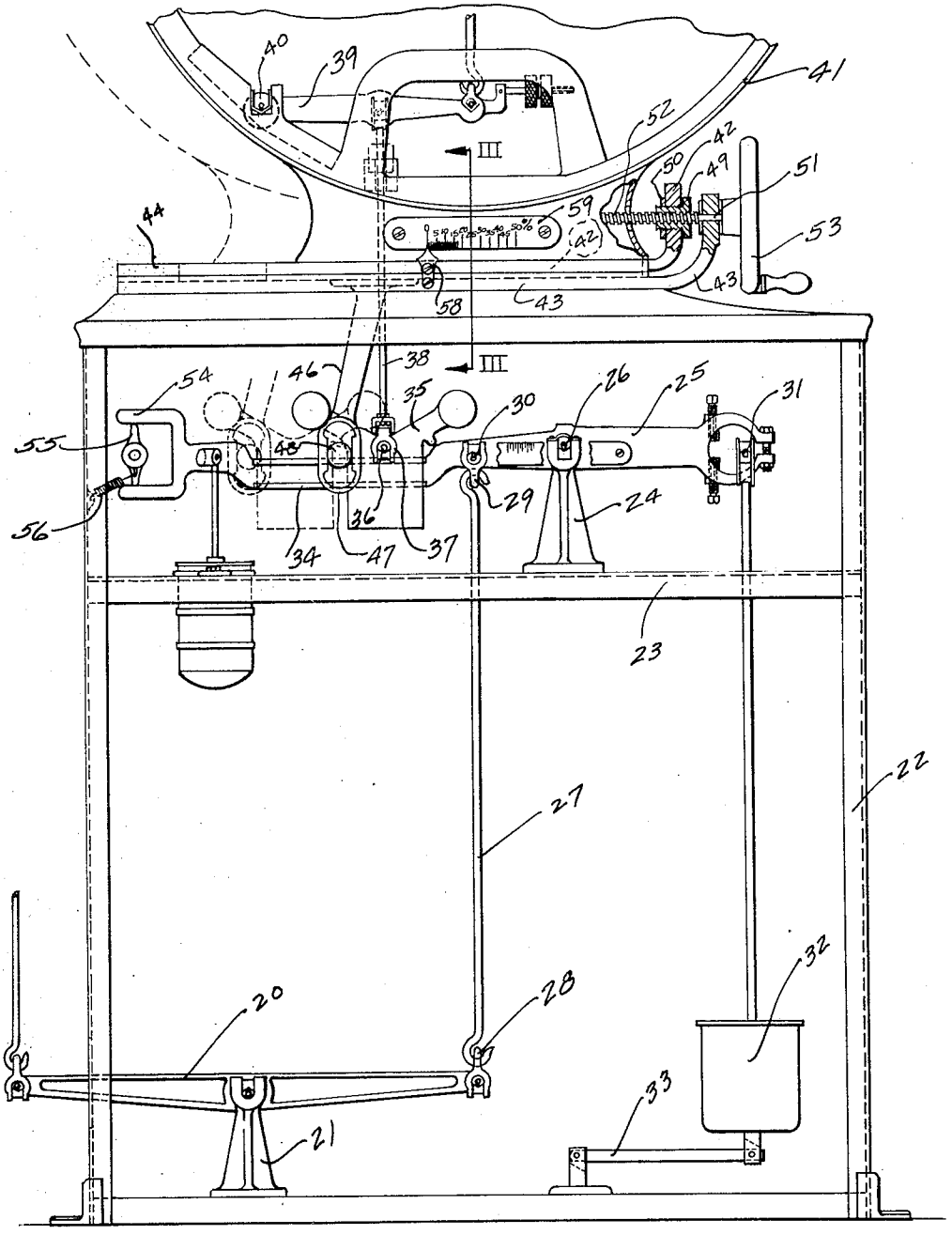

Fig — II

INVENTOR
Edward G. Thomas
BY
C. O. Marshall ATTORNEY

Patented Oct. 4, 1932

1,880,574

UNITED STATES PATENT OFFICE

EDWARD G. THOMAS, OF TOLEDO, OHIO, ASSIGNOR TO TOLEDO SCALE MANUFACTURING COMPANY, OF TOLEDO, OHIO, A CORPORATION OF NEW JERSEY

VARIABLE RATIO COMPOUNDING SCALE

Application filed April 21, 1930. Serial No. 445,925.

This invention relates generally to the art of making concrete and more particularly to a method of accurately proportioning the ingredients in a batch independently of the amount of moisture contained in the aggregate. It has been established by research and experiment that the maximum strength of a finished concrete structure can only be obtained when sand, coarse aggregate, cement and water are mixed together in proper proportions. Sand, gravel and crushed stone generally contain a great deal of surface moisture, especially after having been stored in the open. It is obvious, therefore, when 100 pounds of sand containing 10 percent of surface moisture is weighed out, the amount of surface dry sand amounts to only 90 pounds, the other ten pounds being water and it will be readily seen that more sand must be added to conform to the amount specified if the formula is based on dry sand or sand carrying less moisture. An excess of water decreases the strength of concrete, therefore the more moist the sand the less water there should be added. Additional sand cannot be added haphazardly, as too little water also decreases the strength.

The first step in overcoming these difficulties is to determine the exact amount of surface dry sand, in a sample of predetermined weight. This is accomplished by means of the device disclosed in my co-pending application Serial No. 428,932. The present invention has for its principal object the provision of means for determining the actual amount of surface dry sand or other aggregates in a load when the percentage of moisture contained therein, is known.

Another object of the invention is the provision of means which automatically indicate only a certain fraction of the total load in the load receiver, particularly the fraction which represents the equivalent by weight of surface dry sand in the total load.

A further object is the provision of means which eliminate the necessity for arithmetical calculations or engineering skill, on the part of the operator, in determining the proper amounts of surface dry sand and other aggregates.

A still further object is the provision of means for scientific concrete batch mixing due to which the maximum strength is obtained in concrete structures and in which economies of production are employed.

Other objects and advantages will be apparent from the following specification in which reference is had to the accompanying drawings illustrating an embodiment of my invention and wherein similar reference numerals designate similar parts throughout the several views.

In the drawings:—

Figure I is a front elevational view of a weighing device embodying my invention.

Figure II is a fragmentary enlarged front view of the scale illustrating my invention in detail.

Figure III is an enlarged fragmentary section along the line III—III of Figure II.

Referring to the drawings; as it is desirable that a device of this type be at least semi-portable, I have provided a frame 1 preferably of structural steel which forms a support for the load supporting levers 2 and 3 which are fulcrumed on pivots 4 and 5 in the stirrups 6 and 7 and which are suspended from the frame 1 by the rods 8 and 9. Laterally extending load pivots 10 and 11 which are in spaced relation to the fulcrum pivots 4 and 5 in the levers 2 and 3 support by means of the stirrups 12 and 13 and the suspension rods 14 and 15, a structural steel frame 16 to which the load receiving hopper is fastened. This hopper serves to receive the sand, gravel or other material to be weighed and is provided at its lower end with a discharge opening normally closed by a gate 18 which may be of any preferred construction. In practice, the device is generally used with a conveying system which is adapted to deliver the aggregates to the hopper, eliminating as much labor as possible, although this is not required for the operation of the device embodying my invention. When a load is deposited in the hopper 17, the force resulting from it is transmitted through the levers 2 and 3, suitable stirrups and the long connecting rod 19 to one end of a motion reversing lever 20, which is fulcrumed in a

bracket 21 secured to the bottom of a cabinet 22 which houses and supports the weighing mechanism. An intermediate shelf 23 within the cabinet 22 supports a fulcrum bracket 24 on which a lever 25 is mounted by means of a pivot 26. A connecting rod 27 and stirrups 28 and 29 serve to transmit the force of the load in the load receiver. The stirrup 29 engages a laterally extending pivot 30. This pivot is fixed in spaced relation to the fulcrum pivot 26. A pivot 31 is adjustably mounted in a rearward extension of the lever 25, from which by means of a suitable stirrup and rod, a loading box 32 is suspended. This loading box serves to counterbalance the dead weight of the load receiver and load lever system. To prevent this loading box from sinking, which would have a detrimental effect on the operation of the scale, a check link 33 is provided. A portion 34 of the lever 25 is machined to form a parallel track and a member 35 is slidably mounted thereon. This member 35 is provided with a pivot 36 which is engaged by a stirrup 37 secured to the lower end of a short connecting rod 38.

The upper end of this rod being provided with a suitable connection, pivotally engages a lever 39 which is fulcrumed at 40 in a housing 41 surmounting the cabinet 22. This housing suitably supports the counterbalancing and indicating mechanism. The housing 41 is fastened to a plate 42 which is slidably mounted in a machined way 43 and is retained thereon by gibs 44 and 45. A depending arm 46 is fastened to the underside of the plate 42 and is provided with an arcuate walled frame 47 at its lower end which is adapted to receive a cylindrical stud 48 which is secured to and extends laterally from the sliding member 35. The arcuate sides of the frame are so shaped that when the lever 25 is in a horizontal position, the stud fits snugly between the walls having only sufficient clearance so that no friction develops at this point when the lever 25 oscillates about its fulcrum. The radii of the arcuate walls are so located and proportioned that at all other points considerably more clearance is had. An upwardly bent end portion of the plate 42 is provided with an aperture in which a bushing 49 is threaded. This bushing is adjustable within the aperture and is provided with a nut 50 so that it may be securely locked in the proper position. The machined way 43 also has one of its ends turned upwardly which is also provided with an aperture through which a turned down portion 51 of the operating screw 52 extends. The operating screw 52 is threaded through the bushing 49 and has a hand wheel secured to the extending portion 51. Revolving the hand screw by means of the wheel 53 therefore serves to move the housing 41 in the machined way. As the depending arm with the arcuate walled frame is fastened to the sliding plate 42 to which the housing 41 is fastened, movement of the housing will automatically move the sliding members carrying the pivots 36 thus varying the ratio between it and the pivots 30 and 26. The adjustable bushing 49 within the upturned end of the member 42 permits an accurate adjustment of the lever ratio at the zero position of the scale. One end 54 of the lever 25 is bifurcated and in the bifurcation a two fingered latch is rotatably positioned. A spring 56 fastened at one end to the latch and with the other end to the cabinet urges the latch normally into the locked position, thus keeping the lever 25 in a horizontal position until a handle 57, which projects through the front of the cabinet, is turned which releases the lever and permits its oscillation.

Assuming that it is desired to weigh out 500 pounds of sand of which the moisture content has been determined as 10 percent, the operator of the device will shift the housing 41 towards the left by turning the hand wheel 53 until the pointer or index 58 which is fastened to the stationary machined way registers with the character 10 located on the percentage chart 59 which is secured to the neck like part of the housing 41. The arm 46 being directly connected to the housing shifts the sliding member 35 automatically so that the ratio between the pivots 26, 30 and 36 is changed. In this example the ratio is changed 10 percent; in other words, when the housing is shifted so that the indicator 58 points to the character 10 on the chart, it will take 10 percent more of the load in the weighing hopper to indicate 500 pounds on the chart 60, thus automatically deducting the moisture in the sand.

The indicia on the chart 59 represent various percentages of moisture in the sand or aggregates used in mixing concrete and are located so that when the pointer 58 registers with one of the characters on the chart 59 the ratio of the lever system has been varied so that additional load must be placed in the load receiver before the required weight of surface dry sand or other aggregates is indicated on the chart by the indicator 62 which is directly connected to the counterbalancing mechanism 61 and is rotated through an angle proportional to the force exerted by the load through the lever mechanism. The normal ratio of the lever system of the scale is calculated and designed that when the pointer 58 registers with the zero character the full weight of the load in the load receiver is indicated.

It will be seen from the foregoing description that when the percentage of surface moisture in sand, gravel and other concrete aggregates is known anyone can easily and efficiently compound the exact proportions to form a theoretically correct concrete mix with the aid of my invention.

The embodiment of my invention herein shown and described is to be regarded as illustrative only and it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

Having described my invention, I claim:

1. In a device of the class described, in combination, means for supporting a load containing a plurality of constituents in predetermined ratio, automatic counterbalancing mechanism, variable lever mechanism for transmitting force exerted by such load to said counterbalancing mechanism, means for adjusting said lever mechanism in accordance with such predetermined ratio to cause said indicating mechanism to indicate the weight of one only of the constituents of such load and indicating means for showing the ratio in accordance with which said lever mechanism is adjusted.

2. In a device of the class described, in combination, means for supporting a load containing a plurality of constituents in predetermined ratio, automatic counterbalancing mechanism, variable lever mechanism for transmitting force exerted by such load to said counterbalancing mechanism, means for adjusting said lever mechanism in accordance with such predetermined ratio to cause said indicating mechanism to indicate the weight of one only of the constituents of such load, said adjusting means including a movable pivot and indicating means for showing the ratio in accordance with which said lever mechanism is adjusted.

3. In a device of the class described, in combination, means for supporting a load containing a plurality of constituents in predetermined ratio, automatic counterbalancing mechanism, variable lever mechanism for transmitting force exerted by such load to said counterbalancing mechanism, means for adjusting said lever mechanism in accordance with such predetermined ratio to cause said indicating mechanism to indicate the weight of one only of the constituents of such load, said adjusting means including a movable pivot and manually operated means for moving said pivot and indicating means for showing the ratio in accordance with which said lever mechanism is adjusted.

4. In a device of the class described, in combination, means for supporting a load containing a plurality of constituents in predetermined ratio, automatic counterbalancing mechanism, variable lever mechanism for transmitting force exerted by such load to said counterbalancing mechanism and means for adjusting said lever mechanism to cause said indicating mechanism to indicate the weight of one only of the constituents of such load, said adjusting means including a movable pivot, manually operated means for moving said pivot and means for indicating the position of said pivot in terms of load percentage.

5. In a device of the class described, in combination, means for supporting a load containing a plurality of constituents in predetermined ratio, automatic counterbalancing mechanism, variable lever mechanism for transmitting force exerted by such load to said counterbalancing mechanism, said variable lever mechanism comprising a movable pivot, a laterally adjustable housing containing indicating mechanism, and means connected to said housing for moving said pivot to cause said indicating mechanism to indicate the weight of only one of said constituents of said load and means for indicating the position of said pivot in terms of load percentage.

6. In a device of the class described, in combination, means for supporting a load containing a plurality of constituents in predetermined ratio, automatic counterbalancing mechanism, variable lever mechanism for transmitting force exerted by such load to said counterbalancing mechanism, said variable lever mechanism comprising a movable pivot, a laterally adjustable housing containing indicating mechanism, means connected to said housing for moving said pivot to cause said indicating mechanism to indicate the weight of only one of said constituents of said load, and means co-operating with said housing for indicating the proportion of weight of the remaining constituents said indicating means comprising a relatively movable chart bearing indicia and a stationary index.

7. In a device of the class described, in combination, load supporting means, automatic counterbalancing means for one constituent of a compound load, indicating means, a variable leverage system operatively connecting said load supporting and automatic counterbalancing means and manipulative mechanism to vary the leverage so that a predetermined percent only of the total load on the load supporting means is indicated on said indicating means.

8. In a device of the class described, in combination, load supporting means, automatic counterbalancing and indicating means, a variable leverage system operatively connecting said load support and automatic counterbalancing and indicating means, and manipulative mechanism to vary the leverage so that a predetermined perecent only of the total load on the load suporting means is indicated, said indicating means co-operating with an indicia bearing chart and indicator, the indicia on said chart representing the percentages of loads thus automatically deducted to the remainder indicated.

EDWARD G. THOMAS.