July 20, 1943. H. S. HIGHT 2,324,580

LIQUID METERING AND MIXING APPARATUS

Filed April 3, 1942 2 Sheets-Sheet 1

Fig. 1

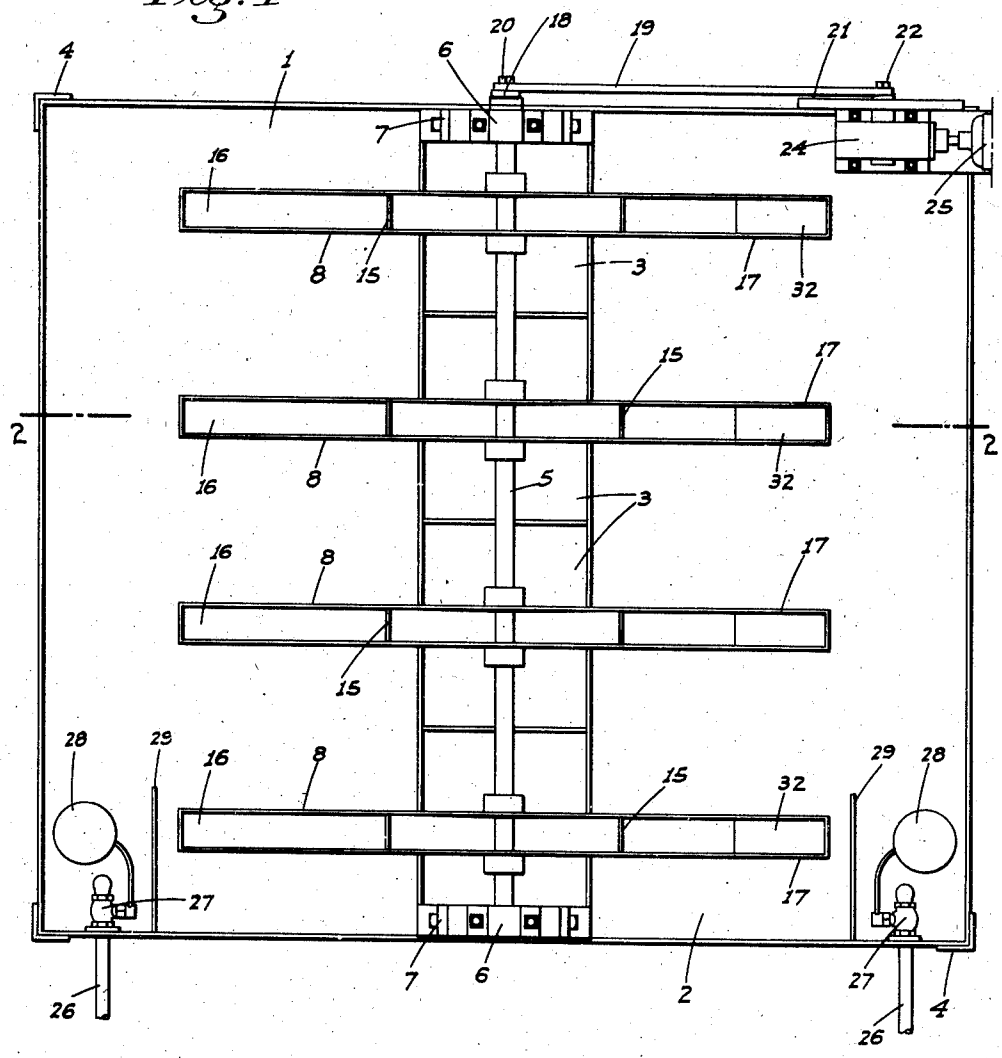
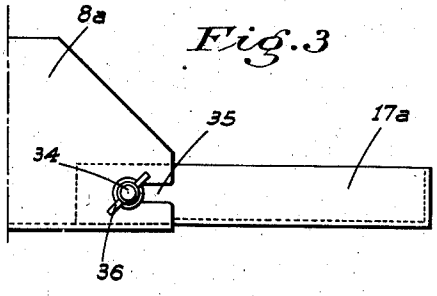


Fig. 3



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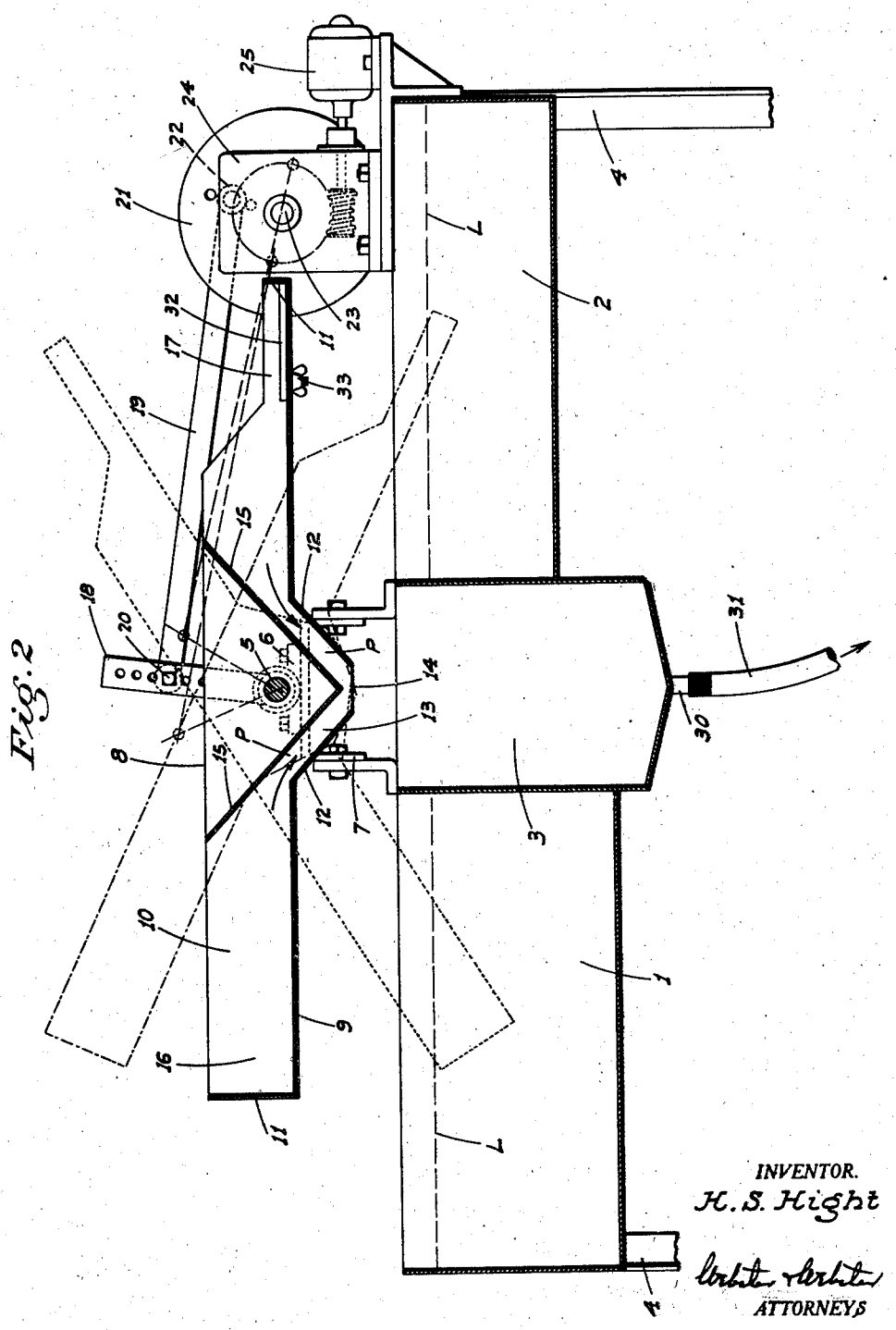


Fig. 2

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UNITED STATES PATENT OFFICE

2,324,580

LIQUID METERING AND MIXING APPARATUS

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Application April 3, 1942, Serial No. 437,592

12 Claims. (Cl. 221—96)

This invention relates generally to improved metering and mixing apparatus for liquids, and in particular the invention is directed to apparatus for automatically metering and mixing different liquids from separate supplies.

In certain industries, and particularly where chemical processing is employed, the processing technique includes the use of a mixture of different liquids which cannot be mixed, due to chemical reactions, until shortly before use, and further when such liquids are metered from supplies and mixed, the apparatus for this purpose must be such that neither supply of liquid can be contaminated from the other supply. This is especially true in the walnut bleaching process wherein chlorine and nickel salts in solution are maintained in separate containers and mixed in the desired quantities and proportions immediately before use. Heretofore, in the walnut industry it has been the practice to employ simultaneously and intermittently actuated valves arranged in a piping assembly leading from the supply tanks to a mixing chamber. However, due to the chemical action of the liquids on the valves and related mechanism, it has been extremely difficult to regulate and maintain the setting of the valves so that the same discharge the correct and constant amounts of the liquids.

It is therefore the principal object of this invention to provide apparatus which is operative to accurately meter from separate supplies of different liquids predetermined quantities thereof, and to separately deliver said quantities to a common receiving or mixing tank; this being accomplished without possibility of any of the liquid from the supply of one liquid gaining access to and contaminating the supply of the other liquid prior to the intended mixing thereof.

Another object of the invention is to provide an automatic metering and mixing apparatus for separate supplies of different liquids, such apparatus comprising a pair of spaced open topped tanks for the different liquids, and a rocker assembly pivoted intermediate its ends above said tanks for rocking movement through an up and down cycle; said assembly including dipper portions at opposite ends adapted to alternately and on the down stroke dip into corresponding ones of said tanks, and on the up stroke to elevate a predetermined amount of liquid therefrom, the assembly having passages from said dippers to a central discharge point in the bottom of the assembly above a central receiving tank, whereby when each dipper elevates, the liquid therein flows to said point and thence discharges into the receiving tank.

An additional object of the invention is to provide, in apparatus as above, effective and readily adjustable means to vary the quantity and proportions of the liquids being metered by the apparatus.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a plan view of the improved metering and mixing apparatus, which here includes four rocker and dipper assemblies arranged to discharge into a corresponding number of receiving tanks.

Figure 2 is a sectional elevation on line 2—2 of Fig. 1.

Figure 3 is a fragmentary side elevation of one of the trough-like rocker assemblies showing a detachable dipper.

Referring now more particularly to the characters of reference on the drawings, the apparatus comprises a pair of elongated relatively wide open-topped supply tanks 1 and 2 disposed in spaced parallel relation and with their upper edges in the same horizontal plane. The space intermediate the tanks 1 and 2 is suitably partitioned to form a plurality of separate open-topped receiving tanks 3. It will be seen that the tanks 1, 2, and 3 are formed in unitary relation, and this tank unit is supported by suitable means, such as legs 4.

A horizontal shaft 5 extends from end to end of the tank unit in a plane above tanks 3 and centrally between the sides of the latter; said shaft being journaled at its ends in bearing units 6 which are carried on vertically adjustable end brackets 7.

Above each of the tanks 3 and in intersecting relation thereto, a trough-like rocker assembly, indicated generally at 8, is fixed centrally of its ends on shaft 5 at right angles thereto and is of a length to partially overhang both tanks 1 and 2. Each trough-like rocker assembly is relatively narrow and includes a bottom 9, sides 10, and ends 11. The rocker assembly centrally of its ends and above the corresponding open topped receiving tank is formed at the bottom with a

downwardly converging chute which includes end portions 12 and side portions 13, the chute opening 14 being centrally above the corresponding tank 3. Converging baffle plates 15 are fixed between the sides 10 of the rocker assembly above the chute and converge downwardly parallel to but spaced above the ends 12 of the chute, said baffle plates being connected together at their lower ends and at a point adjacent discharge opening 14 of the chute. It will thus be seen that the baffle plates form in the chute separate non-communicating passages P, as indicated by the arrows in Fig. 2.

The end portions of the trough-like rocker assemblies beyond and outwardly of the baffle plates 15, form in effect dippers, generally indicated at 16 and 17.

At one end the shaft 5 is fitted with a radial lever 18 to which a relatively long connecting rod 19 is pivoted, as at 20; the other end of said rod being pivoted eccentrically on a crank disc 21, as at 22. This crank disc is fixed on the drive shaft 23 of a gear-type reduction box 24 mounted by suitable means on one corner of the tank unit. The reduction box 24 is driven by a variable speed electric motor 25.

When the above described apparatus is in use, supplies of the different liquids are maintained in tanks 1 and 2 to a predetermined and preferably common level L; this being accomplished by means of supply pipes 26 leading to the respective tanks. Float controlled valves 27 are connected to said pipes and discharge into the respective tanks adjacent an outer corner thereof. In order to stabilize action of the valve control floats 28, which actuate valves 27, baffles 29 may be mounted in the tanks between said floats and the adjacent one of the rocker assemblies.

With actuation of motor 25, the shaft 5 and trough-like rocker assemblies are rocked through a predetermined up and down cycle whereby to alternately submerge dippers 16 and 17 into the liquid in the supply tanks 1 and 2 respectively, and to a depth so that the ends 11 of these dipper portions are below the level L. With such rocking action a supply of liquid will alternately be elevated in the dippers, and as each dipper passes a horizontal position and raises thereabove, the liquid in such dipper will forthwith flow through the corresponding passage P into the corresponding receiving tank 3. The baffle plates 15 assures against any of the liquid from one dipper flowing into the other dipper to subsequently contaminate the supply of the other liquid. The tank 3 may serve as the mixing tank from which the mixture is drawn from a bottom outlet 30 through a hose 31 to the point of use, or if the tank 3 is not used as the mixing tank the hose 31 may lead thereto.

In the present embodiment the rocker assemblies are materially reduced in height at and adjacent one end, whereby the dipper 17 is relatively shallow. This is due to the fact that the present apparatus was designed for use with a process where the amount of liquid to be metered from tank 2 was relatively small in proportion of the amount of liquid to be metered from tank 1. To provide adjustment of the relative proportions of the liquids metered by dippers 16 and 17, a displacement block 32 is removably fitted in the bottom of dipper 17 and is secured therein by any suitable means such as a bolt and wing nut 33.

When it is necessary that the relative proportions of liquids metered from the tanks be varied substantially and at intervals, the dipper at one end of the rocker assembly can be made removable, as shown in Fig. 3. Here the dipper 17a is detachably mounted in connection with the remainder of the trough-like rocker assembly 8a by means of securing studs 34 which project laterally from the sides of the dipper adjacent its inner end and engage in slots 35 open to the corresponding end of the rocker assembly. Wing nuts 36 threaded on studs 34 maintain the removable dipper 17a in position.

The pivots 20 and 22 for the connecting rod 19 are adjustable radially on both the lever 18 and disc 21 whereby the throw of the lever 18 may be regulated to the extent necessary to assure of sufficient rocking action of the rocker assemblies that both dippers 16 and 17 submerge to the desired extent in the supplies of liquids in tanks 1 and 2. In order to regulate the amount of liquid which each dipper picks up, without varying the proportions, the shaft 5 is adjusted vertically, accompanied by a readjustment if necessary of the connecting rod.

Since the dippers move through a stroke of fixed length, they will always dip into the liquids to the same extent, and hence each will recurringly retain and lift identical quantities of the corresponding liquids.

As a result, the relative proportions of the different liquids is always maintained constant.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A metering device for different liquids, comprising a pair of open topped supply tanks disposed in adjacent but spaced relation, an open topped receiving tank between said pair of supply tanks, means to maintain a substantially constant quantity of different liquids in said supply tanks, a rocker assembly disposed above the receiver tank and at the ends overhanging said supply tanks, said rocker assembly being formed with a dipper at each end, means mounting said assembly for rocking movement about an axis intermediate its ends for movement of the dippers through up and down cycles, each dipper at the lower end of its cycle being in the corresponding supply tank, means included in the rocker assembly to discharge the liquid contents of each dipper into the receiving tank as said dipper reaches an elevated position in its cycle, and means to rock said assembly.

2. A metering device for different liquids, comprising a pair of open topped supply tanks disposed in adjacent but spaced relation, an open topped receiving tank between said pair of supply tanks, means to maintain a substantially constant quantity of different liquids in said supply tanks, a rocker assembly disposed above the receiver tank and at the ends overhanging said supply tanks, said rocker assembly being of elongated trough-like configuration, the ends of said assembly forming dippers, means mounting said assembly for rocking movement about an axis intermediate its ends and for movement of said

dippers through up and down cycles, each dipper at the lower end of its cycle being in the corresponding supply tank, said trough-like assembly having a discharge opening in the bottom intermediate its ends and above said receiver tank, the liquid contents of the dippers alternately discharging through said opening into the receiving tank as said dippers reach an elevated position in said cycles, and means to rock said assembly.

3. A metering device for different liquids, comprising a pair of open topped supply tanks disposed in adjacent but spaced relation, an open topped receiving tank between said pair of supply tanks, means to maintain a substantially constant quantity of different liquids in said supply tanks, a rocker assembly disposed above the receiver tank and at the ends overhanging said supply tanks, said rocker assembly being of elongated trough-like configuration, the ends of said assembly forming dippers, means mounting said assembly for rocking movement about an axis intermediate its ends and for movement of said dippers through up and down cycles, each dipper at the lower end of its cycle being in the corresponding supply tank, said trough-like assembly having a discharge opening in the bottom intermediate its ends and above said receiver tank, the liquid contents of the dippers alternately discharging through said opening into the receiving tank as said dippers reach an elevated position in said cycles, and means to rock said assembly; there being a transverse baffle plate fitted into the trough-like assembly intermediate its ends and with its lower edge at and intersecting said opening whereby to prevent liquid flow from one dipper to the other.

4. A metering device for different liquids, comprising a pair of open topped supply tanks disposed in adjacent but spaced relation, an open topped receiving tank between said pair of supply tanks, means to maintain a substantially constant quantity of different liquids in said supply tanks, a rocker assembly disposed above the receiver tank and at the ends overhanging said supply tanks, said rocker assembly being of elongated trough-like configuration, the ends of said assembly forming dippers, means mounting said assembly for rocking movement about an axis intermediate its ends and for movement of said dippers through up and down cycles, each dipper at the lower end of its cycle being in the corresponding supply tank, a chute in communication with and depending from the assembly intermediate its ends and above the receiving tank, the ends of said chute converging downward to an outlet opening and the sides of said chute comprising extensions of the sides of said assembly, transverse baffle plates in the assembly and chute extending from side to side thereof, said plates extending in converging relation from a point adjacent the upper edge of said assembly to a point at and intersecting said outlet opening, but being spaced from said chute ends and forming separate passages in the chute between the assembly and said outlet opening, and means to rock said assembly.

5. A metering device for different liquids, comprising a pair of open topped supply tanks adapted to hold the different liquids, said tanks being adjacent but spaced, an open topped receiver tank between the supply tanks, a horizontal shaft mounted for rotation above and extending in a plane between the supply tanks and intersecting the receiving tank, a rocker assembly having a dipper at each end, means securing said assembly intermediate its ends on said shaft at substantial right angles thereto, the dippers alternately entering the supply tanks upon rocking of the assembly, means included in the assembly to discharge the liquid contents of the dippers into the receiving tank as said dippers reach an elevated position, and means to rock said shaft and assembly through a predetermined arc.

6. A metering device for different liquids, comprising a pair of open topped supply tanks adapted to hold the different liquids, said tanks being adjacent but spaced, an open topped receiver tank between the supply tanks, a horizontal shaft mounted for rotation above and extending in a plane between the supply tanks and intersecting the receiving tank, a rocker assembly having a dipper at each end, means securing said assembly intermediate its ends on said shaft at substantial right angles thereto, the dippers alternately entering the supply tanks upon rocking of the assembly, means included in the assembly to discharge the liquid contents of the dippers into the receiving tank as said dippers reach an elevated position, and means to rock said shaft and assembly through a predetermined arc, said means comprising a radial lever fixed on the shaft, a driven crank member alined with said lever, and a connecting rod pivotally connected at its ends with said lever and member respectively.

7. A device as in claim 6 in which the point of pivotal connection of said rod with the lever and member is arranged for adjustment radially of the axes thereof.

8. A device as in claim 5 in which said shaft is mounted for vertical adjustment whereby to regulate the extent of entry of said dippers into the supply tanks.

9. A metering device comprising a pair of open-topped tanks disposed in adjacent relation, a receiver disposed adjacent said tanks, a rocker assembly having a dipper at each end, means mounting said rocker assembly for rocking movement about an axis intermediate the ends of said assembly, the assembly being positioned so that upon rocking movement thereof the dippers alternately enter corresponding tanks, means included in said assembly to discharge the contents of the dippers into said receiver as said dippers reach a relatively elevated position, and means to rock said assembly.

10. A metering device comprising a pair of open-topped tanks disposed in adjacent relation, a receiver disposed adjacent said tanks, a rocker assembly including a dipper at each end and conduits extending longitudinally inward from said dippers, said rocker assembly having a discharge opening with which said conduits communicate at adjacent ends, means mounting said rocker assembly for rocking movement about an axis intermediate the ends of said assembly, the assembly being positioned so that upon rocking movement thereof the dippers alternately enter corresponding tanks, and means to rock said assembly; said receiver being positioned to receive contents of said dippers discharged through said opening upon rocking movement of the assembly.

11. A metering device comprising a pair of open-topped tanks disposed in adjacent relation, a receiver disposed adjacent said tanks, a trough-like rocker assembly including a dipper at each end and having a discharge opening in the bottom intermediate said ends, means mounting said rocker assembly for rocking movement about an

axis intermediate said ends, the assembly being positioned so that upon rocking movement thereof the dippers alternately enter corresponding tanks, and means to rock said assembly; said receiver being positioned to receive contents of said dippers discharged through said opening upon rocking movement of the assembly.

12. A metering device as in claim 11 including a baffle interposed in said trough-like rocker assembly above said opening; the lower edge of said baffle being disposed at and intersecting said opening, whereby to prevent flow of the contents of one dipper to the other dipper.

HERBERT S. HIGHT.