Jan. 9, 1962 M. PAULSON ET AL 3,015,957

APPARATUS AND PROCESS FOR SAMPLING

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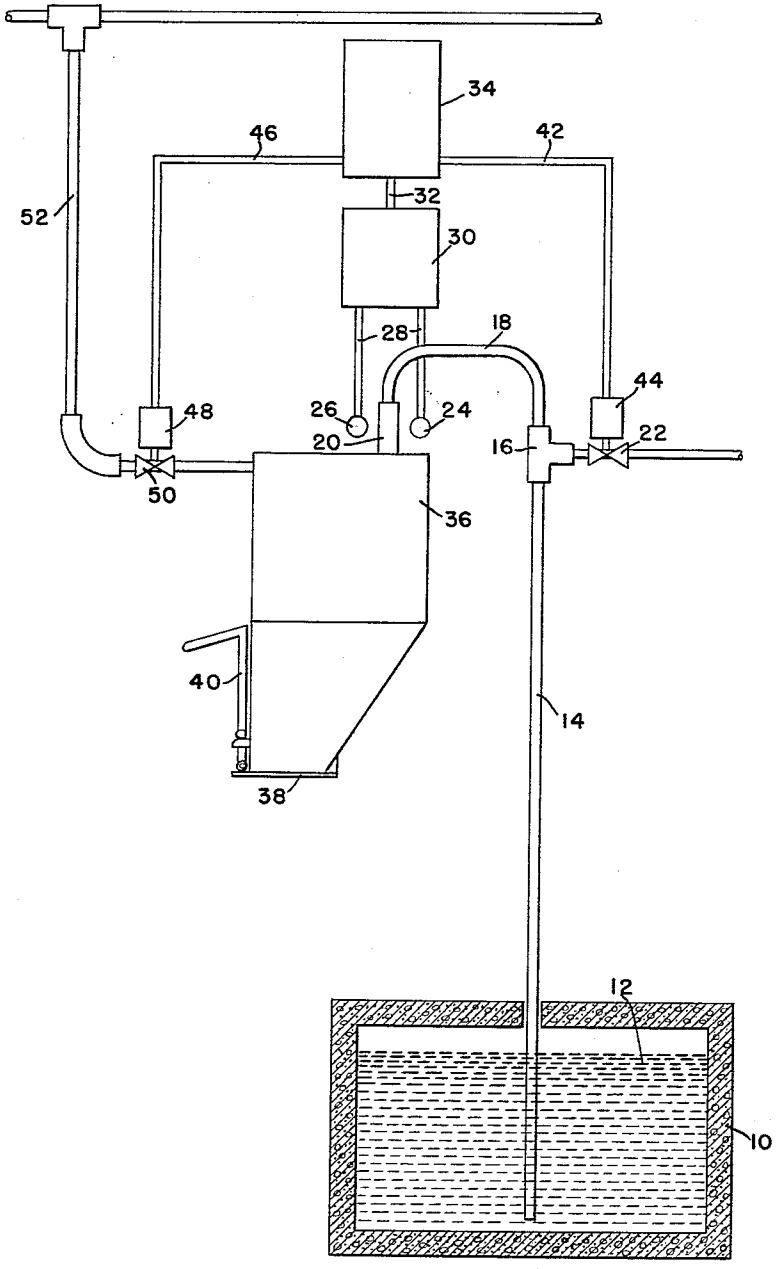


FIG. 1

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2 Sheets-Sheet 2

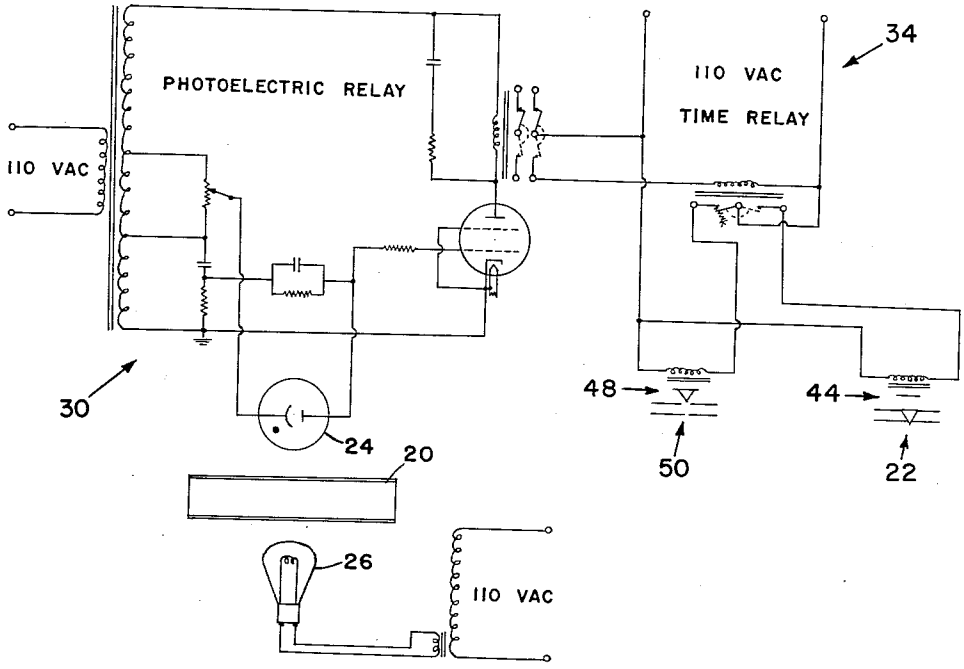


FIG. 2

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United States Patent Office 3,015,957 Patented Jan. 9, 1962

3,015,957

APPARATUS AND PROCESS FOR SAMPLING

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Filed Nov. 2, 1959, Ser. No. 850,128
3 Claims. (Cl. 73—421)

The present invention relates to apparatus and method for sampling a liquid and/or liquid suspension, and more particularly the invention relates to sampling of groundwood pulp.

In the production of mechanical pulp the following properties are of importance: Freeness, uniformity, strength, color, finish of sheet (when made into paper) cleanliness, and resin content. A control of these quantitatively is the ideal to be arrived at in the manufacture of this class of pulp.

The wood fibers are suspended in water which continuously move from the grinders to other steps in the process of making paper. It is necessary to understand that the sample tested must actually be like the large mass of material concerning which information is desired. Unless care be taken in selecting the sample, the results of the test will be useless. Heretofore a sample was taken from the fiber suspension at stated intervals by hand dipping the complete sample to be tested.

An object of the invention is to collect a representative sample from a continuous changing liquid.

Other and further objects of the invention and the advantages of the same will be pointed out hereinafter and indicated in the appended claims, or will be obvious to one skilled in the art upon understanding the present disclosure.

For the purpose of this application there has been elected to set forth one particular structure and one process of sampling but it is to be understood that they are presented for illustrative purposes only and are not to be accorded any interpreatation such as might have the effect of limiting what is claimed short of its true and comprehensive scope in the art.

In the drawing:

FIGURE 1 is a side view of the apparatus used for carrying out the process; and

FIGURE 2 is a diagrammatical illustration of the electrical equipment.

The wood grinding may be carried out by any suitable means such as shown in Patents 2,396,587 Lowgren et al. 1946 and 2,406,904 Roberts 1946. The pulp is produced by the desired means and is discharged into chest **10** where it is suspended in an aqueous bath. If the chest **10** from which the pulp suspension is continuously withdrawn, if provided with a cover **12**, there must be an opening through which supply pipe **14** extends. The supply pipe must extend below the surface of the pulp suspension so that the end is always in the liquid. The supply pipe or conduit **14** is secured to T coupling **16**. From member **16** extends pipe **18** which has secured to one end glass tubing **20**. The length of tubing **20** and the conduit **18** determines the amount of liquid taken at each time. The tubing **20** is connected to air tight container **36**. To remove the sample from the container there is provided a hingedly connected bottom **38** which is locked by locking means **40**.

Connected to T member **16** is a conduit communicating with the atmospheric air. In this conduit is position valve **22**. The valve is operatively connected to solenoid **44**. Mounted on one side of glass tubing **20** is light source **24** and on the opposite side of tubing **20** is mounted photoelectric tube **26**. The tubes **20** and **24** are connected to photoelectric relay **30**. Electrical conductors

32 connect the relay **30** to pneumatic timing relay **34**. Electrical conductors **42** connect rleay **34** to solenoid **44**. Solenoid **48** is connected to the relay **34** by means of conductors **46**. A vacuum supply conduit **52** is connected to container **36** adjacent the upper end. Mounted in the vacuum conduit is valve **50**. This valve is operatively connected to solenoid **48**. A similar device should be employed in conjunction with each wood grinder.

At the beginning of operation the solenoid controlled valve **50** is open and the storage container **36** is under a vacuum. This causes the liquid or pulp suspension to raise in pipe **14** and **18**. When the material fills the glass tubing, the glass tubing with the material therein will cut off light between source **24** and photoelectric tube **26**. Due to the light ray being cut off, the photoelectric relay will momentarily energize the pneumatic timing relay. Upon energizing of the timing relay the relay contacts reverse their positions. This closes solenoid controlled valve **50** and opens solenoid controlled valve **22**. Air rushes through opened valve **22** and into the storage tank **36**. The pulp stock in the pipe **18** and tube **20** is pushed into the storage tank **36**. Upon the pneumatic timing relay returning to the de-energized position solenoid controlled valve **50** is opened and solenoid controlled valve **22** is closed.

The frequency of taking a sample for groundwood pulp should fall within the range of about one to five minutes.

The tester removes the samples from container about every one or two hours depending how close it is desired to determine by test the type of pulp being produced.

It is to be understood that any suitable type photoelectric relay may be used, for example General Electric CR7505–K100G3. Various types of pneumatic timing relay may be used, for example Square D Co. class 9050 type BG10.

The vacuum supply conduit is connected to a vacuum pump means (not shown). During the cycle of gathering each sample, the vacuum on the collecting container will be that necessitated by the viscosity of the material being sampled. For example for ground wood pulp suspension a low vacuum will give satisfactory results. If the groundwood pulp has a consistency of about 3.5% and the supply pipe is about five feet long and the supply pipe is ¾″ copper pipe, a vacuum of about 17″ of mercury is required. The temperature of the groundwood pulp in the example being about 180° F.

What is claimed:

1. A sampling device comprising a closed collecting container, said container having a hingedly connected bottom, a vacuum conduit, said conduit connected to the said collecting container side adjacent the top thereof, a valve in the vacuum conduit, a transparent conduit connected to the top of the collecting container, said transparent conduit extending upwardly therefrom, a supply conduit connected to the transparent conduit and extending into a source of groundwood pulp suspension to be sampled, an air conduit connected to the supply conduit a predetermined distance from the said transparent conduit, a valve positioned in the said air conduit for permitting atmospheric air to enter the supply conduit at predetermined times, a light source located on one side of said transparent conduit and a photoelectric tube positioned on the opposite side of said conduit, the said photoelectric tube operatively connected to said valves in the vacuum conduit and in the air conduit.

2. A sampling device comprising a closed collecting container, a vacuum conduit connected to a side of the container adjacent the top thereof, a valve in the vacuum conduit, a light penetrable conduit extending from the top of the container, a supply conduit connected to the

light penetrable conduit and extending into a pulp suspension to be sampled, a valve operatively connected to the supply conduit a predetermined distance from the top of the said container for opening the supply line to atmospheric air at predetermined times, a light source positioned on one side of said light penetrable tube, a photoelectric tube positioned on the opposite side of said penetrable tube, said photoelectric tube operatively connected to said valves.

3. A sampling device comprising a closed collecting container, a vacuum conduit having a valve therein, said conduit connected to said collecting container, a glass tube communicating with the container and extending upwardly from the top thereof, a supply pipe extending from the glass tube into the material to be sampled, an air pipe connected to the supply pipe, a predetermined distance from the said glass tube, a valve positioned in said air pipe connected to the supply pipe, a light source positioned on one side of said glass tube and a photoelectric tube connected on the opposite side, said photoelectric tube operatively connected to said valves in the vacuum conduit and in the air pipe and means for causing said valves to open and close at predetermined intervals whereby a predetermined quantity of sampled material from the supply pipe is discharged into the said container.

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