United States Patent [19]

Buckman et al.

[11] **3,784,116**

[45] **Jan. 8, 1974**

[54] **PULPING SYSTEM WITH JET ASSIST FOR PULPER DISCHARGE**

[75] Inventors: **Wayne T. Buckman,** Pipersville; **Blaine Monroe Miller,** Malvern; **Thomas Robert Lewis,** Hatboro, all of Pa.

[73] Assignee: **Wascon Systems Incorporated,** Hatboro, Pa.

[22] Filed: **Sept. 28, 1971**

[21] Appl. No.: **184,461**

[52] **U.S. Cl.** **241/46.17,** 241/74, 417/198

[51] **Int. Cl.** **B02c 18/40**

[58] **Field of Search** 241/39, 42, 43, 46.17, 241/74; 417/198

[56] **References Cited**

UNITED STATES PATENTS

3,565,350	2/1971	Combs	241/46.17 X
2,382,391	8/1945	Berman	317/198
2,778,318	1/1957	von Haken	417/198
3,188,942	6/1965	Wandel	241/46.17 X
3,375,776	4/1968	Dyson	241/74
3,584,800	6/1971	Dodd	241/74 X

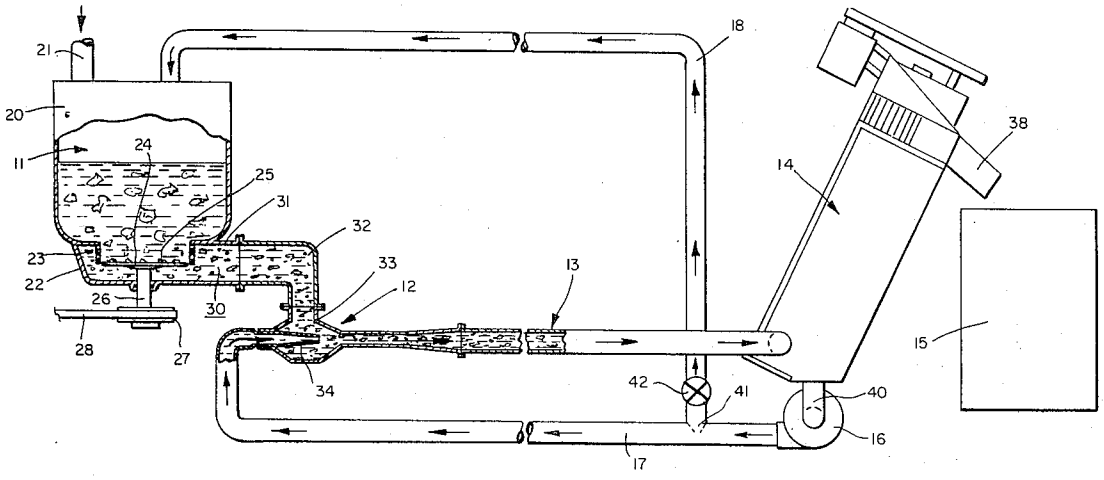
Primary Examiner—Granville Y. Custer, Jr.

Attorney—J. Herman Yount, Jr. et al.

[57] **ABSTRACT**

A pulping system is disclosed herein, having a pulping tank wherein waste is abraded and comminuted, and discharged therefrom, to a press as a water-waste slurry. Water is extracted from solids in the press, and is pumped therefrom, through a jet located at the pulper discharge, with the jet being operative to educt slurry from the pulper, and to assist its conveyance to the press. Waste water which feeds the jet is extracted from a return line of press water being recycled to the pulper.

2 Claims, 2 Drawing Figures



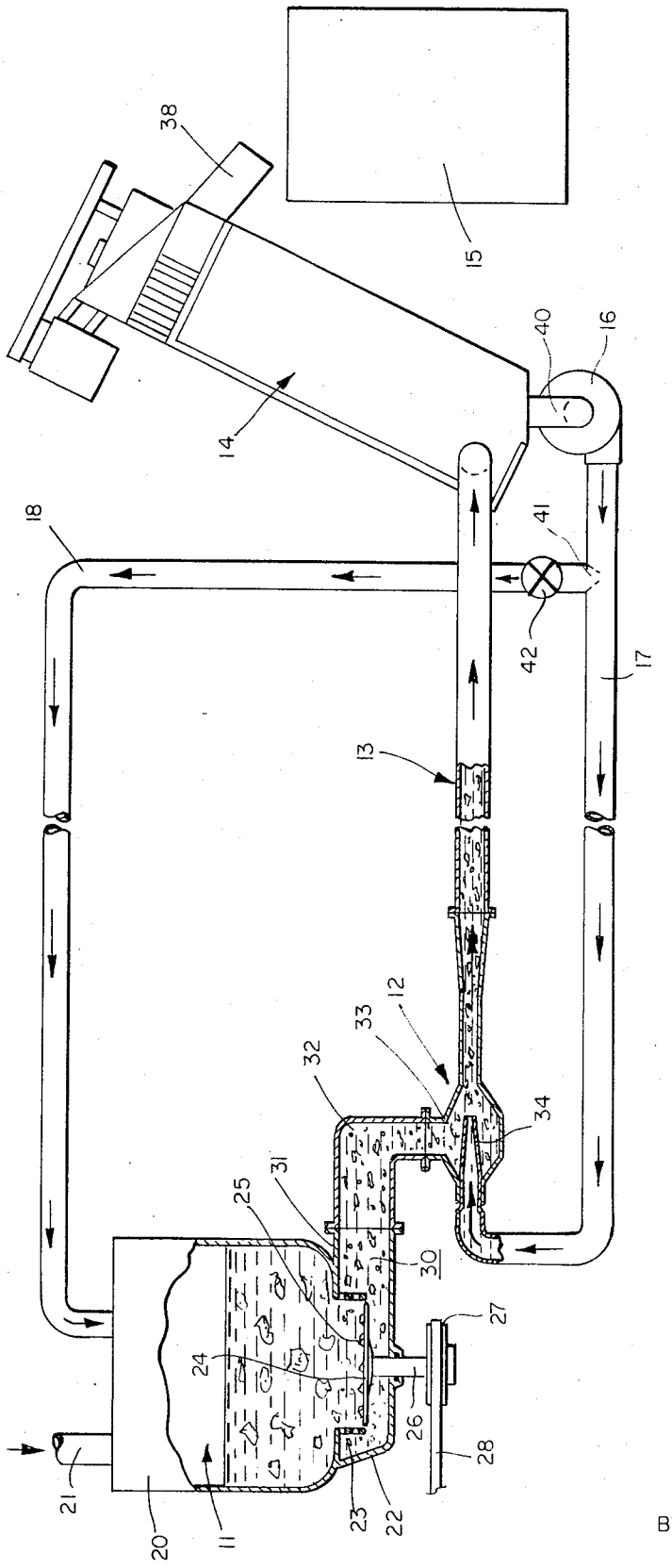


Fig. 1

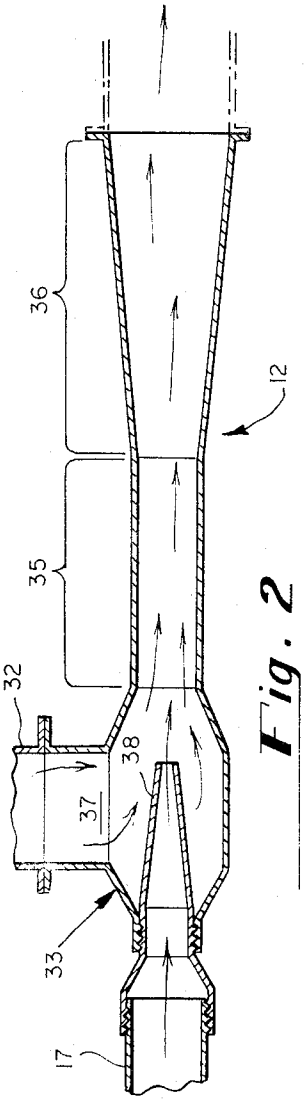


Fig. 2

INVENTORS
WAYNE T. BUCKMAN
BLAINE MONROE MILLER, JR.
THOMAS ROBERT LEWIS

BY Paul & Paul
ATTORNEYS.

PULPING SYSTEM WITH JET ASSIST FOR PULPER DISCHARGE

BACKGROUND OF THE INVENTION

In today's society, it has become commonplace for numerous consumer items, business items and the like to come packaged, whereby packaging for the same becomes waste which must be discarded. Moreover, in industrial and institutional operations, the waste generated thereby has substantially increased in volume, to the point that handling and removal of the same has become of paramount significance. Traditional methods of handling waste, involving the accumulation of waste in a storage area, and periodic pick-up of the same for disposal has presented numerous problems, such as the size of a trash accumulation location, high labor costs attendant to waste pick-up, as well as the eventual disposal of waste thus accumulated and eventually removed from the situs of generation.

It has been found, that these problems, and many others, may be significantly reduced by substantially reducing the volume of waste that must eventually be discarded. This volume reduction has been accomplished by providing a pulping system whereby aggregate mixtures of trash, waste, and any other discardable items may be subjected to a size reduction operation, generally an abrading, comminuting or the like. It has been found that such is best accomplished, in a water or other liquid medium, as in a pulping tank, whereby particles may be reduced to a preselected size, and then conveyed, in a water medium to a water press, or other suitable extraction device, whereby the water medium that has facilitated the pulping operation may be extracted from the then-sized waste (termed pulp), and with the solid waste then delivered from the press being disposed of in some other manner, as by collection, burning, or the like. The type of system immediately above-described has been found to be capable of reducing the volume of waste from office buildings, hospitals, manufacturing facilities, and other institutional, as well as domestic facilities, to about 20 percent of its original volume, thereby greatly reducing the significant removal and subsequent disposal operations.

In the course of accomplishing the desirable result set forth above, pulping apparatus of the type described in U. S. Pat. No. 3,489,356 have been developed, as have presses, such as the type described in U. S. Pat. No. 3,426,677.

In systems of the type utilizing the disclosures of the two above-mentioned patents, the water removed from shredded waste within the press is generally pumped to a sewage discharge, if desired, or may be returned to a pulping tank, such as that described in the above-mentioned pulper patent, for recycling.

In systems of this type, it is necessary for provision to be made for conveying a pulped slurry from the pulping tank to the press. Because this slurry contains an aggregate of fine metal, paper, cardboard, plastic and other shredded components, pumps capable of handling not only the volume of liquid delivered from a pulper, but also capable of handling the great quantity of finely divided particles during a pumping operation in which the slurry is delivered to the press, without damaging the pump, have been very expensive and have lent themselves to early deterioriation and short effective lives.

SUMMARY OF THE INVENTION

The present invention is directed toward refining the system described above, in providing a means for delivering slurry from a pulper to a press, without utilizing expensive components that lend themselves to deterioriation by virtue of contact with the substance which they are adapted to convey. This invention utilizes water from the press, which is delivered by a pump, to the pulper location, and utilizes a nozzle to effect a jet delivery through a cavity which facilitates an eduction of slurry from the pulper, and impels the same to the press.

Accordingly, it is a primary object of this invention to provide a novel overall waste treatment system.

It is a further object of this invention to provide a novel means of waste conveyance by the use of a liquid jet.

Other objects and advantages of the present invention will be readily apparent from a reading of the following brief description of the drawing figures, the detailed description of the preferred embodiment, and the appended claims.

IN THE DRAWINGS

FIG. **1** is a side elvational view, with portions broken away and illustrated in section, and partially schematically illustrated, of a waste handling in accordance with this invention.

FIG. **2** is an enlarged fragmentary detailed view of a portion of FIG. **1**, wherein the jet flow details are more clearly illustrated.

Referring now to the drawings in detail, reference is first made to FIG. **1**, wherein the system generally designated by the numeral **10** is illustrated, as comprising a pulping apparatus, generally designated by the numeral **11**, a pulping flow assist device **12**, a conduit **13** between the device **12** and a press, a press **14**, a receiving tank **15** for solid separated from water within the press **14**, a discharge pump **16**, at the lower end of the press **14**, and return water lines **17** and **18**, for carrying water extracted from waste within the press **14** to the device **12** and the pulper **11**, respectively.

The pulping apparatus **11** may be constructed generally along the lines of the pulping apparatus disclosed in U. S. letters Pat. No. 3,489,356, the disclosure of which is herein incorporated by reference, or in any other suitable manner. For example, the pulper **11** may comprise a tank **20** having a fresh water inlet **21** or the like, for the constant replenishment of the water supply within the tank **20** with fresh water, as a pulping medium, and the tank **20** will generally have a lower end **22** located on the downstream side of the pulping apparatus **11**, across a sizing screen **23**. The sizing screen **23** will be selected to have desirably sized holes therein for passing therethrough of cut, severed, abraded, comminuted or otherwise desirably sized particles that have been shredded or the like due to the vigorous action of a rotating impeller plate **24**, having abrading teeth on a surface thereof, such as those **25**. The plate **24** may be rotatably driven by a shaft **26**, that in turn is driven by a suitable pulley and belt arrangement **27** and **28** as desired. Within the tank **20**, there would thus be water and debris and other waste particles, which, after passing through the holes of the sizing screen **23**, will be comminuted to size, and are hereinafter called "slurry," as for example the slurry in the zone **30** at the

lower end of the pulping apparatus **11**. The "slurry" **30** may, of course, include hard components, such as plastic, metal, as well as sheet plastic, paper and the like. A discharge end or outlet **31** is provided for the pulper **11**, that is connected by a suitable elbow or the like **32**, to an eductor cavity **33**. A stream of water, preferably emanating from the pump **16** at the outlet of the press **14** is delivered, through the line **17**, to a jet type nozzle **34**, that is threadedly or otherwise suitably secured to the left-most end of the chamber **33**, as viewed in FIG. **1**, whereby a stream of water or other fluid extracted from solids within the press **14** emanates from the nozzle **34**, in the form of a jet, at sufficient pressure to traverse the throat portion **35** of the eductor unit **12**, and to undergo an expansion upon entering the divergent portion **36** of the eductor unit **12**, whereby the pressurized water emanating from the nozzle **34** will undergo an expansion, with a consequent pressure drop in the divergent zone **36** to create a reduced pressure or partial vacuum in such zone, which draws from the interior **37** of the cavity **33**, and which creates a partial vacuum in the line **32**, thereby educting slurry from the zone **30**, by a suction like technique, similar to that of a venturi. The impetus thus given to slurry discharge from the pulper **11** thus facilitates the conveyance of the slurry through the delivery line **13**, to the press **14**. The press **14** may be of the type disclosed in detail in U. S. letters Pat. No. 3,426,677, if desired, or any such type that will separate most or sub-stantially all of the water from the solids, and deliver the solids into a receptacle **15**, as by passing along a chute **38** thereto, and deliver the water through a discharge line **40**, to the intake side of a pump **16**, which may, if desired, by of the centrifugal pump type. The pump **16** then delivers the return water either through the line **17** to the nozzle **34** as aforesaid, or to the line **18**, for delivery to the pulper tank **20**, in that it will be noted that the output from the pump **16** is bifurcated at **41**, and may, if desired, be provided with a valve **42** which can direct selected amounts of, or all of the flow to either or both of the lines **17** and **18**, as desired. The solid waste delivered into the container **15** is thus reduced in volume to about 20 percent of the original volume, and may easily be carried away, for subsequent burning or discharge, as desired.

It will further be noted that, as an alternative arrangement, the water delivered from the pump **16** could all go entirely to the tank **20**, and the supply **21** of fresh

water could be used to operate the eductor unit **12**, if desired.

It will thus be seen that by virtue of the system disclosed herein, an efficient and economical means for transfer of slurry from the pulper to the press is provided, which obviates the necessity for the use of a heavy duty pump, adapted for handling water with solid particles therein, and also obviating the necessity of providing electrical or other power source for operating such pump.

It will be noted that various modifications may be made in the details of construction, as well as in the use and operation of the system of this invention, all within the spirit and scope of the invention, as defined in the appended claims.

What we claim is:

1. A system for treatment of waste material, comprising pulper means for forming waste material into a slurry, said pulper means including tank means for receiving the waste material and a liquid and means for forming the waste material and liquid into a slurry, press means for separating the waste material from the liquid in the slurry, first conduit means connected in fluid communication with said tank means and press means for conducting slurry from said tank means to said press means, eductor means connected in fluid communication with said first conduit means for inducing a flow of slurry from said tank means to said press means through said first conduit means, said eductor means including chamber means for receiving slurry and having an inlet connected in fluid communication with said tank means and an outlet, venturi means having a throat connected in fluid communication with said outlet from said chamber means, and nozzle means for directing a stream of liquid from said press means toward said throat of said venturi means to induce a flow of slurry from said chamber means through said venturi means, and second conduit means connected in fluid communication with said eductor means and said press means for conducting to said nozzle means liquid separated from the waste material in the slurry by said press means.

2. A system as set forth in claim **1** further including pump means for inducing a flow of liquid from said press means to said nozzle means.

* * * * *