Aug. 18, 1953 C. S. REID 2,649,371

APPARATUS FOR DEINKING AND DEFIBERING WASTEPAPER

Filed May 3, 1949 3 Sheets-Sheet 1

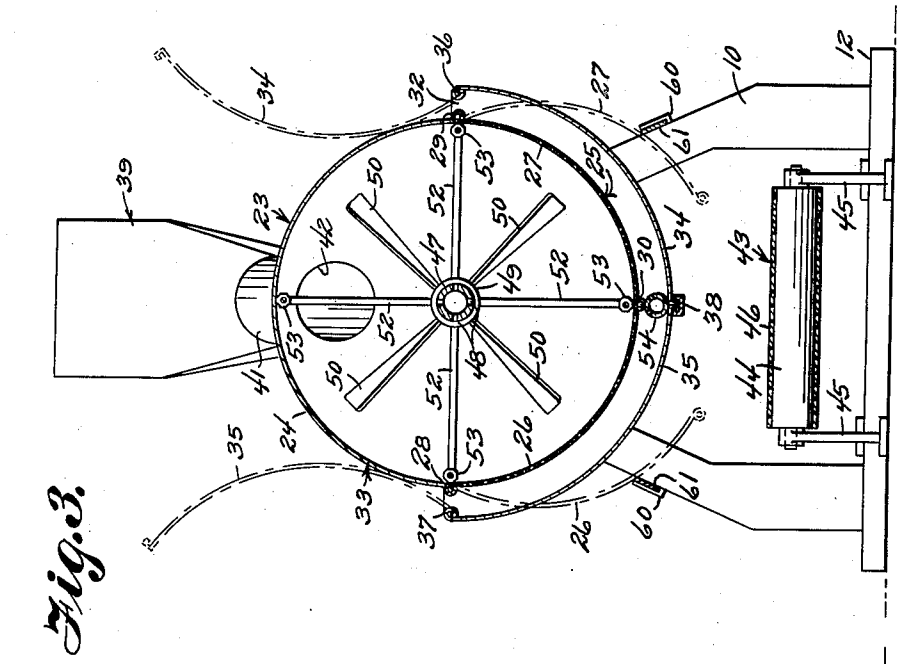


Fig. 3.

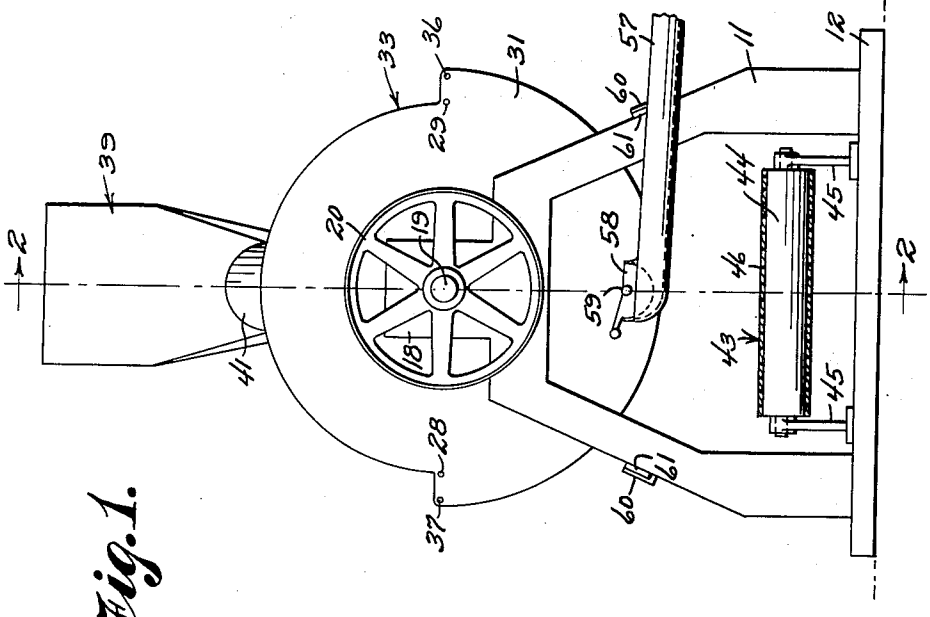


Fig. 1.

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APPARATUS FOR DEINKING AND DEFIBERING WASTEPAPER

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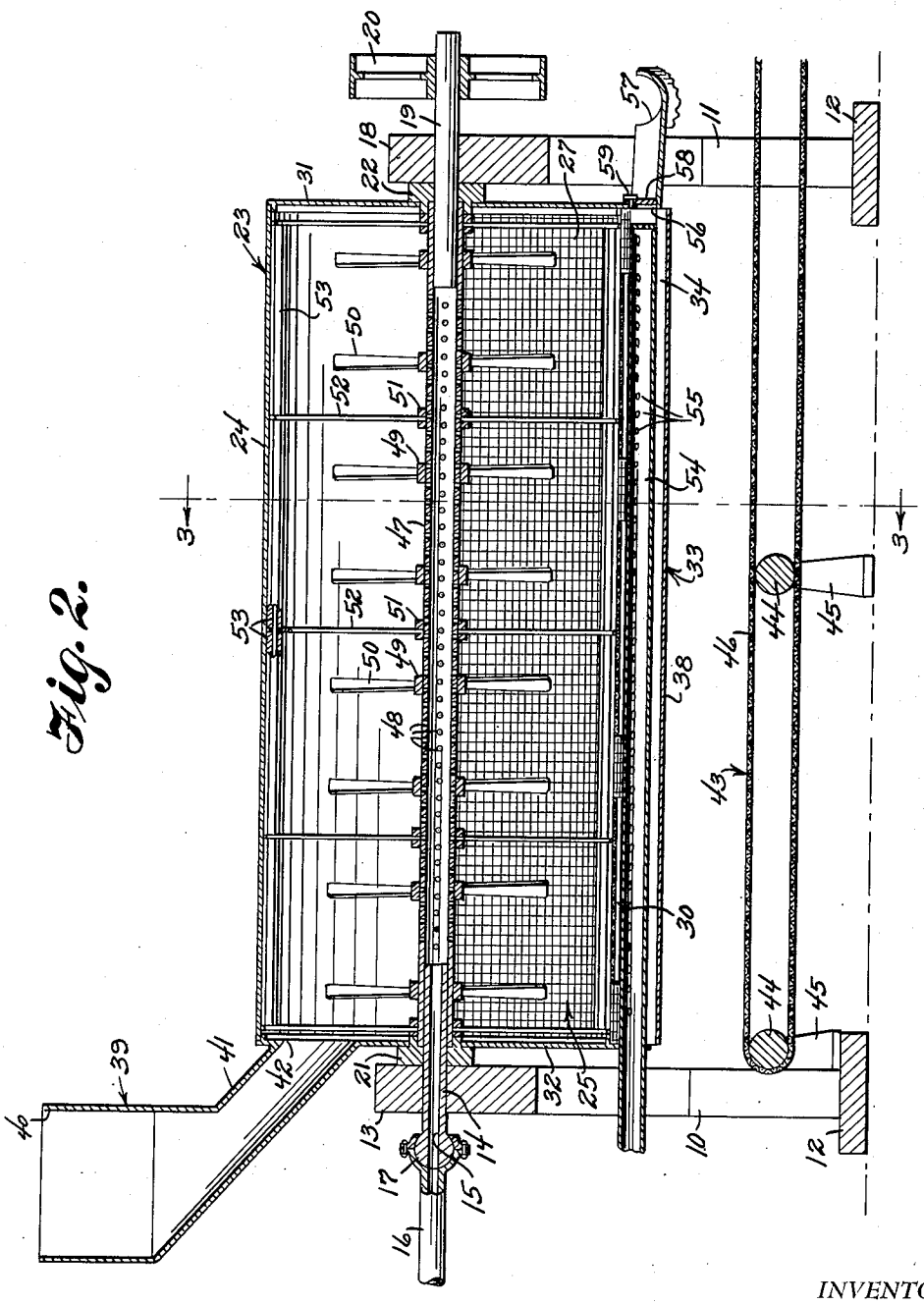


Fig. 2.

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Filed May 3, 1949 3 Sheets-Sheet 3

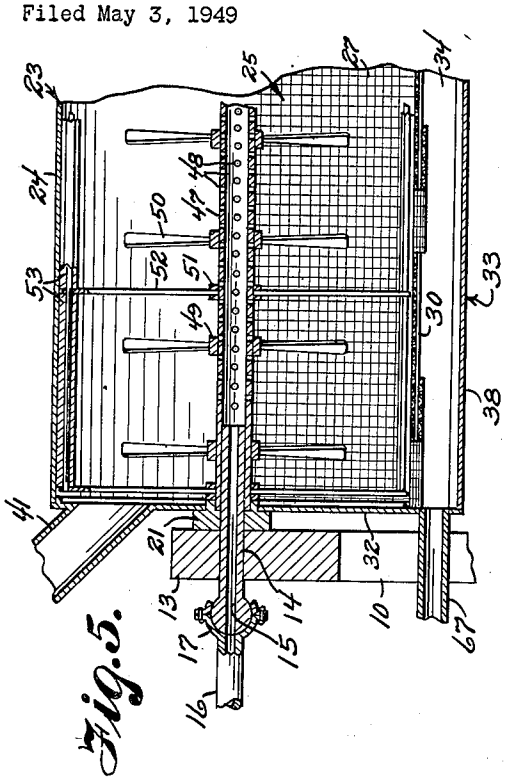


Fig. 5.

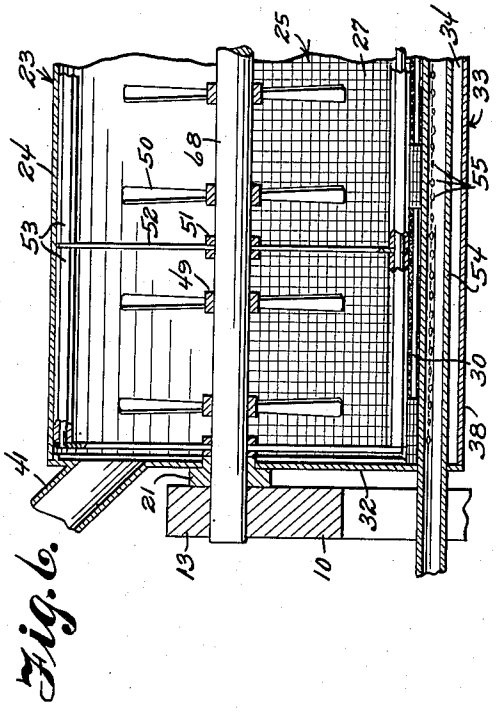


Fig. 6.

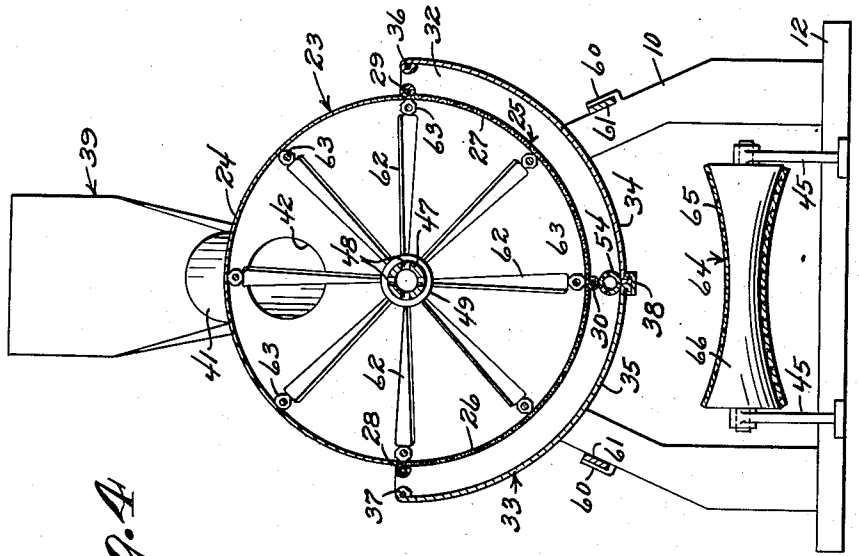


Fig. 4

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APPARATUS FOR DEINKING AND DEFIBERING WASTEPAPER

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4 Claims. (Cl. 92—1.5)

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This invention relates to a deinking process and means therefor, and more particularly to an apparatus for removing ink from newspapers and the like.

The object of the invention is to provide an apparatus for removing printer's ink from newspapers and other paper stock whereby the stock can be reclaimed and used in making further newsprint.

Another object of the invention is to provide an apparatus for deinking and decoloring waste paper of all kinds, such as newspapers, magazines, so that with the ink removed the resulting pulp may again be used for making paper.

A further object of the invention is to provide an apparatus whereby paper can be treated and the ink removed therefrom with great economy and facility.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are used to designate like parts throughout the same:

Figure 1 is an end elevational view of the machine for deinking waste paper, according to the present invention, and with the conveyor belt being shown in section;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a transverse vertical sectional view of a modified form of the machine;

Figure 5 is a fragmentary vertical longitudinal sectional view of the modified form of the machine; and

Figure 6 is a view similar to Figure 5, but showing another modification of the machine.

Referring in detail to the drawings, there is shown the apparatus which is used according to the present invention for removing imprinted ink from newspapers or other paper stock. The apparatus comprises a pair of spaced parallel vertically disposed standards 10 and 11 which are secured to a base 12 for supporting the standards 10 and 11 on a horizontal surface. Mounted on the upper end of the standard 10 is a bearing block 13, Figure 2, and the bearing block 13 rotatably supports a horizontally disposed shaft 14, there being a passageway 15 extending longitudinally through the shaft 14 for conveying fluid from a source of supply. A hose 16 is connected to the outer projecting end of the shaft 14 by means of a swivel connection 17, and the hose

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16 serves to convey fluid, such as water, from a suitable source of supply.

Carried by the upper end of the other standard 11 is a bearing block 18 which rotatably supports a horizontally disposed solid shaft 19 therein. Mounted on the outer projecting end of the shaft 19 is a pulley 20 and a belt (not shown) is adapted to be trained over the pulley 20 and connected to a suitable power source for rotating the shaft 19.

Secured to the inner surface of the bearing block 13 is a body member 21 and secured to the other bearing block 18 is a similar body member 22, the members 21 and 22 providing a support for a stationary drum 23. The drum 23 is cylindrical in shape and is adapted to receive therein the waste stock from which the ink is to be removed. The drum 23 includes a semi-cylindrical upper portion 24, Figure 3, and a semi-cylindrical bottom portion 25. The bottom portion 25 includes a pair of arcuate sections 26 and 27 which are each fabricated of a reticulated material, such as wire mesh screen. A pin 28 hingedly connects the upper end of the arcuate section 26 to one of the lower horizontal edges of the upper portion 24, while a similar pin 29 hingedly connects the upper end of the other arcuate section 27 to the other horizontal edge of the upper portion 24, Figure 3. Thus, the sections 26 and 27 may be swung from their solid line position of Figure 3 to the dotted line position when it is desired to empty the drum of the deinked pulp. The sections 26 and 27 pivot about axes extending through the pins 28 and 29.

For normally maintaining the sections 26 and 27 in their closed position a pin 30 projects through corresponding hinge parts which are formed on the meeting edges of the arcuate sections 26 and 27. The drum 23 is provided with a pair of spaced parallel end walls 31 and 32. Extending between the end walls 31 and 32 and arranged longitudinally below the drum 23 is a semi-cylindrical vat 33 which is adapted to receive waste liquid that drains through the bottom portion 25 of the drum 23. The vat 33 includes a pair of arcuate sections 34 and 35, there being a pin 36 hingedly connecting the arcuate section 34 to the end walls 31 and 32. A similar pin 37, Figure 3, hingedly connects the upper horizontal edge of the arcuate sections 35 to the end walls 31 and 32. Thus, the arcuate sections 34 and 35 can be moved from the solid line position of Figure 3 to the dotted line position when the drum 23 is being emptied of deinked pulp. For normally maintaining the arcuate sections 33 and 34 in assembled or closed

relation, a clamp 38 is arranged in sliding engagement with a projecting portion of each of the sections 34 and 35. The clamp 38 can be disengaged when the sections 33 and 34 are to be swung open.

For filling the drum 23 with waste paper from which the ink is to be removed, a hopper 39 is provided, the hopper 39 being provided with an upper open end 40 and an inclined chute 41 for the passage therethrough of the paper into the drum 23, there being an opening 42 arranged in the end wall 32 which registers with the lower end of the chute 41 for the passage therethrough of the material into the drum 23.

Extending longitudinally below the machine is a conveyor 43 which includes a plurality of horizontally disposed rollers 44 that are supported on uprights 45. A belt 46 is trained over the rollers 44 and when the drum 23 and vat 33 are opened, the deinked pulp will drop onto the conveyor 43 and the conveyor 43 will carry the pulp to drying apparatus, pressers, or direct to a paper mill, as desired.

Extending longitudinally through the drum 23 is a horizontally disposed pipe 47 which has its ends arranged in engagement with the shaft 14 and the shaft 19. The pipe 47 is provided with a plurality of spaced apertures or openings 48 so that the incoming water or water mixed with chemicals passes through the shaft 14, and is discharged through the openings 48 into the interior of the drum 23. Thus, as the shaft 19 rotates, the pipe 47 will also rotate. The pipe 47 has fixed thereto a plurality of spaced clamps 49 which each carry paddles 50, the paddles 50 revolving in the drum 23 as the shaft 19 rotates so that the chemicals and waste paper stock are thoroughly intermixed in the drum 23. The pipe 47 also carries a plurality of spaced clamps 51, which have secured thereto the inner ends of a plurality of radially extending rods 52. Carried by the outer ends of the rods 52 is a plurality of rollers 53 and the rollers 53 serve to dislodge any pulp which may tend to stick to the inner surface of the drum 23. The rollers 53 are of such a size and revolve sufficiently fast that fibers are prevented from building up in the path of the rollers.

Interposed between the drum 23 and the vat 33 is a horizontally disposed tube 54 which is adapted to be connected to a suitable source of water supply or other fluid, and the tube 54 is provided with a plurality of spaced openings 55 for the egress therethrough of this fluid. The tube 54 serves to spray water onto the stock in the drum 23 to help prevent the stock from precipitating or clogging the bottom of the drum 23.

The end wall 31 is provided with an opening 56, Figure 2, for selectively draining therethrough the waste solution. Thus, the solution that drains through the perforated bottom 25 of the drum 23 is received by the vat 33 and can be emptied through the opening 56. An inclined channel 57 serves to receive or catch the fluid flowing through the opening 56 whereby the dispensed liquid can be conveyed to a sewer or the like. A manually operable valve 58 is hingedly connected to the end wall 31 by means of a pin 59 so that when the valve 58 is in the position shown in Figure 1, the opening 56 is closed and the solution will be maintained in the vat 33.

Secured to each of the standards 10 and 11 is a pair of brackets 60 and the brackets 60 are adapted to releasably support therein a pair of horizontally disposed bars 61, Fig. 3. Thus, when the deinked pulp is being emptied from the drum 23 onto the conveyor 43, a certain portion of the pulp may stick to the arcuate portions 26 and 27 of the drum 23. Therefor, when the drum is opened, the arcuate portions 26 and 27 rest against the bars 61, as shown in Figure 3, so that the operator can kick the bar 61 with his foot to thereby jar the portions 27 and 26 whereby any pulp on the sections 26 and 27 will be freed therefrom and will drop onto the conveyor 43.

Referring to Figure 4, there is shown a slightly modified machine. In the machine of Figure 4, the paddles 62 have a greater length than the paddles 50 in the previously described apparatus, and secured to the outer ends of the paddles 62 are rollers 63 which again serve to dislodge any pulp which may stick to the inner surface of the drum 23. Also there is provided in the apparatus of Figure 4 a slightly modified conveyor, as designated by the numeral 64. The conveyor 64 includes a belt 65 which rides on arcuate rollers 66 so that the belt 65 assumes a concave shape. The conveyor 64 is thus especially suitable when such conveyor is being used for transporting pulp having a high water content, since the arcuate shape of the belt 65 will prevent the water from running over the sides of the belt.

In Figure 5, there is shown an apparatus which has the same construction as the device of Figures 1, 2 and 3, except that the tube 54 has been eliminated. Thus, in Figure 5, there is provided a tube 67 which serves to convey water from a suitable source of supply into the vat 33 and this water can be used to help prevent the pulp from precipitating in the bottom of the drum 23. In Figure 6, there is shown another modified construction wherein the apparatus has the same construction as the device of Figures 1, 2 and 3, except that the hollow shaft 14 has been eliminated and in lieu thereof a solid shaft 68 has been provided. When using the apparatus of Figure 6 the water or other fluid can be added through the hopper 39 or through the tube 54.

In use, waste paper stock, such as newspapers or magazines are loaded into the drum 23 through the hopper 39, then suitable deinking chemicals, in the proper proportions, such as sodium silicate, sodium peroxide, and soap solution are added to the drum 23. The drum 23 can be supplied with water or these chemicals either through the hopper 39, through the hollow shaft 14, or through the tube 54. At the same time that these materials are being added to the drum, the shaft 19 is being rotated by a suitable power source, not shown. This causes the paddles 50 to revolve and also rollers 53 rotate, thereby insuring a thorough intermixing of the materials in the drum 23. The speed of the paddles and rollers can be increased as desired. After the materials have been thoroughly agitated and intermixed, the valve 58 is opened and the spent liquid containing ink is discharged through the opening 56 and conveyed away by means of the channelway 57. Then, the drain valve 58 is closed or moved to the position shown in Figure 1 and additional water is supplied into the drum 23 through the pipe 47, the water spraying through the openings 48 in the pipe 47. While the water is being sprayed into the interior of the drum 23, the paddles 50 and rollers 53 are being slowly rotated or revolved. The incoming water serves to wash free any ink particles from the pulp and this wash water is drained through the opening 56 as previously described. Several washings by

the water may be necessary, depending on the type and quantity of waste paper being deinked. After the pulp has been thoroughly deinked and the water drained off, the vat **33** is opened. This is accomplished by removing the clamp **38** and pivoting the sections **34** and **35** from the solid line position of Figure 3 to the dotted line position. Next, the bars **61** are arranged in engagement with the brackets **60**. Then, the pin **30** is removed from the lower end of the drum **23** and the arcuate sections **26** and **27** of the perforated bottom **25** of the drum **23** are swung from their solid line position to their dotted line position so that the arcuate sections **26** and **27** rest against the bar **61**. This operation allows most of the deinked pulp to drop onto the conveyor **43** where it is carried to the driers, pressers, or paper mill. However, a certain amount of the deinked pulp may stick or adhere to the sections **26** and **27** and to remove or dislodge this material from the sections **26** and **27**, the operator need only kick the bars **61** to thereby jar the sections **26** and **27** whereby the material thereon will also drop onto the conveyor **43** and be conveyed to the desired location. After the deinked pulp has all been emptied from the machine, the drum **23** is again closed as is the vat **33**, and the above cycle is repeated to deink an additional supply of waste paper stock.

What I claim:

1. A machine for deinking and decoloring imprinted paper stock to produce pulp comprising a pair of vertically disposed spaced parallel standards, a horizontally disposed shaft rotatably supported by one of said standards and adapted to be driven by a power mechanism, a hollow shaft rotatably supported by the other standard and adapted to be connected to a source of liquid, a pipe provided with a plurality of spaced openings for the egress therethrough of liquid extending between said shafts and connected thereto, a drum supported by said pair of standards and adapted to receive therein paper stock to be deinked, a hopper connected to said drum for filling the latter, said drum including an upper semi-cylindrical portion and a reticulated bottom portion, said bottom portion comprising a pair of arcuate sections hingedly connected to said top portion whereby the pulp can be emptied from said drum after the ink has been removed therefrom, an arcuate vat extending longitudinally below said drum and supported by said standards for receiving waste liquids discharged through the reticulated bottom of said drum, said vat including a pair of arcuate sections adapted to be opened and closed to selectively discharge the deinked pulp therethrough, a channelway connected to said vat for the conveyance therealong of waste liquid, a manually operable valve for controlling the flow of liquid from said vat, a plurality of spaced parallel radially extending rods each having their inner ends secured to said pipe, rollers connected to the outer ends of said rods for dislodging any pulp adhering to the inner surface of said drum, and a plurality of paddles carried by said pipe for agitating the contents of the drum.

2. A machine for deinking and decoloring imprinted paper stock to produce pulp comprising a pair of vertically disposed spaced parallel standards, a horizontally disposed shaft rotatably supported by one of said standards and adapted to be driven by a power mechanism, a hollow shaft rotatably supported by the other standard and adapted to be connected to a source of liquid, a pipe provided with a plurality of spaced openings for the egress therethrough of liquid extending between said shafts and connected thereto, a drum supported by said pair of standards and adapted to receive therein paper stock to be deinked, a hopper connected to said drum for filling the latter, said drum including an upper semi-cylindrical portion and a reticulated bottom portion, said bottom portion comprising a pair of arcuate sections hingedly connected to said top portion whereby the pulp can be emptied from said drum after the ink has been removed therefrom, an arcuate vat extending longitudinally below said drum and supported by said standards for receiving waste liquids discharged through the reticulated bottom of said drum, said vat including a pair of arcuate sections adapted to be opened and closed to selectively discharge the deinked pulp therethrough, a channelway connected to said vat for the conveyance therealong of waste liquid, a manually operable valve for controlling the flow of liquid from said vat, a plurality of spaced parallel radially extending rods each having their inner ends secured to said pipe, rollers connected to the outer ends of said rods for dislodging any pulp adhering to the inner surface of said drum, and a plurality of paddles carried by said pipe for agitating the contents of the drum, and a liquid conveying tube interposed between said drum and vat, there being a plurality of openings in said tube for the egress therethrough of liquid.

3. A machine for removing ink from paper stock to produce a deinked pulp comprising a horizontally disposed cylindrical drum, approximately the lower half of said drum being of reticulated material for drainage of liquid therethrough, means for supplying liquids to said drum, said liquid supplying means including a perforated pipe extending longitudinally through said drum along the axis thereof, means for rotating said pipe, a plurality of agitating paddles fixed to and projecting from said pipe, arms fixed to and radiating from said pipe, pulp dislodging members carried by the outer ends of said arms, said pulp dislodging members being parallel to said pipe and being positioned in proximity to the wall of said drum for dislodging pulp adhering to the inner surface thereof upon rotation of said pipe, and a vat positioned around the reticulated portion of said drum to receive liquids discharged therefrom.

4. A machine for removing ink from paper stock to produce a deinked pulp comprising a horizontally disposed cylindrical drum, the lower portion of said drum being of reticulated material for drainage of liquid from the drum, a drive shaft mounted for rotation along the longitudinal axis of said drum, means for supplying liquid into said drum, means for rotating said drive shaft, a plurality of agitating paddles fixed to and projecting from said drive shaft, arms fixed to said drive shaft and projecting therefrom to adjacent the wall of said drum, pulp dislodging members mounted on the outer ends of said arms, said pulp dislodging members being parallel to said drive shaft and serving to dislodge pulp adhering to the inner surface of said drum, and a vat positioned around the reticulated portion of said drum to receive liquids discharged therefrom.

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(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
210,339	Lauga	Nov. 27, 1878
241,815	Meech	May 24, 1881
296,780	Pond	Apr. 15, 1884
785,025	Sherwood	Mar. 14, 1905
807,925	Handford	Dec. 19, 1905
848,484	Newnham	Mar. 26, 1907
976,037	Burton	Nov. 15, 1910
1,048,853	Muntzing	Dec. 31, 1912
1,278,155	Jefferson	Sept. 10, 1918
1,607,828	Holthoff	Nov. 23, 1926
1,921,080	Hammond	Aug. 8, 1933
1,993,362	Crisp	Mar. 5, 1935
2,040,417	White	May 12, 1936
2,141,586	Woolsey et al.	Dec. 27, 1938
2,221,294	Bragg	Nov. 12, 1940
2,287,332	Steely	June 23, 1942
2,452,135	Lowe	Oct. 26, 1948