S. MITCHELL.

APPARATUS FOR PAPER MILLS.

APPLICATION FILED FEB. 27, 1918.

1,277,631.

Patented Sept. 3, 1918.

3 SHEETS—SHEET 1.

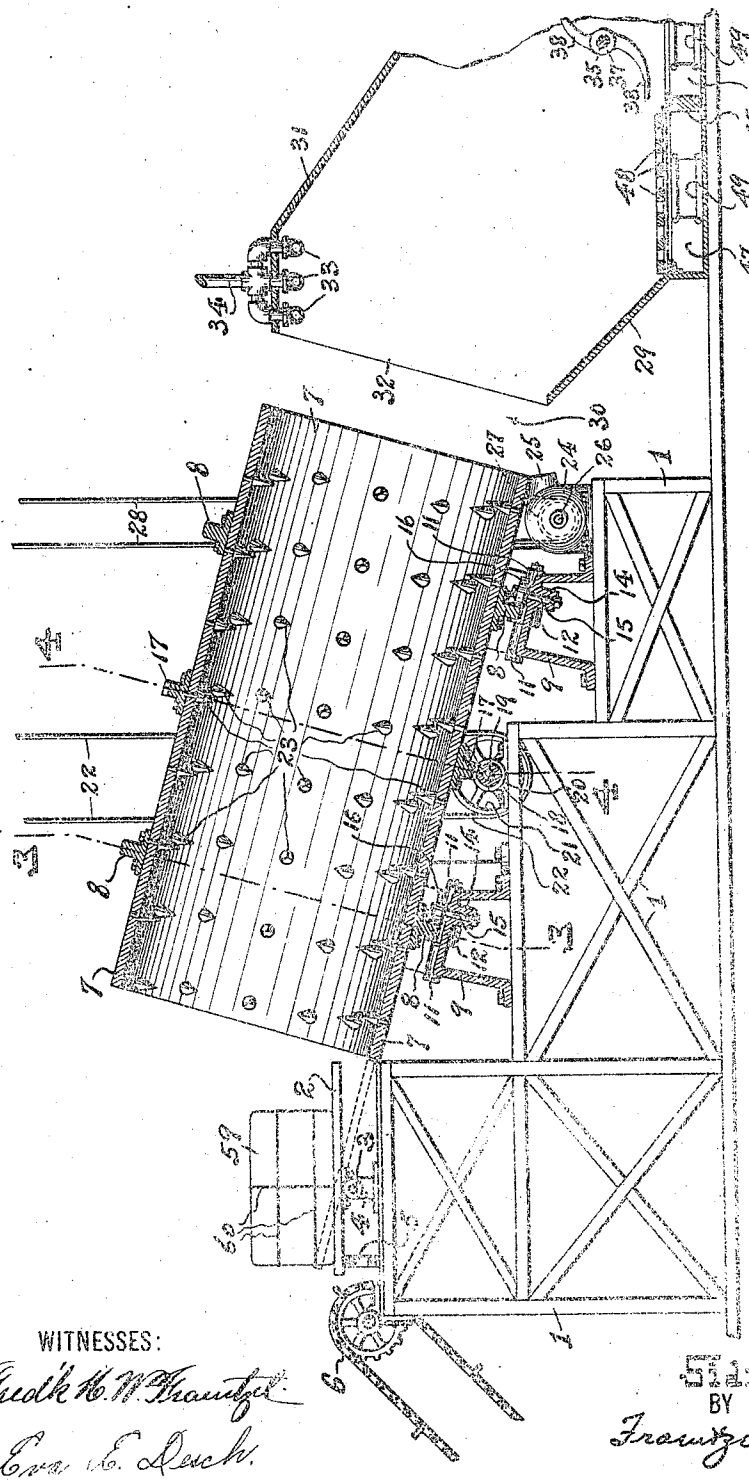


Fig. 1.

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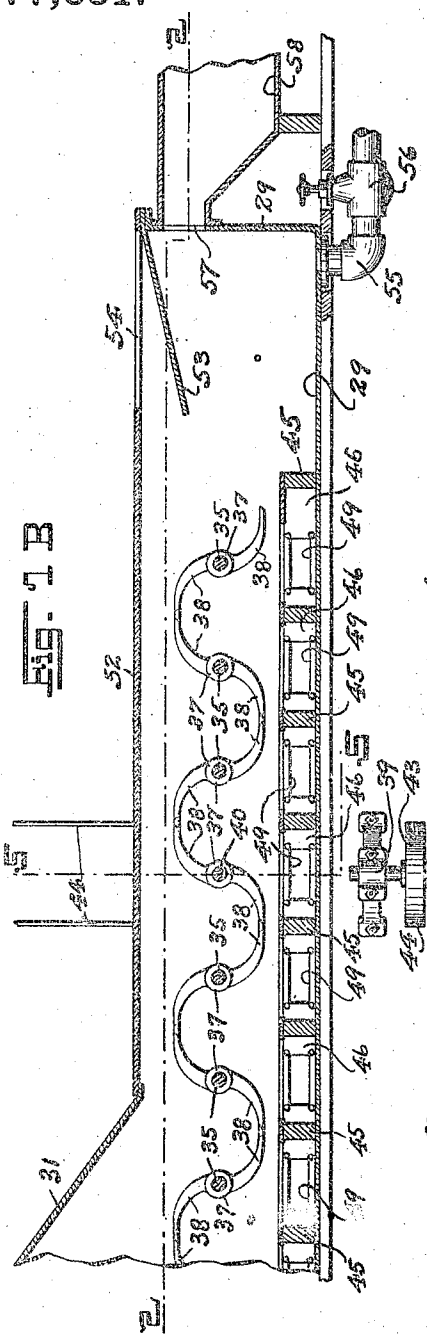


Fig. 1 B

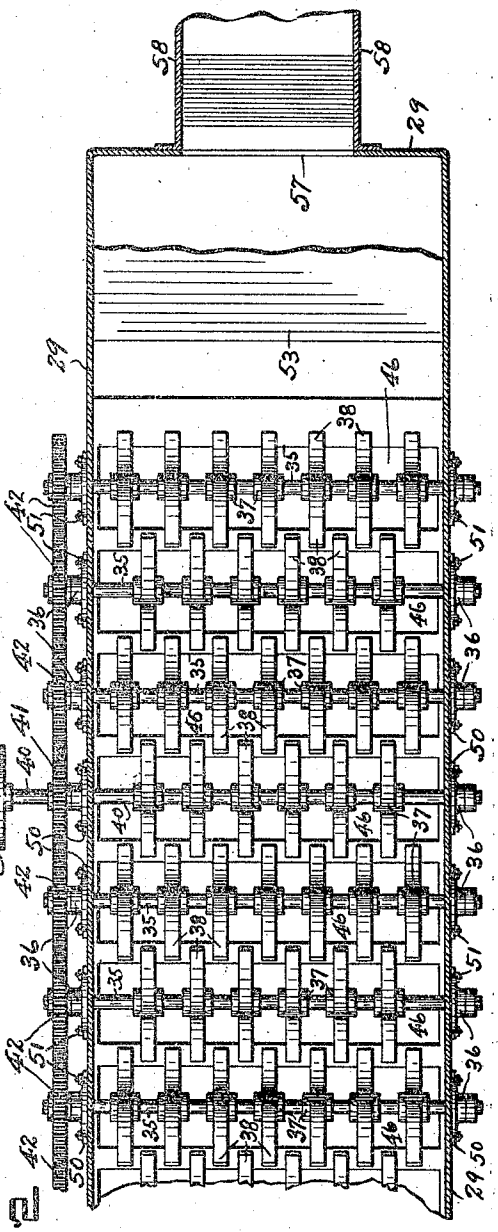


Fig. 2

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3 SHEETS—SHEET 3.

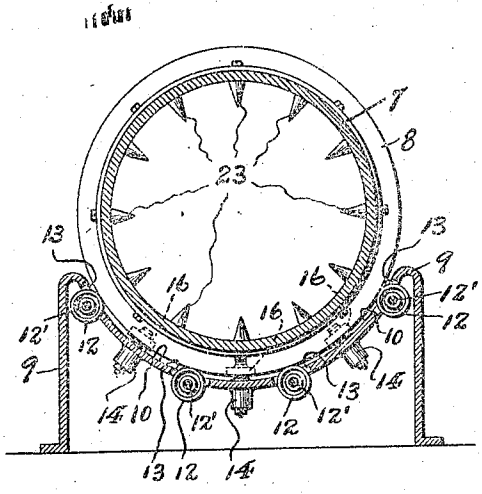


Fig. 3

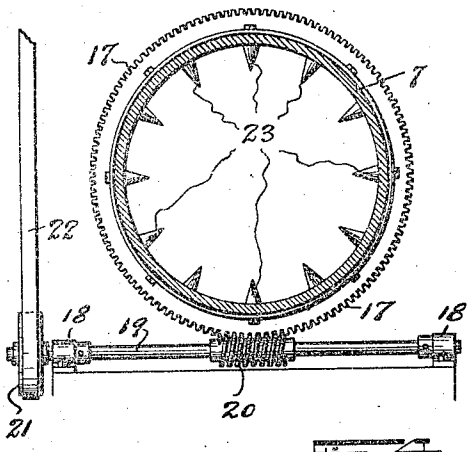


Fig. 4

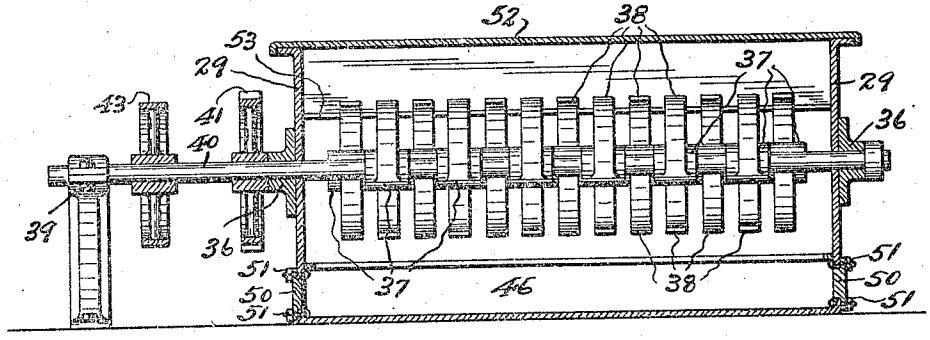


Fig. 5

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UNITED STATES PATENT OFFICE.

SIDNEY MITCHELL, OF NEW YORK, N. Y.

APPARATUS FOR PAPER-MILLS.

1,277,631. Specification of Letters Patent. Patented Sept. 3, 1918.

Application filed February 27, 1918. Serial No. 219,370.

To all whom it may concern:

Be it known that I, SIDNEY MITCHELL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Paper-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in paper mill machinery; and the invention has reference, more particularly, to a novel apparatus for preparing raw paper stock for introduction to the pulp beaters commonly used in the paper manufacturing industry.

The invention has for its principal object to provide an apparatus for use in mills which use waste paper as the raw material or stock from which new paper products are manufactured, and to this end my invention provides a novel means for automatically preparing such waste paper (which is usually brought to the mills in bales) for introduction into the pulp beaters used for beating the same out into a fibrous pulp. The novel apparatus therefore comprises a means for automatically opening and loosening up the contents of a bale of waste paper, sorting out foreign material, and softening and coarsely breaking up the mass of waste paper preliminary to subjecting the same to the action of a pulp beater, so that a great saving in human labor is attained, a saving of time and energy in the pulp beater operation due to the preliminary softening and breaking of the paper stock, and a consequent saving in cost per ton in the whole manufacturing process.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

With the various objects of my present invention in view, the same consists, primarily, in the novel preparing apparatus for raw paper stock hereinafter set forth; and the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction of said devices and parts, all of which will be more fully described in the following specification, and then finally embodied in the claims appended thereto.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figures 1^A and 1^B, taken together, illustrate a vertical longitudinal section of the novel raw paper stock preparing apparatus, made according to and embodying the principles of my present invention; Fig. 2 is a detail horizontal section, taken on line 2—2 in said Fig. 1^B, looking downward. Fig. 3 is a detail transverse section taken on line 3—3 in said Fig. 1^A, looking toward the right; and Fig. 4 is another detail transverse section, taken on line 4—4 in said Fig. 1^A, also looking toward the right. Fig. 5 is a detail transverse section, taken on line 5—5 in said Fig. 1^B, looking toward the right.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring now to the said drawings, the reference character 1 indicates a suitable supporting frame-work upon which a part of the apparatus is mounted. Mounted upon the forward end of said frame-work is a tipping platform 2 pivotally supported by a shaft 3 journaled in the standards or bearing pedestals 4, said platform being normally supported in horizontal plane by a stop-frame 5 engaging its forward end. A suitable conveyer mechanism 6 is connected with said supporting frame-work 1 so that its discharge end is adjacent to said tipping platform 2. Also supported upon said frame-work 1 is a downwardly inclined bale opening and loosening apparatus, the same comprising a rotatable tubular barrel or drum 7 open from end to end. Secured upon the outer circumference of said barrel or drum, adjacent to each end thereof, is an outwardly projecting annular flange 8. Mounted in proper location upon said supporting frame-work 1 are cradle standards 9 having curved seat portions 10 conforming generally to the external contour of said barrel or drum 7. Said supporting standards are provided with suitable transverse journal portions 11 adapted to support shafts 12' upon which are mounted vertical rollers 12, which engage in supporting relation the perimeters of said annular flanges

8 in such a manner that said barrel or drum 7, when rotated, rides upon said rollers 12. The seat portions 10 of said cradle standards 9 are provided with suitable openings 13 in which said rollers 12 are disposed, so that the periphery of the latter project slightly above the surface of said seat portions 10. Said standards 9 are further provided with spaced radial journal portions 14 adapted to support spindles 15 upon which are mounted horizontal idler rollers 16, which engage the rear sides of said flanges 8 to prevent longitudinal displacement of said barrel or drum 7 when rotated. Said standards and their several rollers are so disposed and supported on said frame work 1 at different relative elevations as to provide said barrel or drum 7 with a downwardly inclined pitch from its receiving end toward its discharge end. The means for rotating said barrel or drum 7 comprises an external annular worm gear 17 secured upon the external surface of said barrel or drum. Secured upon said frame-work 1 are bearings 18 in which is journaled a transverse driving shaft 19. Secured upon said driving shaft is a worm 20 which meshes operatively with the teeth of said worm gear 17. Said driving shaft is driven from any desired source of power by any suitable transmission means, the means illustrated being a pulley 21 and driving belt 22. Secured to the inner circumferential surface of said drum or barrel 7 are a plurality of inwardly projecting radial sharpened fingers or spikes 23, the same being preferably disposed in a spirally extending line around the interior of the barrel or drum, from one end to the other, although other grouping arrangement may be employed if desired.

Secured upon said frame-work 1, so as to be positioned directly beneath the discharge end of said barrel or drum 7, is a blower device 24, having its discharge nozzle 25 directed outwardly in line with the discharge end of said barrel or drum. Said blower, as shown in the drawings, is preferably of the rotary type, driven by the shaft 26, pulley 27 and belt 28.

The reference character 29 indicates a receiving trough or vat, which is positioned adjacent to the discharge end of said barrel or drum 7, but removed slightly therefrom to provide the intervening space 30. The forward end of said trough or vat 29 is provided with a forwardly projecting hood 31 having a receiving opening 32 of dimensions approximating the size of the discharge end of said barrel or drum 7, and spaced slightly away from the same. Connected with the upper portion of said hood is a spray-head 33 fed by a supply pipe 34, the same being adapted to discharge hot water into the forward end of said trough or vat. Extending transversely through the interior of the main body of said trough or vat in longitudinally spaced relation to each other are a series of shafts 35, the same being journaled in bearings 36 secured externally upon the sides of said trough or vat. Secured upon each shaft 35 are a plurality of laterally spaced paddle devices 37, each having a pair of oppositely extending curved paddle arms 38. The arrangement and relative spacing of said shafts 35 and their paddle devices 37 is such, that the free ends of said paddle arms 38 of the paddle devices of one shaft intervene between the free ends of the paddle arms of paddle devices of adjacent neighboring shafts, thus providing an interlocking relation of the paths of movement of said paddle arms. The means for driving said shafts 35 is preferably such that alternate shafts and their paddle devices are driven in opposite directions. The means illustrated for so driving the shafts 35 comprises an extension of one of said shafts to a bearing standard 39, thus constituting said shaft a primary driving shaft 40. Mounted on said primary driving shaft 40 is a gear-wheel 41 which meshes operatively with mutually intermeshed gear-wheels 42 mounted respectively upon the remaining shafts. Said primary driving shaft 40 may be driven from any desired source of power by any suitable transmission means, the means illustrated being a pulley 43 and driving belt 44.

The bottom of said vat or trough 29 is divided by transverse partitions 45 into a plurality of receiving pits 46 arranged to be respectively located beneath each set of paddle devices 37, and in addition to said pits 46 there is provided a forward pit 47 disposed beneath said hood 31, and covered with a suitable grating device 48. The side walls of said trough or vat are provided with hand-hole openings 49 at one or both ends of said pits above described, the same being normally closed by hand-hole plates or covers 50 secured in place by the nut and bolt devices 51, or by any other suitable fastening means.

Said vat or trough 29 is preferably provided with a cover-member 52 as shown. Arranged at the rear end of said trough or vat is a forwardly and downwardly inclined drift-catching shelf or platform 53, upon which floating foreign material, such as excelsior, wood, cork, or any other similar substances, which owing to their specific gravity will float on the surface of the water in the trough or vat, may be caught and brushed out or otherwise removed through the opening 54 in said cover member 52.

Connected with the bottom of said vat or trough 29, preferably at its rearward end is a drain pipe 55, having a suitable gate valve 56.

The rear wall of said trough or vat is

provided with a suitably disposed overflow discharge opening or gate 57 which communicates with a suitable conduit structure 58 which leads to the usual pulp beaters employed in paper mills for producing the desired fibrous pulp for the paper making machines.

Having thus described the construction of my novel paper stock preparing apparatus, I will now briefly describe the operation of the same in practice.

In paper mills utilizing waste and scrap paper as the raw material for producing pulp stock for the proper machines to convert into new paper product, the said waste and scrap paper is shipped to the mill in bales. Ordinarily these bales must be opened and loosened up, the foreign material sorted out, and the waste or scrap paper then fed to the pulp beaters by hand. By the use of my novel apparatus, however, a large part of the hand labor thus necessary is eliminated. When employing my apparatus the bale 59 of waste and scrap paper is placed upon the conveyer 6, and carried thereby upwardly to the tipping platform 2 upon which it is deposited. While resting on the platform (as shown in Fig. 1A) the binding wires or cords 60 holding the bale together are cut and removed therefrom. The platform 2 is then tipped down (as indicated by the dotted lines in Fig. 1A) so that the bale falls into the receiving end of the rotating barrel or drum 7. Immediately the fingers or spikes 23 engage and tear apart the paper scrap loosening the same from its compressed relation in the bale, while the latter is tumbled about in said rotating barrel or drum. The barrel or drum being downwardly inclined toward its discharge end, the fingers or spikes 23 in their spiral arrangement or disposition aiding, the loosened paper scrap is caused to move toward the discharge end of said barrel or drum. The barrel or drum is constructed of sufficient length to assure the entire loosening up and separation of the paper scrap from the bale form by the time it reaches the discharge end of the same. As the loosened and separated paper scrap falls from the discharge end of the barrel or drum it comes in contract with a strong blast of air emitted from the blower device 24. This blast of air carries the scrap paper across the intervening space 30 and precipitates the same into the hood 31, so that the same falls into the forward end of the vat or trough 29. Since it frequently occurs that bales of waste or scrap paper contain foreign substances and articles, such as pieces of metal, wood, bottles, glass, etc., which are comparatively heavy, and which must be separated from the scrap, so as not to be deposited eventually in a pulp beater, the substantially horizontal movement of the loose scrap across the space 30, under the influence of the air blast, allows time and opportunity for these heavier substances and articles to drop by gravity through the space 30 between the barrel or drum and the trough or vat, so that the greater bulk of such substances and articles are thus automatically separated before the paper enters the vat or trough 29.

The paper scrap thus precipitated within the forward end of the vat or trough 29 falls into the water content of the vat or trough and under the shower of hot water discharged thereupon from the spray-head 33 connected with the hood 31. The hot water thus causes a preliminary wetting down and softening of the paper scrap, causing the same to submerge itself in the vat or trough, and then flow toward the rotating paddle devices 37. Fine pieces of metal, glass and other hard substances, which may still be carried with the scrap into the vat or trough tend to sink to the bottom, and work their way through the grating 48 into the forward pit 47. A slow flow of water is maintained through the vat or trough from its forward to rearward end, fed and maintained, by the discharge from the spray-head 33. This flow of the water carries along the paper scrap into contact with the revolving arms 38 of the paddle devices 37. The said paddle devices engaging the wet and softened scrap tend to break the same up and further soften the same, although not beating the same out to fibrous pulp. As the scrap is thus softened and broken up while flowing rearward in engagement with the paddle arms 38, any heavy foreign material, such as metal, glass, etc., still carried therein works its way to the bottom of the vat or trough, and finally lodges within the pits 46 in which it is retained. Any foreign material possessing buoyancy sufficient to permit the same to float, such as wood, excelsior, straws, etc., will work its way to the surface, and will be carried by the flow into engagement with the drift collecting self or platform 53, the forward end of which inclines forwardly and downwardly slightly beneath the surface of the water so as to obstruct and catch the drift of such floating material. The breaker device thus provided by the vat or trough 29 and its mechanism serves both as a sorting or separating device, and as a softening and breaking up means, and the same is made of sufficient length to assure that the mass of scrap, by the time it reaches the discharge end, is pretty well softened and broken up or coarsely subdivided, so that upon arrival at the overflow discharge opening 57 the mass will overflow continuously into the conduit structure 58, whence it is conveyed to the usual pulp beater. The mass of scrap paper being thus softened and

broken up before delivery to the pulp beater, it will be apparent that it may be much more quickly beaten out by the pulp beater into the desired fibrous pulp with much less expenditure of power and time, than is the case when hard dry unbroken scrap is deposited in the pulp beater as is ordinarily done.

The vat or trough 29 may be cleaned out occasionally, by draining off the water content, and then opening the hand hole openings 49 so that the collection of foreign substances may be removed from the pits 46 and 47.

From the above description of the construction and operation of my novel apparatus, it will be clearly understood that paper scrap and waste may be easily and automatically prepared for deposit within a pulp beater with a minimum expenditure of labor, power and time, since the power saved over the requirement for operating pulp beaters upon dry hard paper scrap will be more than necessary for operating my preparing apparatus, and since the operations can be continuously carried on with little necessary interruption.

I am aware that some changes may be made in the various arrangements and combinations of the several devices and parts, as well as in the details of the construction thereof, without departing from the scope of my present invention as set forth in the foregoing specification, and as defined in the appended claims. Hence, I do not limit my invention to the exact arrangements and combinations of the said devices and parts as described in the foregoing specification, nor do I confine myself to the exact details of the construction of said parts as illustrated in the accompanying drawings.

I claim:—

1. In apparatus of the kind described, a rotatable drum open from end to end, bearing means for supporting said drum in downward inclination, means for rotating said drum, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat positioned with its receiving end adjacent to the discharge end of said drum, a water feed means for said vat, a plurality of rotatable paddle devices mounted within said vat, overflow discharge means connected with the discharge end of said vat, and a blower device located beneath the discharge end of said drum to direct an air blast toward the receiving end of said vat.

2. In apparatus of the kind described, a rotatable drum open from end to end, bearing means for supporting said drum in downward inclination, means for rotating said drum, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat having a hood provided with a receiving opening positioned adjacent to the discharge end of said drum, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, means for rotating said shafts, means for subdividing the bottom of said vat into a plurality of pits, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, and overflow discharge means connected with the discharge end of said vat.

3. In apparatus of the kind described, a rotatable drum open from end to end, bearing means for supporting said drum in downward inclination, means for rotating said drum, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat having a hood provided with a receiving opening positioned adjacent to the discharge end of said drum, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, means for rotating said shafts, means for subdividing the bottom of said vat into a plurality of pits, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, overflow discharge means connected with the discharge end of said vat, and a blower device located beneath the discharge end of said drum to direct an air blast toward the receiving opening of said hood.

4. In apparatus of the kind described, a rotatable drum open from end to end, bearing means for supporting said drum in downward inclination, means for rotating said drum, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat having a hood provided with a receiving opening positioned adjacent to the discharge end of said drum, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, means for rotating said shafts, means for subdividing the bottom of said vat into a plurality of pits, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, overflow discharge means connected with the

discharge end of said vat, and a downwardly and forwardly inclining drift collecting shelf at the rear end of said vat.

5. In apparatus of the kind described, a rotatable drum open from end to end, bearing means for supporting said drum in downward inclination, means for rotating said arm, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat having a hood provided with a receiving opening positioned adjacent to the discharge end of said drum, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, means for rotating said shafts, means for subdividing the bottom of said vat into a plurality of pits, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, overflow discharge means connected with the discharge end of said vat, a downwardly and forwardly inclining drift collecting shelf at the rear end of said vat, and a blower device located beneath the discharge end of said drum to direct an air blast toward the receiving opening of said hood.

6. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for wetting down, softening and breaking up the loosened scrap paper, and an air blast means for blowing the loosened scrap from the former means into the latter means while allowing heavy foreign substances to drop by gravity from said scrap.

7. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for wetting down, softening and breaking up the loosened scrap paper, comprising a vat positioned to receive the scrap from said bale opening means, a water feed means for said vat, a plurality of rotatable paddle devices mounted within said vat, overflow discharge means connected with the discharge end of said vat, and air blast means for blowing said scrap from said bale opening means into said vat while allowing heavy foreign substances to drop by gravity from said scrap.

8. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for wetting down, softening and breaking up the loosened scrap paper, comprising a vat having a hood provided with a receiving opening, a water spray-head connected with the upper side of said hood and discharging into said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices mounted on each shaft, means for rotating said shafts, means subdividing said vat into a plurality of pits beneath said shafts and their paddle devices, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, and overflow discharge means connected with the rear end of said vat.

9. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for wetting down, softening and breaking up the loosened scrap paper, comprising a vat having a hood provided with a receiving opening, a water spray-head connected with the upper side of said hood and discharging into said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices mounted on each shaft, means for rotating said shafts, means subdividing said vat into a plurality of pits beneath said shafts and their paddle devices, the sides of said vat having openings communicating with said pits, and detachable means for closing said openings, overflow discharge means connected with the rear end of said vat, and air blast means for blowing said scrap from said bale opening means into said vat while allowing heavy foreign substances to drop by gravity from said scrap.

10. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for wetting down, softening and breaking up the loosened scrap paper, comprising a vat having a hood provided with a receiving opening, a water spray-head connected with the upper side of said hood and discharging into said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices mounted on each shaft, means for rotating said shafts, means subdividing said vat into a plurality of pits beneath said shafts and their paddle devices, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, overflow discharge means connected with the rear end of said vat, and a downwardly and forwardly inclining drift collecting shelf at the rear end of said vat.

11. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for wetting down, softening and breaking up the loosened scrap paper, comprising a vat having a hood provided with a receiving opening, a water spray-head connected with the upper side of said hood and discharging into said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices mounted on each shaft, means for rotating said shafts, means subdividing said vat into a plurality of pits beneath said

shafts and their paddle devices, the sides of said vat having openings communicating with said pits, detachable means for closing said openings, overflow discharge means connected with the rear end of said vat, a downwardly and forwardly inclining drift collecting shelf at the rear end of said vat, and air blast means for blowing said scrap from said bale opening means into said vat while allowing heavy foreign substances to drop by gravity from said scrap.

12. In apparatus of the kind described, a scrap paper bale opening and loosening means comprising a rotatable drum open from end to end, external annular flanges on said drum, cradle standards disposed to support said drum in downwardly inclined position, vertical idler rollers carried by said cradle standards in supporting relation to the peripheries of said annular flanges, horizontal idler rollers carried by said cradle standards in engagement with the rear side of said annular flanges to prevent longitudinal displacement of said drum, an external worm gear connected with said drum, a power-driven shaft, a worm on said shaft meshing with said worm gear, and a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum.

13. In apparatus of the kind described, a scrap paper bale opening and loosening means comprising a rotatable drum open from end to end, external annular flanges on said drum, cradle standards disposed to support said drum in downwardly inclined position, vertical idler rollers carried by said cradle standards in supporting relation to the peripheries of said annular flanges, horizontal idler rollers carried by said cradle standards in engagement with the rear side of said annular flanges to prevent longitudinal displacement of said drums, an external worm gear connected with said drum, a power-driven shaft, a worm on said shaft meshing with said worm gear, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, and means for wetting down, softening and breaking up scrap paper discharged from said drum.

14. In apparatus of the kind described, a scrap paper bale opening and loosening means comprising a rotatable drum open from end to end, external annular flanges on said drum, cradle standards disposed to support said drum in downwardly inclined position, vertical idler rollers carried by said cradle standards in supporting relation to the peripheries of said annular flanges, horizontal idler rollers carried by said cradle standards in engagement with the rear side of said annular flanges to prevent longitudinal displacement of said drum, an external worm gear connected with said drum, a power-driven shaft, a worm on said shaft meshing with said worm gear, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, means for wetting down, softening and breaking up scrap paper discharged from said drum, and a blower device beneath the discharge end of said drum for blowing scrap paper discharged from said drum into said wetting down, softening and breaking up means while allowing heavy foreign substances to drop by gravity from said scrap.

15. In apparatus of the kind described, a scrap paper bale opening and loosening means comprising a rotatable drum open from end to end, external annular flanges on said drum, cradle standards disposed to support said drum in downwardly inclined position, vertical idler rollers carried by said cradle standards in supporting relation to the peripheries of said annular flanges, horizontal idler rollers carried by said cradle standards in engagement with the rear side of said annular flanges to prevent longitudinal displacement of said drum, an external worm gear connected with said drum, a power-driven shaft, a worm on said shaft meshing with said worm gear, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat having a hood provided with a receiving opening positioned adjacent to the discharge end of said drum to receive the scrap therefrom, a spray head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle-arms mounted on each shaft, the paddle devices of each shaft rotating in overlapping intermediate paths of movement relative to the paddle devices of adjacent shafts, means for rotating alternate shafts and their paddle devices in opposite directions, means subdividing the bottom of said vat into a plurality of pits, the sides of said vats having openings communicating with said pits, detachable means for closing said openings, a downwardly and forwardly inclined drift collecting shelf at the rear end of said vat, and overflow discharge means connected with the discharge end of said vat.

16. In apparatus of the kind described, a scrap paper bale opening and loosening means comprising a rotatable drum open from end to end, external annular flanges on said drum, cradle standards disposed to support said drum in downwardly inclined position, vertical idler rollers carried by said cradle standards in supporting relation to the peripheries of said annular flanges, horizontal idler rollers carried by said cradle

standards in engagement with the rear side of said annular flanges to prevent longitudinal displacement of said drum, an external worm gear connected with said drum, a power-driven shaft, a worm on said shaft meshing with said worm gear, a plurality of inwardly extending radially disposed spikes grouped in spaced relation around the interior sides of said drum, a vat having a hood provided with a receiving opening positioned adjacent to the discharge end of said drum to receive the scrap therefrom, a spray head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, the paddle devices of each shaft rotating in overlapping intermediate paths of movement relative to the paddle devices of adjacent shafts, means for rotating alternate shafts and their paddle devices in opposite directions, means subdividing the bottom of said vat into a plurality of pits, the sides of said vats having openings communicating with said pits, detachable means for closing said openings, a downwardly and forwardly inclined drift collecting shelf at the rear end of said vat, overflow discharge means connected with the discharge end of said vat, and a blower device located beneath the discharge end of said drum to blow said scrap discharged from the latter into said vat while allowing heavy foreign substances to drop by gravity from said scrap.

17. In apparatus of the kind described, means for opening and loosening bales of scrap paper, means for feeding bales to said opening and loosening means, means for wetting down, softening and breaking up the loosened scrap paper, and an air blast means for blowing the loosened scrap from said bale opening and loosening means into said wetting down, softening and breaking up means while allowing heavy foreign substances to drop by gravity from said scrap.

18. In apparatus of the kind described, a vat having a hood provided with a receiving opening, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, the paddle devices of each shaft rotating in overlapping intermediate paths of movement relative to the paddle devices of adjacent shafts, means for rotating alternate shafts and their paddle devices in opposite directions, and an overflow discharge means at the discharge end of said vat.

19. In apparatus of the kind described, a vat having a hood provided with a receiving opening, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, the paddle devices of each shaft rotating in overlapping intermediate paths of movement relative to the paddle devices of adjacent shafts, means for rotating alternate shafts and their paddle devices in opposite directions, means subdividing the bottom of said vat into a plurality of pits, the sides of said vats having openings communicating with said pits, detachable means for closing said openings, and an overflow discharge means at the discharge end of said vat.

20. In apparatus of the kind described, a vat having a hood provided with a receiving opening, a spray-head connected with the upper side of said hood for discharging water streams into the receiving end of said vat, a plurality of transverse shafts extending through the main body of said vat, a series of paddle devices having paddle arms mounted on each shaft, the paddle devices of each shaft rotating in overlapping intermediate paths of movement relative to the paddle devices of adjacent shafts, means for rotating alternate shafts and their paddle devices in opposite directions, means subdividing the bottom of said vat into a plurality of pits, the sides of said vats having openings communicating with said pits, detachable means for closing said openings, a downwardly and forwardly inclined drift collecting shelf at the rear end of said vat, and an overflow discharge means at the discharge end of said vat.

In testimony that I claim the invention set forth above I have hereunto set my hand this 20 day of February, 1918.

SIDNEY MITCHELL.

Witnesses:
JAMES TODD, JR.,
MATHIAS PLUM.