

May 22, 1934.

F. GREWIN

1,960,106

METHOD AND APPARATUS FOR RECONDITIONING PAPER STOCK

Filed Oct. 8, 1932

5 Sheets-Sheet 1

Fig. 1

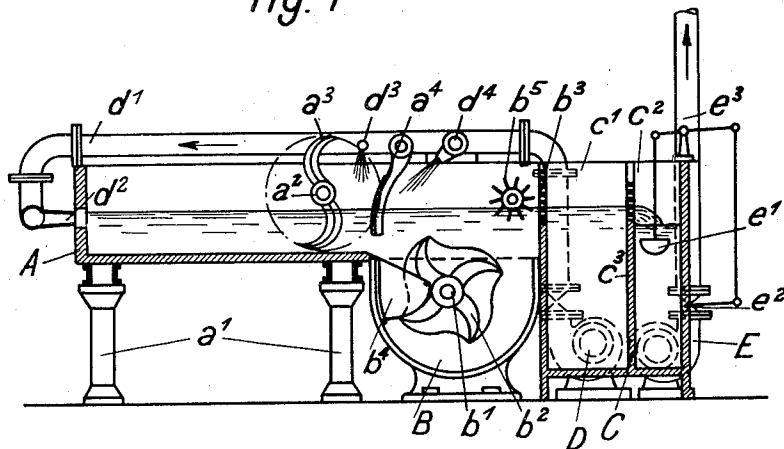
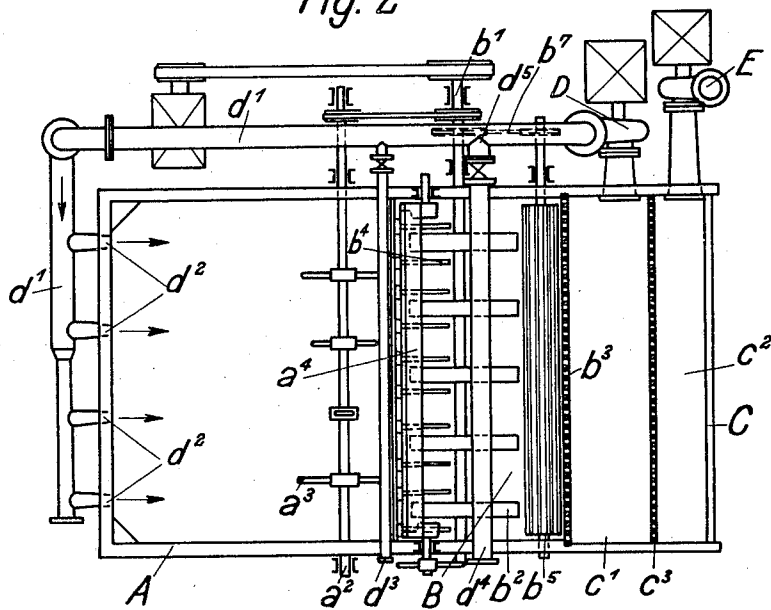


Fig. 2



Inventor
Friedrich Grewin
by C. P. Boepel
his attorney

May 22, 1934.

F. GREWIN

1,960,106

METHOD AND APPARATUS FOR RECONDITIONING PAPER STOCK

Filed Oct. 8, 1932

5 Sheets-Sheet 2

Fig. 3

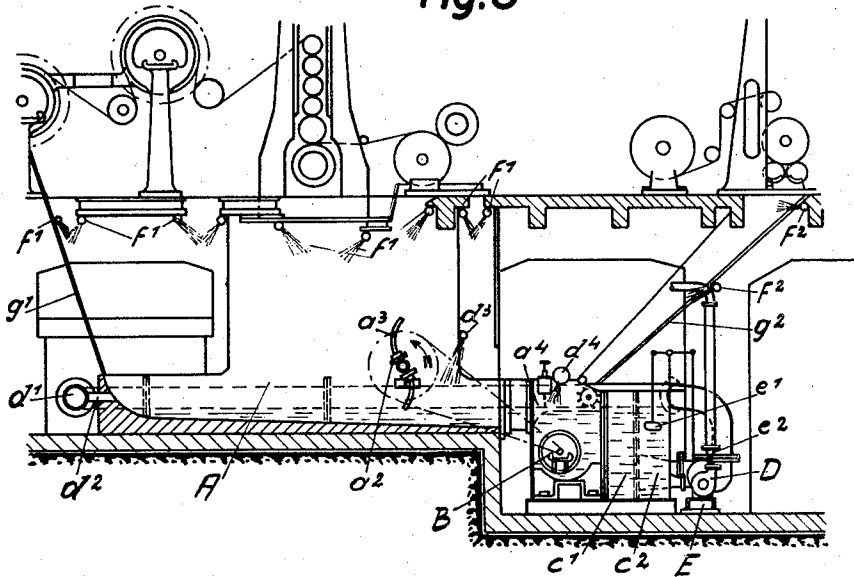
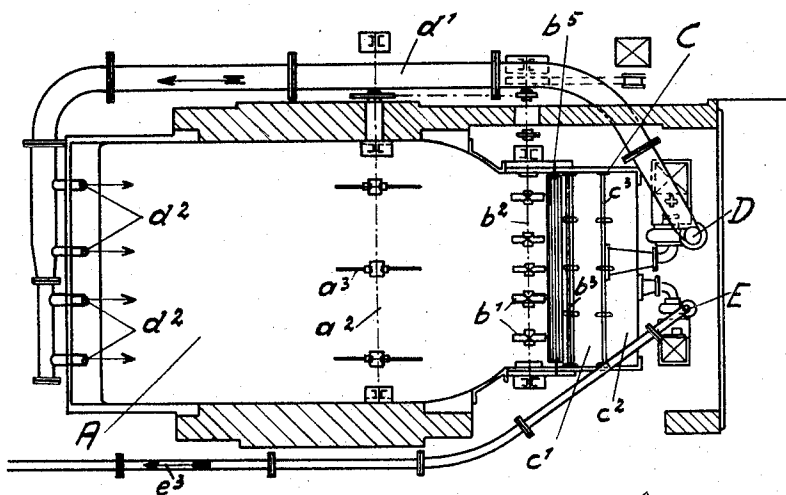


Fig. 4



Inventor
Fredrik Grewin
by C. P. Buepel
his attorney

May 22, 1934.

F. GREWIN

1,960,106

METHOD AND APPARATUS FOR RECONDITIONING PAPER STOCK

Filed Oct. 8, 1932

5 Sheets-Sheet 3

Fig. 5

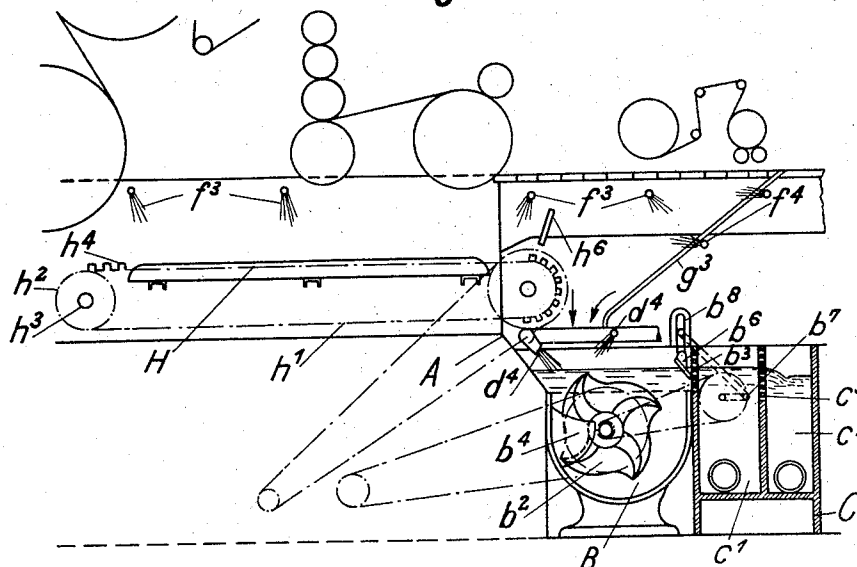
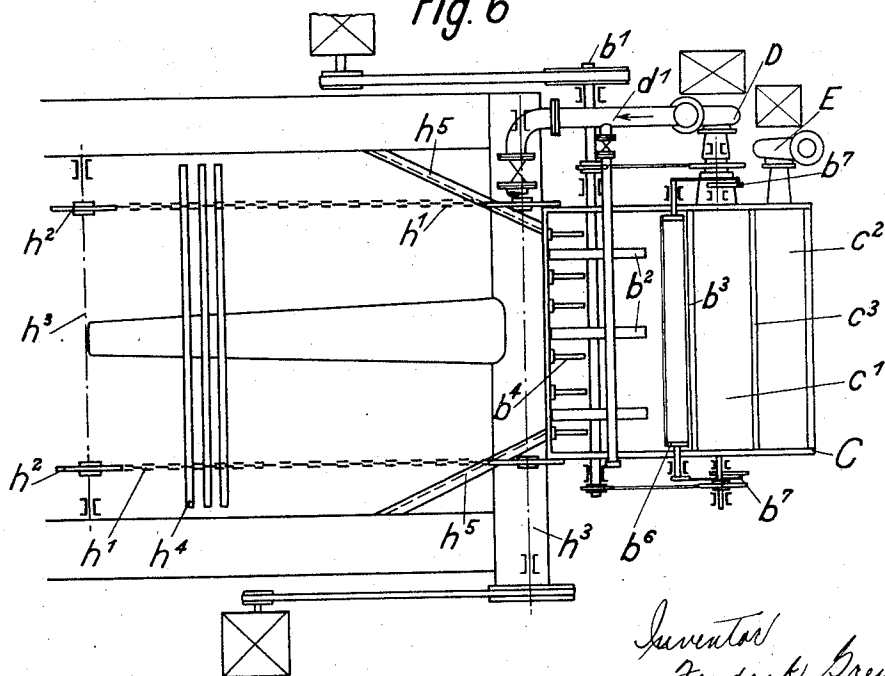


Fig. 6



Inventor
Fredrik Grewin
by C. P. Koppel
his attorney

May 22, 1934.

F. GREWIN

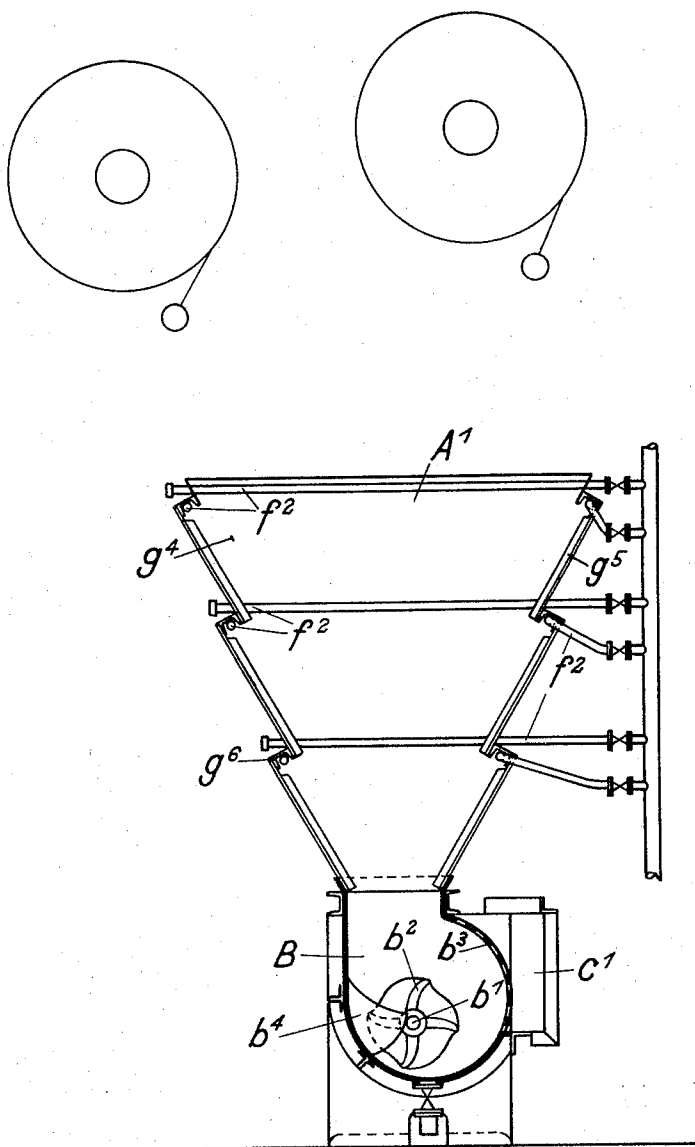
1,960,106

METHOD AND APPARATUS FOR RECONDITIONING PAPER STOCK

Filed Oct. 8, 1932

5 Sheets-Sheet 4

Fig. 7



Inventor
Fredrik Grewin
by C. P. Koppel
His attorney

May 22, 1934.

F. GREWIN

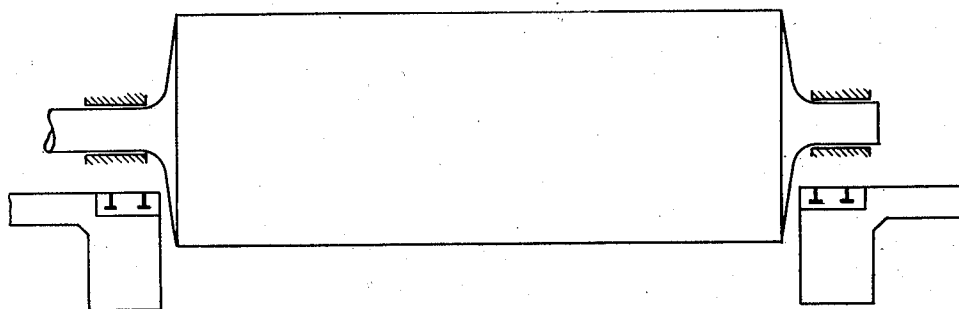
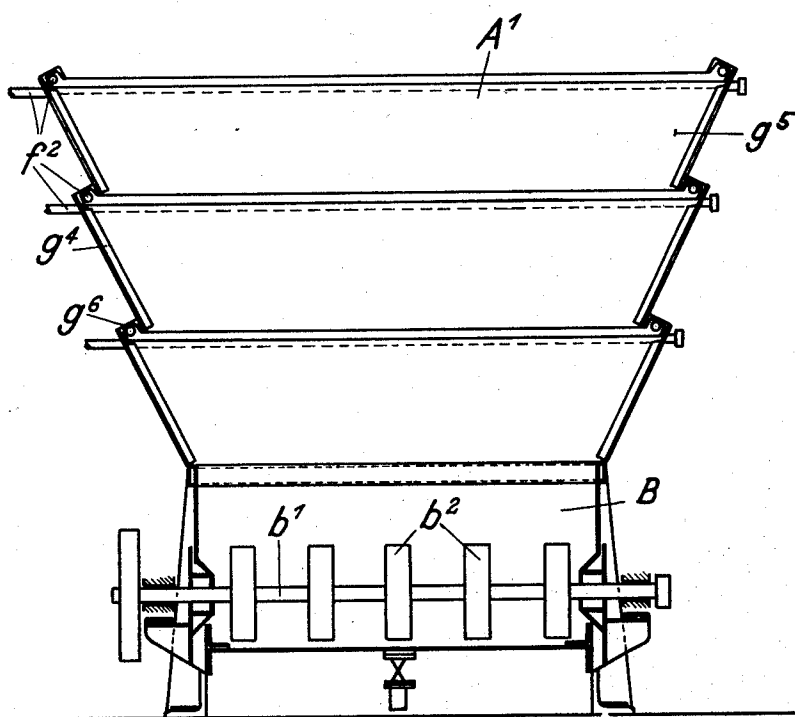
1,960,106

METHOD AND APPARATUS FOR RECONDITIONING PAPER STOCK

Filed Oct. 8, 1932

5 Sheets-Sheet 5

Fig. 8



Invented
Fredrik Grewin
by C. P. Hoepel
his attorney

UNITED STATES PATENT OFFICE

1,960,106

METHOD AND APPARATUS FOR RECONDITIONING PAPER STOCK

Fredrik Grewin, Hallstavik, Sweden, assignor to
American Voith Contact Company, Inc., New
York, N. Y., a corporation of New York

Application October 8, 1932, Serial No. 636,886
In Germany October 15, 1931

21 Claims. (Cl. 92—20)

The invention concerns a method and devices for a continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp and similar materials and the conveying of these materials from the various places in the paper mill at which they accrue to the reconditioning apparatus. It has for its purpose the elimination of manual labor for collecting, transporting and working up of these materials, a further object being the thickening of the pulp mass to any desired degree of consistency.

It is a well-known fact that in the manufacture of paper rather large quantities of broke accrue at the rear part of the paper machine and in the case of paper machines operating at high speed the broke quantities are considerable and pile up quickly in loose heaps in the machine room basement underneath the paper machine. This broke is composed of the sheet edges continuously cut off on the slit or the longitudinal cutter to which is added the waste accruing in irregular amounts in case the paper sheet breaks at the cooling cylinder, the calendar or the reel. This broke can be reduced to a pulp and reintroduced into the manufacturing process, waste papers, ground wood, chemical pulp in rolls, sheets, etc. can also be reduced to pulp and so used. All former methods require much transportation of the materials as in many cases the places at which broke accrues or where the waste papers, pulp sheets etc. are stored are located quite a distance from the place where they are disposed of. Furthermore, the storage and reconditioning plants require much space and therefore considerable expense for buildings etc. while the working up of the materials in a comparatively dry condition requires much power and causes great wear and tear on the equipment. The danger of fire breaking out in such installations is considerable and special precautions must be taken in this respect as for instance erecting fire walls in the paper machine room basement, which requires great expenditures.

It is the purpose of the present invention to change fundamentally and to improve the present methods for reconditioning broke, waste papers, etc. By extensively and thoroughly moistening the broke, etc., the accumulations of large voluminous amounts of it are prevented and the difficulty eliminated in removing the broke which is subject to great variations both as to time and amount of its accrual. All the manual labor hitherto required for transporting the broke is done away with, while the large power

requirements of the present systems are considerably reduced in the new method.

A further and very important feature of the invention is the avoidance of any danger of fire which is very great in the present systems due to a high degree of static electricity being present in the broke. The presence of paper dust and inflammable oil vapors makes this fire danger a very real one, but this danger is entirely eliminated in the present invention where the broke is subject to an energetic moistening immediately upon its accumulation.

Furthermore, through the complete soaking of the broke paper in a trough located beneath the paper machine a shortening of the disintegrating process is obtained. By means of the dissolving machine forming another important feature of the invention, in combination with a circulation pump, a complete separation and preparation of the fibers is obtained which results in producing stock ready for the paper machine chest or head box which does not require any additional refining treatment but can directly be returned into the manufacturing process. It is furthermore possible to give this fully disintegrated stock the same consistency as that prevailing in the stock chest or head box or at any place in the stock preparing process.

As described, the invention comprises a thorough water moistening of the unevenly accruing broke at or near the places at the paper machine where it accrues, the collection of the moistened broke in a trough, its continuous feeding to the disintegrating apparatus positioned adjacent to the trough, and the disintegration proper of the material in a closed circuit in a disintegrator chest and a rotating pump.

A particularly advantageous arrangement for transporting the broke to the collecting trough and to the broke chest is obtained by providing underneath that part of the paper machine where the largest amount of broke accrues, as for instance, underneath the smoothing press, reel or slit, a conical housing, the side walls of the same having openings through which the inner wall surfaces can be sprinkled with water. By this arrangement, it is no longer necessary to have the chest for receiving the broke and the apparatus for dissolving it extend over the whole width of the paper machine; furthermore, the spilling of pieces of broke during the filling of the chest is positively avoided.

The moistening of the broke is effected by having jets of water play on both sides of the sheet, thereby moving same downward positively and in

a predetermined direction. The broke coming from the several parts of the paper machine, as for instance, the cooling cylinder, the smoothing press, winder, etc., is collected in a water filled trough located underneath the paper machine and is completely soaked in the chest. The dimensions of the trough are so chosen that it can receive the largest amount of broke accruing at any time, which broke is soaked in the trough, and is then removed from it in substantially uniform quantities. The continuous moving of the material to the disintegrating machine proper is effected by means of a fluid current entering the trough at its one end, or may be effected by suitable transportation means, it being possible to use as carrying fluid what is called white water or stock water taken from the disintegrating process and in which is contained more or less disintegrated broke material which, in order to obtain its complete disintegration, must again pass through the disintegrating apparatus.

The disintegrating apparatus which can be located by itself and used for this or a similar purpose, is a vat open at the top and provided with a shaft which toward the inlet side is supported eccentrically to the longitudinal axis of the vat and provided with disks. These disks subject the moistened paper to a tearing, beating and kneading action which can be augmented by plates etc. by stationary plates extending between the disks. In relation to its dimensions the disintegration capacity of the apparatus is very large inasmuch as the disintegrator shaft acts continuously on the stock which cannot escape but is again and again brought under the action of a disintegrator or scooper or impeller disk. This action influences to a large degree the disintegration of the stock which in other respects depends upon the grade of the material to be defibered, i. e., the degree of sizing and the intensity of the preceding moistening action. Thus, with mildly sized and thoroughly soaked papers the action of the apparatus will bring about quickly a full defibering, while heavily sized papers require repeated passages through the apparatus.

According to the invention a container for receiving the partly or fully defibered stock is connected with the disintegrating apparatus. When working up certain grades of paper, this container can be made in one piece so that from it a part of the separated stock is directly brought to the place where it is reintroduced into the manufacturing process, while the rest is used for moistening and as carrying means for freshly introduced broke. In most cases it will, however, be necessary to subject the stock coming from the disintegrating apparatus once or several times more to the defibering action of the disintegrator shaft. For this purpose the container is provided with two compartments. The stock coming from the disintegrating apparatus is passed through a rake or sieve and by means of a centrifugal pump which itself influences the disintegrating process very favorably, is brought back to the vat entrance end, where it assists in the moistening and transportation of the freshly fed broke. Only the stock that passes a second finer rake is pumped to the place where it is reintroduced into the manufacturing process.

In the drawings several examples of the invention are shown:

Figure 1 is a longitudinal section of the novel disintegrator unit;

Figure 2 is a plan view of same;

Figure 3 illustrates the application of the dis-

integrator unit to a paper machine in a section in the direction of the paper run;

Figure 4 is a plan view of Figure 3;

Figure 5 shows another application similar to Fig. 3 but with the room underneath the paper machine only partly excavated;

Figure 6 is a plan view of Figure 5;

Figure 7 is a particularly advantageous arrangement of the soaking bin in a section in the direction of the run of the paper sheet; and

Figure 8 is a cross section of Figure 7.

Referring to the drawings and more particularly to Figures 1 and 2, the disintegrator unit comprises a soaking trough A filled with water, a disintegrator compartment B positioned adjacent to trough A, and a rotary pump D which draws from the compartment C¹ of the collecting vat C, said vat C being separated from the disintegrator compartment B by means of a rake or wire dam wall b³. Pump D pumps the major part of the partly dissolved stock collected in compartment C¹ through pipe line d¹, back to the soaking trough A which rests on supports a¹, the stock entering the soaking trough evenly distributed and at substantial speed through orifices d². In the soaking trough A the partly dissolved stock is mixed with the new broke in sheet form, moistens it and carries it towards disintegrator compartment B. A paddle shaft a² equipped with paddle arms a³ immerses the still partly voluminous sheets and thereby assists in their being completely soaked. Shower pipes d³ directed against the paddle arms a³ clean the same of any sheet particles which should have a tendency of adhering to the arms. The curved adjustable weir a⁴ has the purpose of keeping back any floating sheets and directing them towards disintegrator arms b² mounted on disintegrator shaft b¹. It is a further purpose of the adjustable weir a⁴ to regulate the level of the stock in the soaking trough A.

For thinning and conveying purposes, a small part of the stock mixture is brought by the pump D by means of an orifice pipe d⁴ connected with pipe d¹ at d⁵ and is reintroduced into the system at the place where disintegrator arms b² cut the sheets between the knife shaped plates b⁴. Through this, the tearing and disintegrating work in the chest, in which the stock is kept in circulation through the spirally positioned disintegrator arms b², is materially assisted. For keeping the openings of the rake or wire dam wall b³ free from clogging up, a rotating brush or quill roll b⁵ is provided, the roll or scraper being driven from shaft b¹ by means of a belt b⁷. Therefore, only partly dissolved material can get into compartment C¹ from which the pump D draws, this partly dissolved material passing several times through the pump which is specially designed for the low pressure head and disintegrator work, and through this process a uniform disintegration of the stock is obtained. The heavier mass in compartment C¹ sinks to the bottom and is taken up by the pump D. Through the short operating circle of the pump during which the broke paper accepts the moisture of the stock in the system, a quick and complete disintegration is obtained as well as any desired consistency of the stock, which is returned to the orifices d². The lighter and substantially finished stock passes from compartment C¹ to compartment C².

A further centrifugal pump E, controlled by valve e² with float e¹ draws the stock out of a second compartment C² which is separated from

compartment C¹ by a wire or overflow wall C³. This pump exerts a further disintegrating action upon the stock and conveys the fully defibered stock through the pipe line e³ to the place where it is to be reintroduced into the manufacturing system.

The disintegrating unit as described can be located at any place in the mill best suited for the purpose of defibering paper in sheets, ground wood and chemical pulp and similar materials. The raw undefibered stock can be brought to the disintegrating unit in any suitable manner.

Figures 3 and 4 illustrate the application of the novel disintegrating apparatus to a paper machine. The broke is produced at several places of the machine rather far distant from each other. So, for instance, broke is made at times when breaks in the paper sheet occur while it is being guided from one part of the machine to the other, while at the slitter or longitudinal cutter there is a continuous accrual of broke from cutting off the edges, etc. Depending upon the grade of paper made, the amount of broke represents a smaller or larger percentage of the total production. When through a combination of circumstances a large amount of broke is made at times, this broke interferes with the proper operation of the paper machine and increases the danger of fire, particularly if the paper machine is electrically driven.

According to the present invention a trough A of any suitable length is provided underneath the paper machine for receiving the broke dropping down from the paper machine above, said broke being moved towards the disintegrator chest by means of the stock current entering through orifices d². As the broke drops down, shower pipes f¹ located at various places below the paper-making machine as shown moisten it with water. Through the action of these shower pipes f¹ and of trough A, all danger of fire is eliminated, resulting in a reduction of the insurance risk and in cheaper building construction. Walls g¹ and g² are arranged slopingly so that under the action of air or water shower pipes f² the broke slides downward on them. Through this arrangement the length of the trough A can be made short with consequent saving in space. It is not necessary to make the length of disintegrator chest B the same as the width of the trough A, which latter extends over the whole width of the paper machine, so as to act as a catch basin. Circulation pump D and pump E can, for instance, also be connected at the lower central part of the collecting compartment C¹ and C² respectively as shown in Figure 4. The operation of the other parts shown in Figures 3 and 4 is the same as described in connection with Figures 1 and 2.

As a further illustration of the invention Figures 5 and 6 shows the same applied to a paper machine for which the basement is only partly excavated. Where no space is available, trough A can be replaced by a chain conveyor H, or some similar conveying means, without removing the advantages of the compact arrangement or the avoidance of danger of fire. Shower pipes f³ moisten the paper. The wooden drags h⁴ of chains h¹, which latter are moved by chain wheels h² positioned on shafts h³, move the moistened broke towards the disintegrator chest B. Guide strips h⁵ guide the paper into the chest and an adjustable scraper h⁶ holds back the paper, if it should momentarily come in too large quantities. The sloping arrangement of walls g³ make it in

this application also possible to arrange the unit in a very compact form inasmuch as they guide the broke coming from distant parts through the action of blow or shower pipes f⁴ to the place where the broke comes under the action of the disintegrator arms.

In Figures 5 and 6, for example, the adjustable and oscillating scraper b⁶ is shown as being actuated from the disintegrator shaft by the crank b⁷ moving in the slotted bar b⁸. Other parts in Figures 5 and 6 similar to those in Figures 1 and 2 operate in the same manner as described in connection with Figures 1 and 2.

The trough may also be formed cone-shaped. Atop of a chest B in which a runner b¹ provided with breaker arms b² is rotatably mounted, a cone-shaped housing A¹ rises up to the paper machine floor. Its side walls g⁵ and end walls g⁴ slope inwardly towards chest B, so that in both length and width chest B has substantially smaller dimensions than the broke entrance opening at the upper part of cone shaped housing A¹. The upper part of the trough A¹ extends below the paper making machine as shown in Figures 7 and 8. In order to prevent accumulation of broke on the highly sloping side walls g⁴ and g⁵, these walls according to the invention are provided with vertical gaps or openings g⁶ through which the inner parts of the walls are continuously sprayed with water by means of the pipes f². This has the effect that the broke at the moment of its coming in contact with the housing walls of the trough A¹ comes under the action of a downward stream of water and is flushed down so that its clinging to the walls g⁴ and g⁵ is effectively prevented. The design of the walls in the present case is so chosen that they consist of individual overlapping sections, sufficient space being provided at the point of overlapping between each two sections for the arrangement of shower pipes f². In actual practice, the connection of two successive wall sections can be effected by connecting them through a U-iron as shown, the U affording space for the shower pipe.

The disintegrator chest is provided on one side with an overflow, as for instance perforated plate b³, connected with a discharge compartment C¹ through which the broke flows away upon its having attained a sufficient degree of disintegration. The remainder of the system is arranged similar to what is shown in Figures 1 to 6.

It is a further advantage of this invention that all manual labor for handling the broke sheets is eliminated. The broke is received automatically and continuously, in the trough, and moistened in a preliminary manner by the shower pipes, is carried by the circulation pump, the stock in circulation, or by the chain conveyors. The high transportation expenses resulting from the use of manual labor are thereby eliminated. Furthermore, the repulping process proper does not require any manual labor and the plant, once set, continues to operate automatically. It automatically equalizes the uneven accrual of broke, waste paper, etc., on account of dam boards (a⁴ and h⁶) holding back the material for a thorough soaking. Through this energetic soaking the work to be done in the disintegrator unit is reduced which, in turn, reduces the power requirements of the latter. The final defibering of the small stock particles is effected through the action of the circulation pump which latter operates evenly and positively and on account of the low static head also requires little power.

The method, furthermore, has the advantage of resulting in a quick defibering and makes it possible to quickly recondition the broke for re-use which is particularly important when frequent changes of grade and color are necessary.

In the above, the particular application of the invention and of the component parts for reconditioning the broke coming from the paper machine have been described; it is evident, however, that the invention is equally well adapted for the disintegration of old papers, waste papers, ground wood and chemical pulp, etc.

In each embodiment described the broke is first wetted, then disintegrated, then subjected to a pumping action and returned to the disintegrating action, and finally enters the end compartment C², from which it is removed and can be used in paper-making. There is, therefore, a continuous and circulatory movement of the initial broke, when converted into its disintegrated parts until the defibering and consistency are such that it can be used as paper pulps in the manufacture of paper. This novel method is exemplified in the structure shown in Figures 1 and 2; and in order to take care of the broke as it comes directly from the paper-making machine, the structure of Figures 1 and 2 has the trough A extended to embrace the part of the paper-making machine from which the broke falls and collecting walls extend from the trough to below that part of the machine, as shown in the structure of Figures 3 and 4. Similarly, the structure of Figures 5 and 6 extends below the paper-making machine, the apron mechanism feeding into the trough A, which is correspondingly reduced, though it may extend laterally to take the place of the apron mechanism, though the basement is only partially excavated. Finally, the cone-shaped trough of the structure of Figures 7 and 8 extends substantially the length and with of that part of the paper-making machine, and below the same, from which the broke falls. In each case, of Figures 3 to 8, the apparatus described acts as a catch-all for the broke and then acts automatically to disintegrate the same, until it attains that defibering and consistency to enable it to act as a paper pulp in the manufacture of paper. Thus, laterally or above the disintegrator, the trough is arranged, and also laterally of the disintegrator the compartments are arranged to separate the completed pulps from that requiring further treatment. The incomplete pulp is completed by a further pumping and disintegrating action, until it is completed, this action being automatically continuous.

The invention has been described in connection with various embodiments, but changes may be made therein without departing from the spirit of the invention as defined in the claims.

I claim:

1. A device of the character as described, including the arrangement of a trough compartment for the accrual of broke shower pipes underneath and on both sides of the places of accrual of the broke, said shower pipes extending over the whole width of the paper-making machine, and means for immersing the broke at the place of accrual.

2. In a device of the character described, a disintegrator unit having a shaft arranged eccentrically at the inlet side of disintegrator chest, and having disintegrator arms, said disintegrator arms being spaced from each other, said spacings being the manifold of the width of said disintegrator arms, and a plurality of compartments for the collection of pulp material of different fineness reduced by said unit.

3. A device of the character described, including a disintegrator, a compartment, a coarser rake or wire between the disintegrator and the compartment, a second compartment, and of a fine rake between the compartments.

4. A device of the character described, including a trough, a disintegrator, a compartment laterally of the disintegrator, a pump for conveying the soaked and disintegrated stock from the compartment to the trough, a plurality of orifices arranged in spacings over the width of the trough for disintegrating the pumped material in the trough.

5. The method for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, which consists in subjecting broke and the like to a preliminary moistening action to a crumbling and immersing action, then to a mechanical disintegration, then to a pumping action while removing some of the more finely reduced broke, and repeating these actions until a paper pulp is produced of a consistency and freeness suitable for paper-making.

6. The method for the continuous reconditioning of paper broke, waste papers, and the like into paper pulp, which consists in collecting the paper broke, subjecting the broke and the like to a moistening action, then to a mechanical disintegration, then to a pumping action, and repeating these actions until a paper pulp is produced of a consistency and freeness suitable for paper-making, said actions of collecting and subsequent treatments being automatic and continuous.

7. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, including a trough for the collection of paper broke, a disintegrating mechanism in communication with the trough, a settling compartment in connection with the disintegrating mechanism, a pump connected with the compartment for receiving the mass in the lower part of the compartment and returning it to the trough, and a compartment in communication with the first compartment for receiving the upper part of the mass in the first compartment.

8. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which the trough extends the length and breadth of part of a paper-making machine and below the same, to receive the broke from the paper-making machine.

9. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which the trough is provided with sloping extensions.

10. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which water jets are provided below the paper-making machine, and directed towards the trough.

11. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which jets are provided along the extensions to direct the broke to the trough.

12. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which the trough is provided with sloping extensions.

tioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7 in which a feeder for the broke is placed in advance of the disintegrating mechanism, and a baffle weir is placed therebetween.

13. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which a separator is placed in front of the first compartment to prevent broke from passing into the compartment.

14. An apparatus for the continuous reconditioning of paper broke, waste papers, ground wood pulp, chemical pulp, etc. into paper pulp, according to claim 7, in which the disintegrating mechanism is provided with rotating blades, and fixed abutments laterally of the blades, between which abutments the blades enter.

15. Apparatus for the treatment of broke, comprising a trough, a plurality of inlet conduits in connection with the trough, means extending the width of the trough for immersing the broke, an adjustable member for removing paper adhering to said means, a disintegrating unit for the broke, and means for by-passing some of the disintegrated broke and for recirculating some of the remaining broke.

16. A device of the character described, including a collecting trough mounted as a substitute for the ordinary broke pit below a paper making machine at the delivery end of the same and extending to the whole width of the machine, means for admission and collection of water in said trough for receiving and soaking of all the broke as it accrues, and a disintegrator unit mounted at one end of the trough and comprising a shaft provided with disintegrator arms mounted in a spaced relation to each other, the spacing between them being a manifold of the axial dimension of said arms.

17. A device of the character described, including a disintegrator, a compartment, a coarser rake or wire between the disintegrator and the compartment, a second compartment, of a fine rake between the compartments, and an actuable cleaning member adapted to coact with the openings of the rake for freeing them from stock accumulations.

18. A process for treatment of paper waste or broke arising in paper-making machines, consisting in subjecting the dry broke as it accrues at the delivery end of the paper-making machine to a sprinkling with water, directing the sprinkling jets so as to cause a downward pull on the broke as it descends into the broke pit below the

machine, subjecting the broke thus soaked to a disintegration, and continuously removing the pulp formed.

19. A process for treatment of paper waste or broke arising in paper-making machines, consisting in subjecting the broke as it accrues at the delivery end of the paper-making machine to a sprinkling with water so as to pre-soak the same, directing the sprinkling jets so as to cause a downward pull on the broke as it descends into the broke pit below the machine, subjecting the broke to an additional soaking when at hand in the broke pit, conveying the soaked broke from said pit to an adjacent disintegrating machine and subjecting the same to a disintegrating action, and continuously removing from the disintegrator the completely disintegrated pulp formed therein.

20. A process for treatment of paper waste or broke arising in paper-making machines, consisting in subjecting the broke as it accrues at the delivery end of the paper-making machine to a sprinkling with water so as to pre-soak the same, directing the sprinkling jets so as to cause a downward pull on the broke as it descends into the broke pit below the machine, subjecting the broke to an additional soaking when at hand in the broke pit, conveying the soaked broke from said pit to an adjacent disintegrating machine and subjecting the same to a disintegrating action, continuously removing from the disintegrator the completely disintegrated pulp formed therein, and separating and discharging from the disintegrator insufficiently disintegrated broke mass and re-circulating the same through the disintegrator and the broke pit for a repeated soaking in the latter.

21. A process for treatment of paper waste or broke arising in paper-making machines, consisting in subjecting the broke as it accrues at the delivery end of the paper making machine to a sprinkling with water, directing the sprinkling jets so as to cause a downward pull on the broke as it descends into the broke pit below the machine, subjecting the pre-wetted broke to a soaking with water when at hand in the broke pit, conveying the soaked broke from said pit to an adjacent disintegrating machine and subjecting the same to a disintegrating action therein, discharging the completely disintegrated pulp from said machine, separating the insufficiently disintegrated broke, and re-circulating the latter together with the main bulk of water through the broke pit and the disintegrator for repeated treatment until the disintegration is completed.

FREDRIK GREWIN.

60 135
65 140
70 145
75 150