H. S. RINKER.

PAPER MAKING SYSTEM.

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935,407. **Patented Sept. 28, 1909.**

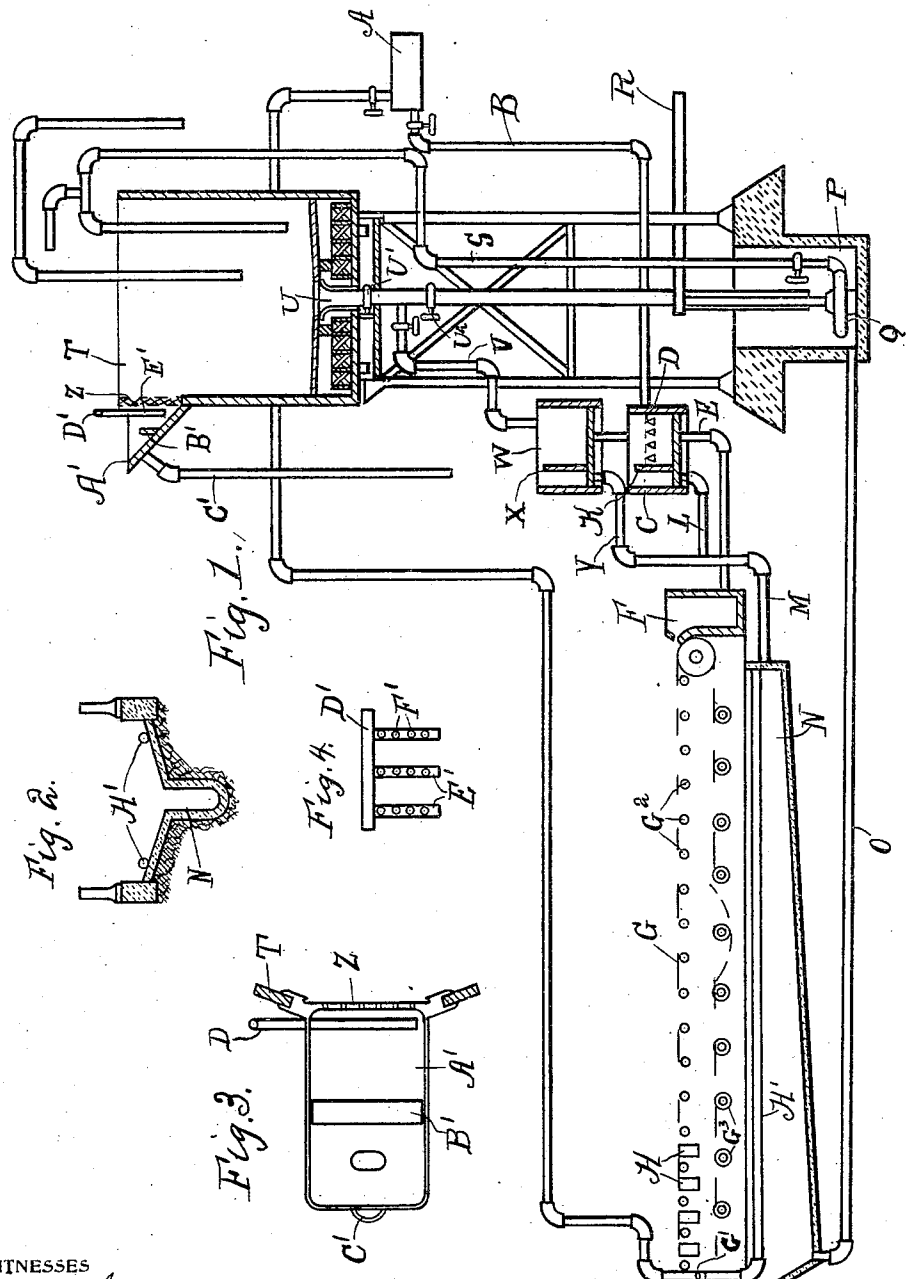

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

WITNESSES

S. M. Gallagher.

E. N. Schofield

INVENTOR

Harry S. Rinker

BY

W. Preston Hutchinson

ATTORNEY

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HARRY S. RINKER, OF PHILADELPHIA, PENNSYLVANIA.

PAPER-MAKING SYSTEM.

935,407. Specification of Letters Patent. Patented Sept. 28, 1909.

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To all whom it may concern:

Be it known that I, HARRY S. RINKER, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Paper-Making Systems, of which the following is a specification.

My invention relates to a new and useful improvement in paper making systems, and has for its object the conversion of any continuous system of making paper, cardboard, paper pulp or allied products, now operating with an unlimited water supply, into a closed circuit system, thereby utilizing the water repeatedly and preventing the loss of pulp, clay, size and alum incidental to all systems as now operated. The objects sought to be accomplished being the increased economy in the use of water, in preventing the loss of pulp, and in the saving of clay, size and alum.

The invention as contemplated by me is intended to act as an auxiliary to any continuous system of making the above mentioned products now in use, and is intended to be added to said system or systems without in any way affecting their present mode of operation, or the change of any machinery now in use for accomplishing the purpose of the manufacturers, except the substitution of the closed circuit system of water supply for the present method of using unlimited water.

In carrying out my invention the machine to be improved has added to it a storage tank, which is capable of receiving the entire quantity of water in use in the system at any one time; a drain of peculiar and novel form, which will take the place of the ordinary open sewer under the screen or cylinder or mold, and adapted to receive all water which passes from the machine, and convey it by suitable means to a well in which a centrifugal pump of the proper capacity is located for the purpose of returning the same to the storage tank, whence it returns by suitable piping, tanks, screens, etc. to the screen or cylinder or mold on which paper is being made, again passing the machine, where it deposits the major portion of the material which it carries in suspension, on the screen, cylinder or mold, returning thence carrying such surplus material as it still has in suspension, to the drain, thence to the well, thence by the aforesaid centrifugal pump to the storage tank, and thence over the same circuit repeatedly, thus saving all valuable material for the making of the products aforesaid and preventing the same from being washed away and wasted as occurs in the continuous supply of fresh water at present in use.

With the object in view of preventing the addition of extraneous water to this system by irresponsible parties provision is made for supplying the beaters with water from the storage tank and after having been properly mixed in the beaters with the material for making the products aforesaid, it passes through such machinery and processes as may be required by the particular system in use, by means of suitable pipes, valves, tanks, and other necessary mechanical appliances, eventually reaching the screen, cylinder or mold in company with the portion of water previously mentioned, when both portions of water with the material suspended therein, after depositing the major portion of such suspended material on the screen, cylinder or mold, pass to the aforesaid drain, thence to the pump, thence to the storage tank, returning over the same circuit repeatedly, as described for the preceding described portion of water, thus preventing the escape of any useful material carried in suspension, keeping the said materials circulating in the system until eventually all the said material leaves the screen, cylinder or mold in the shape of products for whose manufacture the system is operated. Owing to the possibility of ignorant or malicious addition of extraneous water, in defiance of the method of operation hereinabove described, and also owing to the fact that under some conditions it is necessary to have more water in the system than when operating in its balanced condition, the storage tank aforementioned is provided with an apparatus permitting the overflow of such surplus water at the highest level at which the storage tank is operated. This overflow being located at the highest point of the system will dispose of surplus water without the loss of any suspended materials, as the overflowing water must pass a screen of sufficient fineness to retain such materials before reaching the overflow dam, and all suspended materials will be stopped by this screen, allowing only clear water to pass. Should this screen become clogged a steam spray is so arranged as to blow the material away from the screen, thus throwing the

said material back into suspension in the water in the main body of the storage tank, where it is again put into circulation.

The improvement also contemplates the use of water from the storage tank by the shower pipes at present in use in connection with the screen, cylinder or mold for the purpose of washing the adhering material from the screen, cylinder or mold, in case of the breaking of the web, or other disarrangement of the process of manufacture.

It is further a part of my improvement that the aforesaid centrifugal pump which elevates the water from the aforesaid well to the storage tank shall be operated from a source of power which shall be free and independent of the operation of the source of power which communicates motion to the screen, cylinder or mold, to the end that the pump may be operated previous to the starting of the remaining mechanism of the system, thus churning the materials held in suspension to a proper diffusion and consistency throughout the body of water contained in the system before being admitted to the screen, cylinder or mold.

The entire improvement described in sectional detail above, to be connected and made operative as required by the various conditions appertaining to the system and to the particular machine in question, by means of piping, valves, auxiliary tanks, dams, screens, safety devices, and such other mechanical apparatus and appliances as may be required for the proper and sufficient operation of the improved system, as above described, for and in pursuance of the aforesaid improvement, and for the purpose of attaining the objects or results for which the system and the particular machine in question is being operated. This and preceding descriptions are contemplated to be taken into consideration in connection with the accompanying drawing which is hereby designated as, and made a part of this specification, and:—in order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by letter to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a diagrammatic view of my improvement. Fig. 2, a section of the drain at X. Fig. 3, a plan view of the overflow gate of the tank. Fig. 4, a front view of the steam pipe blow-off.

In carrying out my invention as here embodied, A represents the beaters which prepare the material for making paper and mix it with water so that it will flow through the pipe B into the small tank C which has a screen D fastened therein to prevent particles which are too large for making paper passing through said screen. That part of the material which does pass through the screen goes through the pipe E and into the box F where it floats to the top and is carried off by means of the traveling screen or apron G which is prevented from sagging by means of the small rollers G^2 and G^3, and on this apron the water drains from the material thus leaving it partly dry. To further dry the material vacuum boxes H are placed at one end beneath the screen. Passing beyond said vacuum boxes the material runs between two rollers indicated at I and I′. Here it is taken and placed upon the roller J and allowed to return to other parts of the machinery in which we are not concerned. Should the water in the small tank C become higher than the dam K in the said tank the water would flow over this and into the drain pipe L then into the pipe M, and finally to the drain N where it would flow downward and into the pipe O until it had reached the well P where there is placed a centrifugal pump Q. This pump is revolved by the application of some means of power to its shaft; when this pump is put in motion it pumps the water through the pipe S and into the large tank where it once more starts on its round by passing through the pipe U when the gate valve U′ is opened and the gate valve U^2 is closed; from here it runs into the pipe V and into the small tank W where it passes into the small tank C and so on until all surplus water has been removed, and the paper making material has passed over the roller J. Should the water become higher than the dam X in the small tank W it would flow over the said dam and into the drain pipe Y into M and so on until it again reached the large tank T where it would again start on its circuit of the system until it had deposited all paper making material carried in suspension.

The large tank T has a hole cut therein over which is placed the screen Z to prevent the paper making material from flowing out. When the water reaches the height of the bottom of this hole it will flow into the reservoir A′, and should it become higher than the dam B′ which is placed in said reservoir it would flow over it and into the pipe C′ whence it is discarded and allowed to run to waste. Should any of the material catch on the screen Z a blast of steam could be blown through the steam pipe D′ which would pass into the row of small pipes E′; from these it would pass out of a row of small holes as indicated at F′ and against the material which rests upon the screen Z, thus blowing it back into the water. Should any of the material stick to the apron, screen, cylinder or mold, it would be separated from the same by means of a spray of water coming through a pipe and out by means of a row of small holes, said pipe to be

placed to the best advantage in connection with the machine in question. In case any of the material remains upon the sides of the drain N it would be washed down by the small streams of water which flow from the pipes H'.

The particular advantages of my improvement are that no part of the material is lost because it cannot get out of the system, and thus it must in time leave the machine as finished product and a large economy of auxiliary materials, such as clay, size and alum is also attained.

The drawing which forms a part of this specification shows only one of the several types of machines which are in use for the purpose of manufacturing the products herein before referred to, and it is to be understood that with the necessary variation in mechanical detail, the system is adaptable to all the types of machines now in use for the manufacture of such products when the said manufacture is a continuous operation, and such adaption can be made without departing from the spirit of my invention.

The portions of the system shown in diagram on the drawing herewith, and forming part of this specification, marked A, C, D, G, G', G^2, G^3, I, I', F, H, and J, are parts of the system of operation with or without my improvement, and are in common use at the present time.

Having thus fully described my invention, what I claim as new and useful, is—

1. In a paper making system of the character described, a separating tank C, adapted to receive the liquid pulp from the beaters, screen the same, and deliver it to the distributing box, a tank W located above the level of the first named tank, a pipe leading from the tank W to the tank C, a drain located beneath the traveling screen so as to receive the waste therefrom, a well, a pipe connecting said drain with said well, a reservoir tank T, means for forcing the waste from said well to said reservoir tank, and a pipe connecting said reservoir tank with the tank W, whereby the waste is returned to the separating tank C, as and for the purpose set forth.

2. In the combination with a system of the character described, a reservoir tank T, means for collecting and conveying the waste material to the said tank, an overflow reservoir connected with the reservoir T, a screen separating said reservoir, a steam blast opposed to the flow of material from the tank T, adapted to clean said screen, an overflow pipe leading from the overflow reservoir whereby any overflow from this reservoir will be diverted from the system, and run to waste, a tank W, a pipe adapted to convey material from the tank T thereto, a separating tank C, adapted to receive the material from the beaters, and also from the tank W, and a distributing box F with which the tank C is connected by pipe, as shown and described.

In testimony whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses.

HARRY S. RINKER.

Witnesses:
JOHN MACGREGOR,
ARTHUR H. HAIGT.