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Patented Oct. 24, 1899.

C. WURSTER.

MACHINE FOR PULPING UP PAPER AND PAPER MATERIALS.

(Application filed June 16, 1899.)

(No Model.)

Fig. 1.

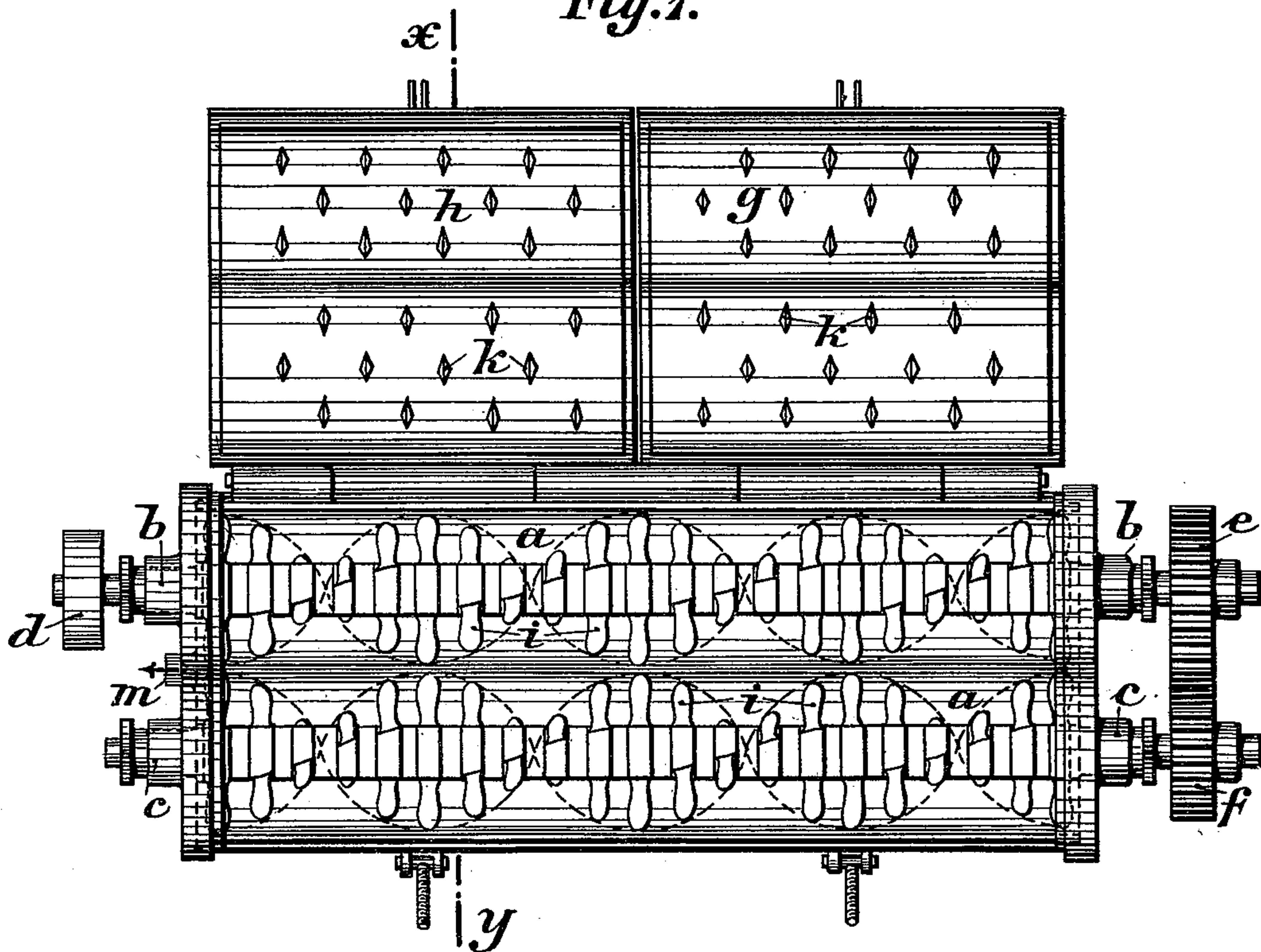
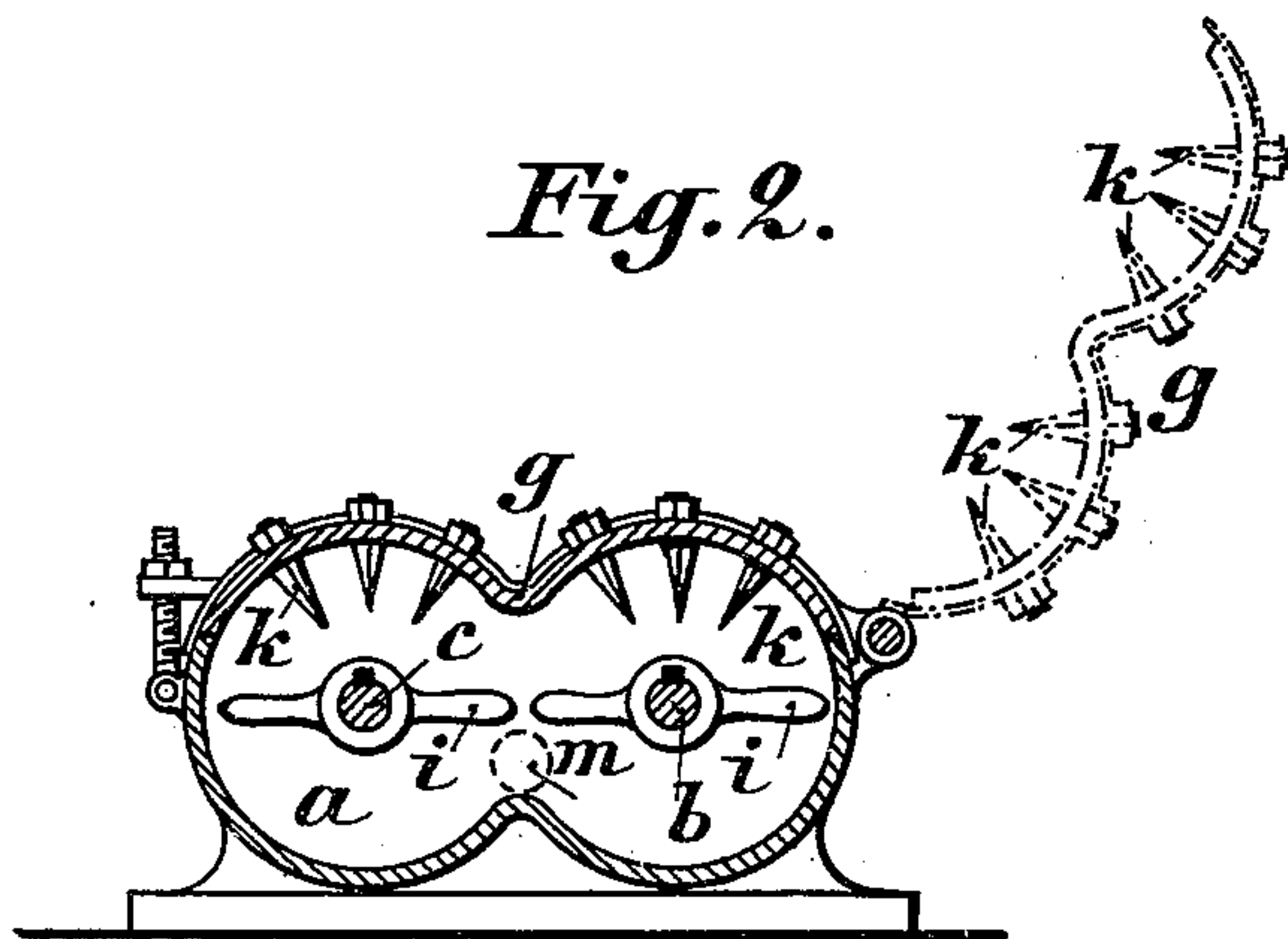


Fig. 2.



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CASIMIR WURSTER, OF LONDON, ENGLAND.

## MACHINE FOR PULPING UP PAPER AND PAPER MATERIALS.

SPECIFICATION forming part of Letters Patent No. 635,412, dated October 24, 1899.

Application filed June 16, 1899. Serial No. 720,739. (No model.)

*To all whom it may concern:*

Be it known that I, CASIMIR WURSTER, a subject of the Emperor of Germany, residing at Dudley Mansion, 29 Abbey road, St. John's Wood, N. W., London, England, have invented certain new and useful Improvements in Machines for Pulping Up Paper and Paper Materials, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to machines for pulping up paper and paper substitutes. For this purpose the "Kollergang" or "Stones" is nearly exclusively in use at present, although this machine has a number of disadvantages. It requires, first, a great deal of motive power, which is out of proportion to the work done, and, secondly, it grinds up and shortens the fibers and with them also all hard and soft foreign matter contained in the paper-stock.

For years experiments have been made with other machines with a view to supplant the Stones; but none of the new implements have given entire satisfaction so far, as most of them show the same disadvantages as the Kollergang. In this respect I especially mention the "Barbotte," generally in use in France, and the "Triturateur," which also is of French origin. Both these machines take no account of the vast amount of foreign matter and impurities which is always contained in old paper-stock and which interferes with the proper working of the machine and at the same time is ground up more or less, and thus deteriorates the resulting paper-pulp. This is more especially the case in the Barbotte. In the Triturateur the fibers of the paper also get shortened and ground up, which is equivalent to a deterioration of the pulp. The Triturateur also requires a large excess of motive power. With both these machines the paper-stock has to be soaked in water for some considerable time before it is used and the resulting pulp is too wet for transport. Especially the Barbotte only produces very wet pulp, which contains an excess of the amount of water wanted for handling the pulp properly.

The subject of the present invention is the machine described hereinafter, which combines the advantages of the older appliances, but avoids their faults. This object is attained by dividing the work of the machine into two distinct operations—first a simple kneading of the paper and afterward the actual pulping up of the mass.

Referring to the accompanying drawings, Figure 1 is a plan view of my improved machine seen from above, and Fig. 2 a cross-section on line *x y* in Fig. 1.

The machine consists of a trough *a*, the cross-section of which has the shape of two circles partly intersecting each other. About one-third of the two upper cylinder-mantles which form the sides of this trough is cut away, so that the trough is open at the top. In the centers of the two cylinders shafts *b* and *c* are provided, one of which is driven by a pulley *d* and drives the other by means of the wheel-gearing *e f*. The two shafts are preferably coupled in such a way that they revolve with different speeds.

To the sides of the trough *a* two or more lids or covers *g h* are jointed in such a way as to complete the two cylinder-walls and to shut up the machine when they are closed. The covers *g h* are shown in the closed position in full lines and in the opened position in dotted lines in Fig. 2. In Fig. 1 they are represented in the opened position, so as to expose the interior of the machine.

On the whole length of the shafts *b* and *c* and at a certain distance from each other a number of paddles or blades *i i* are fastened. They are made of such length as to neither touch the walls of the trough nor the blades of the opposite shaft. These blades are shaped like propeller-screws, such as are used in steamships, and are fastened in such a way on the shafts *b* and *c* that together they substantially coincide with a helical surface the axis of which is formed by the shafts. On the covers *g h* are arranged a certain number of stationary blades or spikes *k k*, which are fastened in such a way that they project into the open spaces left between the blades *i i*.

The working of the machine is performed as follows: To start working, the covers *g h* are first thrown back, as shown in dotted lines



in Fig. 2, and the paper-stock is fed into the machine either in a dry state, water being sprinkled into the machine at the same time, or it is fed in after having previously been soaked. As the opposite blades do not touch each other, in this first operation a kneading only of the stock takes place, and no proper pulping-up action is produced, and thus the advantage is gained over the older machines that the stock can be supplied to the machine in a dry or almost dry state. As the two shafts revolve with different speeds, the blades *ii* where they approach each other in the middle of the trough, although going in the same direction, have a different velocity. The result will be that the blades of the one shaft will squeeze off a part of the pulp from the blades of the other shaft. The helical shape and position of the blades produce a slow propelling action of the kneaded stock toward the other end of the trough. In this way the whole stock is continuously thrown about, mixed, and kneaded; but strings and rags are not torn or ground up. The larger and harder foreign substances do not combine with the kneaded stock, but rise to the surface of the kneaded mass and can be easily picked out by hand. Strings and rags fasten around the blades and shafts and can also be taken away by hand when the machine is stopped for this purpose. By this preliminary kneading I get rid of most of the impurities and foreign matter of the paper-stock and can then proceed to the real pulping up. For this purpose the covers are now closed, and the kneaded stock not only continues to be thrown about, as before, but is also squeezed through the interstices between the standing blades of the covers by each turn of the rotating blades, and thus the disintegrating and pulping-up action takes place. In this second phase the machine works very much like the Barbotte; but through its horizontal position, allowing to work it first with open covers, the disadvantages of the Barbotte, especially the tearing up of strings and rags, are avoided. For this reason the new pulping-machine is also more economical, since the grinding up of the strings, rags, and other hard substances requires a great deal of the power in the Barbotte; but the new machine also produces a much drier pulp and will also pulp up very hard sized papers, which escape being pulped up in the Triturateur. My new machine also avoids another disadvantage of the Triturateur—viz., the shortening of the fibers themselves. Moreover, it combines in this respect the advantage of the Barbotte with that of the Triturateur, not possessed by the Barbotte, to work continually.

If continuous working is preferred, the end of the trough toward which the blades propel the pulp is provided with an opening *m*, and the cover *h*, situated next to this end, is kept closed from the beginning of the opera-

tion and the other cover is kept open the whole time.

When working continuously, the propeller action of the blades *ii* comes into requisition. By means of this arrangement the paper-stock fed into the machine is at the same time kneaded and continually transported forward toward the farther end of the trough.

The pitch of the screw and the size of the opening *m* at the end of the trough are regulated so as to allow the stock enough time to be thoroughly kneaded in the first open part of the trough and the foreign matter and impurities to be picked out before the stock is conveyed into the second closed part of the trough, where the stock is subjected to the action of the combined standing and rotating blades and ultimately is delivered as pulp through the opening *m* in the end in form of a continuous string. In this way of working the two different operations of the kneading and of the pulping up of the stock are locally separated, while in the first instance the two operations were temporarily separated. By this method of continuous working also all stopping for the purpose of emptying the machine after each charge is made superfluous.

Having now particularly described and ascertained the nature of my said invention and the manner in which the same is to be performed, I declare that what I claim is—

1. In a machine for pulping up paper and paper materials, a substantially horizontal trough having an unarmed surface, shafts passing through said trough, means for rotating said shafts, blades carried by said shafts, a lid for said trough armed with blades or spikes, and means for throwing said lid into and out of position to cooperate with the blades on said shafts.

2. In a machine for pulping up paper and paper materials, a substantially horizontal trough having an unarmed surface, shafts passing through said trough, means for rotating said shafts, blades carried by said shafts, a lid for said trough armed with blades or spikes and formed of a plurality of parts, and means for independently throwing said parts into and out of position to cooperate with the blades on said shafts.

3. In a machine for pulping up paper and paper materials; a substantially horizontal trough, shafts passing through said trough, means for rotating said shafts, blades carried by said shafts, and blades or spikes arranged to cooperate with the blades on said shafts for a portion only of their length, whereby kneading and pulping may be accomplished at the same time.

In testimony whereof I have hereunto set my hand.

CASIMIR WURSTER.

Witnesses:

HERRY HASPER,  
WOLDEMAR HAUPT.