(No Model.) 2 Sheets—Sheet 1.

J. W. HYATT.

PROCESS OF MAKING VEGETABLE PARCHMENT FABRIC.

No. 511,891. Patented Jan. 2, 1894.

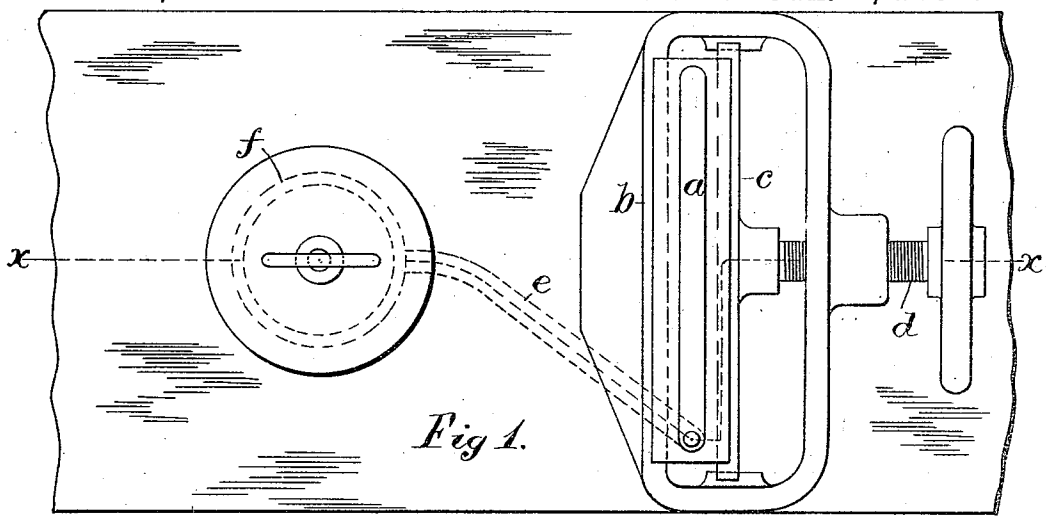

Fig 1.

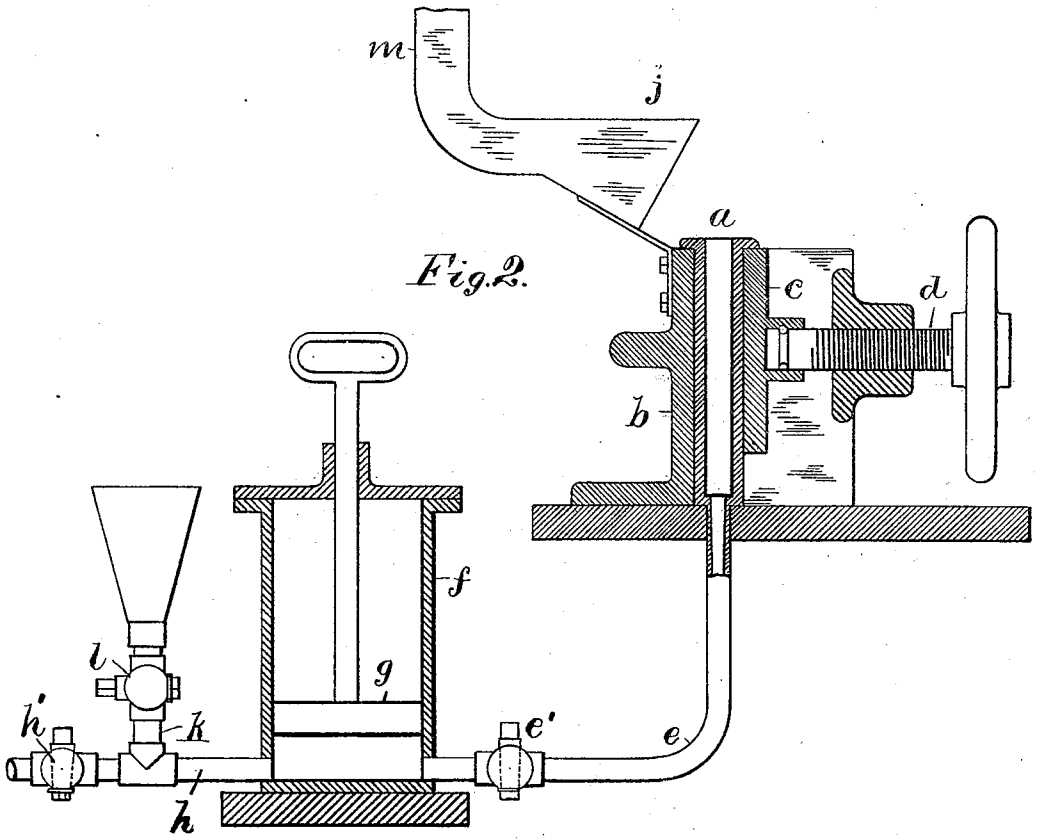

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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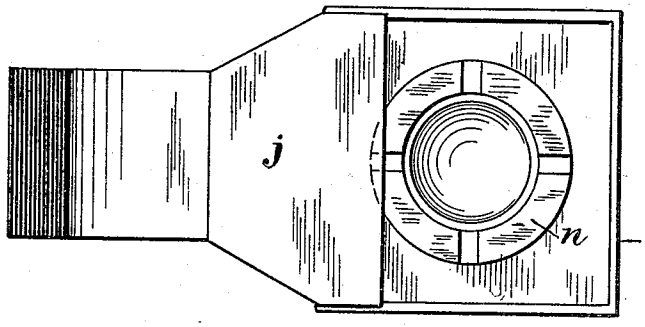

Fig. 4.

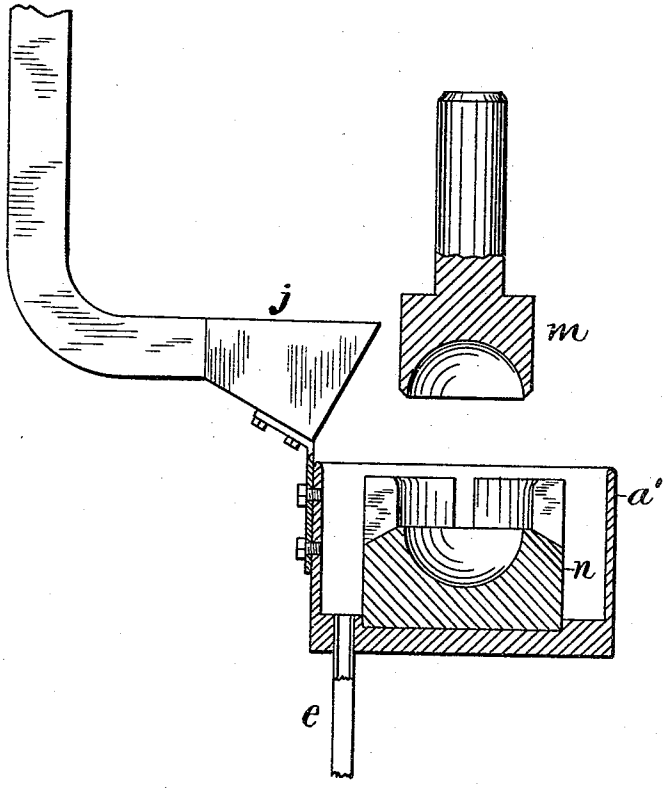

Fig. 3.

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THE NATIONAL LITHOGRAPHING COMPANY,
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UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY.

PROCESS OF MAKING VEGETABLE-PARCHMENT FABRICS.

SPECIFICATION forming part of Letters Patent No. 511,891, dated January 2, 1894.

Application filed July 23, 1892. Serial No. 440,988. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN W. HYATT, a citizen of the United States, residing at Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Processes of Making Vegetable-Parchment Fabrics, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to manufacture sheets, tubes, and other fabrics, of vegetable parchment, by cementing separate sheets of the parchment together to form a thick material. Such material, from one quarter of an inch and upward in thickness, is of great use in various manufactures; but can only be produced by cementing numerous sheets together, and certain difficulties have been heretofore experienced in its production, for the reason that some solvents of cellulose cannot be properly washed out of the thick material, and others are much more expensive and require a very slow process to expel the solvent. Sulphuric acid is the cheapest agent in use for parchmentizing sheets of vegetable matter, and operates rapidly upon the cellulose; but is liable to convert the same into pulp if it acts too long upon the cellulose, and it cannot be removed by evaporation, and cannot be washed wholly from a thick mass of the material without great difficulty. Chloride of zinc, although more expensive, is therefore commonly used in forming thick masses of parchmentized material, which are generally known as "vulcanized fiber," but this agent as well as sulphuric acid injures the fiber if it remains permanently in contact therewith, and must therefore be removed or neutralized. Such removal, which may be done by a bath of suitable reagent, is relatively slow in its operation, and the use of chloride of zinc therefore involves a slow and relatively expensive process.

I have discovered a means of utilizing the rapid action of sulphuric acid in parchmentizing the vegetable matter, and of avoiding the expense and slow operation of the chloride of zinc in the formation of thick bodies of the material. In the use of chloride of zinc, the parchmentizing of the vegetable sheets and the cementing of them together is performed simultaneously; but in my process I employ two steps, first, parchmentizing the sheets separately by the use of sulphuric acid, and second, softening their surfaces and cementing them firmly together by the use of a solvent which contains no injurious agent, and the liquid in which evaporates readily from the mass. An ammoniacal solution of cupric oxide is such a solvent, and other ammoniacal solutions which perform the same functions may also be used. The evaporation of aqua-ammonia leaves the cupric oxide in the mass of parchmentized material, but such agent is entirely neutral in relation to the parchment, except when associated with the ammonia, and its presence causes no injury to the product. By the use of such a solvent, I find that a mass of parchmentized material may be built up of any desired thickness, and the solvent wholly expelled with comparative rapidity; as the ammonia and the water combined with the same are wholly volatile, and are easily discharged from the product by mere exposure to the atmosphere.

My process therefore consists essentially in first parchmentizing the vegetable fiber by a suitable agent, as sulphuric acid, washing such agent from the fiber and drying the same and then cementing a mass of such parchmentized fiber together by the means of a suitable ammoniacal solution. By the use of such agents, the process is performed with great cheapness and rapidity, and objects of any desired shape and dimensions may be produced; as the product is somewhat pervious to water, and the water and ammonia may thus be perfectly discharged from the same.

In forming layers or flat masses, I parchmentize single sheets of paper of suitable quality with sulphuric acid, and thoroughly wash and dry the same, which wholly removes the acid. The sheets require drying before the application of the copper solution, as the water if left in the sheets, would dilute the solution and prevent its action in the desired degree as a solvent. Sheets of the vegetable parchment, in suitable number to form a mass of the required thickness, are then treated with the ammoniacal solution of cupric oxide for a suitable length of time to dis-

solve their surfaces, say half a minute, and are then pressed together with a very moderate pressure, sufficient to bring the surfaces uniformly into contact. The surfaces of the separate sheets are rendered so adhesive by this solution that the mass becomes completely consolidated in four or five minutes, and the product may then be dried in the atmosphere, which for sheets under half an inch in thickness can be accomplished in from one to three days.

To form objects of irregular shape, I employ parchment paper or the waste pieces of the sheets made as above reduced to small grains, and immerse them in the ammoniacal solution for a suitable length of time, and then press the same into a mold of the required form. In any case, the greater part of the solution is expressed from the mass of parchmentized material, and may be preserved and used over and over if its strength be maintained by the addition of ammonia gas.

It will be understood that it is essential to dry the material, whatever its form, after it is parchmentized, before it is subjected to the solution for cementing the material together.

In the annexed drawings, I have illustrated the means for pressing flat sheets together to form a thick layer, and have shown the means for preserving the ammoniacal solution, for preventing the dissipation of the ammonia from such solution, and for protecting the operator from the ammonia vapor.

In the annexed drawings, Figure 1 is a p of the apparatus with the exhaust hood removed, and Fig. 2 is an elevation of the same with the parts in section, where hatched, on line x, x, in Fig. 1. Fig. 3 shows in a sectional view like Fig. 2, the apparatus for producing molded objects; and Fig. 4 is a plan of the receptacle and lower die.

I will refer first to Figs. 1 and 2, showing the apparatus for forming thick layers of parchmentized material. In these figures a is an india-rubber tank or receptacle adapted to receive the sheets when ready for pressure, the opposite sides of the tank being fitted to a bed b and a platen c actuated by hand-screw d. Such a tank forms a yielding receptacle, whose walls may be pressed upon the parchmentized material, and also serves to prevent the loss of the solution. The bottom of the tank is connected by a tube e with the bottom of an iron receiver f, which is provided with a vertical plunger g. The receiver and its plunger are made sufficiently tight to prevent the escape of the ammonia, and a pipe h with cock h' is also connected with the bottom of the receiver to supply ammonia gas, to strengthen the solution when desired. A pipe k may be used to fill the receiver when the plunger is raised, and the solution is forced into the tank by depressing the plunger. The parchmentized sheets are then immersed in the tank and when their surfaces are suitably softened the plunger is raised to withdraw the solution; and the opposite sides then pressed together by rotating the screw d. The pressure, which is only intended to bring the surfaces of the sheets into uniform contact, is sufficient to expel the greater part of the ammoniacal solution, which passes from the tube e into the receiver f.

In removing the solution from the tank a, the cock h' in the pipe h is closed, and a cock e' in the tube e is opened, and the solution is drawn into the receiver by lifting the plunger g to a suitable degree. By closing the cock e' and opening the cock in the pipe h, ammonia gas under pressure may be admitted to the receiver beneath the plunger, which operates to maintain the strength of the solution in the receiver until the same is required for subsequent use. A pipe k with cock l is provided to supply or draw off the solution when required. The hood j is provided over the tank a to collect the ammonia fumes, and an exhaust pipe m is connected with the hood to draw off the fumes and thus prevent the fumes from affecting the operator after the parchment is placed in the tank.

In making objects or masses of irregular form, suitable dies would be used, and surrounded by a suitable receptacle to collect the solution and discharge it to a receiver as already described.

In Fig. 3, the receptacle a' is made rigid and dies m, n are shown within the same to form a spherical object, as a billiard ball. The lower die n may be filled with a suitable volume of the softened vegetable parchment, and the upper die m would be pressed upon the same in any ordinary press; which is not shown in the drawings, as the operation of such presses is already well known. In such an apparatus the vegetable parchment may be softened by admitting a supply of the cupric ammonia to the receptacle, as described in connection with Fig. 2, or the parchment may be suitably softened by the solvent before it is applied to the dies within the receptacle. In either case, the solution expressed from the material within the dies would overflow within the receptacle and may be discharged through the tube e into any suitable receiver.

The apparatus, like that shown in Fig. 2, is provided with an exhaust hood j, to draw the fumes away from the operator. With the use of such apparatus, the operator is protected from the ammonia fumes, and the ammoniacal solution is collected and its strength maintained, so that it can be repeatedly used.

To facilitate the formation of thick masses and the rapid drying of the same, single sheets may be first made into layers one quarter of an inch in thickness and then dried and when the water and ammonia are thoroughly evaporated from such layers, several of the layers may be cemented together by softening their surfaces with the ammonia copper solution.

The layers when pressed together adhere with the same readiness as single sheets, and the solvent is absorbed in the whole mass in such a manner that it is easily evaporated, being very small in amount, owing to the small number of joints.

My process is distinguished from others by its performance in three distinct steps, and by the use of two distinct agents, the material being first treated with a cheap solvent to parchmentize the fiber; second, washed and dried, and third, cemented together by the use of an ammoniacal solution. The division of the process into three steps greatly facilitates the complete removal of the sulphuric acid or other parchmentizing agent by which the fiber is primarily treated. The use of an ammoniacal solution in the final step of the process greatly facilitates the final drying of the product, and secures the entire absence of all injurious ingredients within the mass.

Mechanical means are already well known for forming tubes and sheets of thick material of parchmentized fiber, and I do not therefore claim any such means but only the means described herein for collecting and preserving the ammoniacal solution when pressing the fiber together.

No process has been heretofore known for forming a plastic mass or compound which could be molded into objects of homogeneous vegetable parchment, and no means has therefore been known of utilizing the scraps of vegetable parchment which are formed by cutting sheets of such material into various articles. By my process, such scraps when reduced into small particles may be externally softened and reunited by pressure into a homogeneous mass, and many articles which are now made by cutting up sheets with great waste may thus be molded directly into form. The scraps which are unavoidably produced in making certain articles can also be utilized in the production of other articles. My invention, both in the operation of the successive steps, and by the nature of the product, is therefore clearly distinguished from the means heretofore known, which merely produce a layer of material in a single step or operation.

Having thus set forth the nature of my invention, what I claim herein is—

1. The process for making a mass of vegetable parchment, which consists in first parchmentizing the vegetable fiber by a suitable agent, second, washing such agent from the vegetable fiber and drying the same, and third, cementing the parchmentized fiber into a mass by means of an ammoniacal solution of cupric oxide or its equivalent, as set forth.

2. The process for making vegetable parchment fabric, which consists in first parchmentizing sheets of vegetable fiber with sulphuric acid, washing the acid from such sheets, drying the same, dissolving the surfaces of the sheets by an ammoniacal solution of cupric oxide and pressing the sheets together, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN W. HYATT.

Witnesses:
THOMAS S. CRANE,
HENRY J. MILLER.