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TYMPAN

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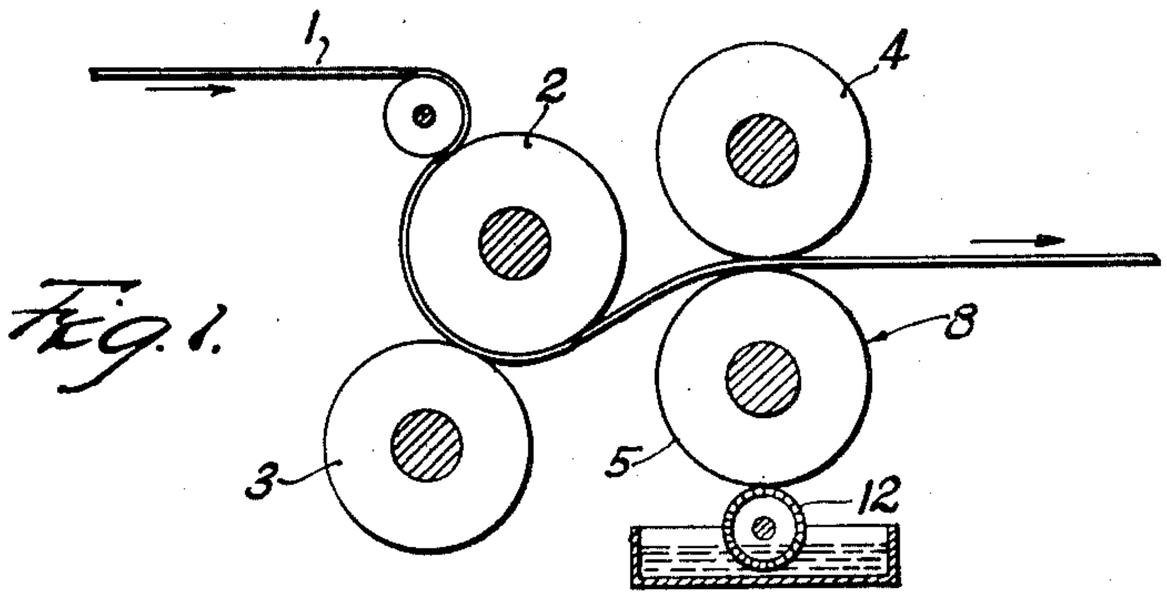

Fig. 1.

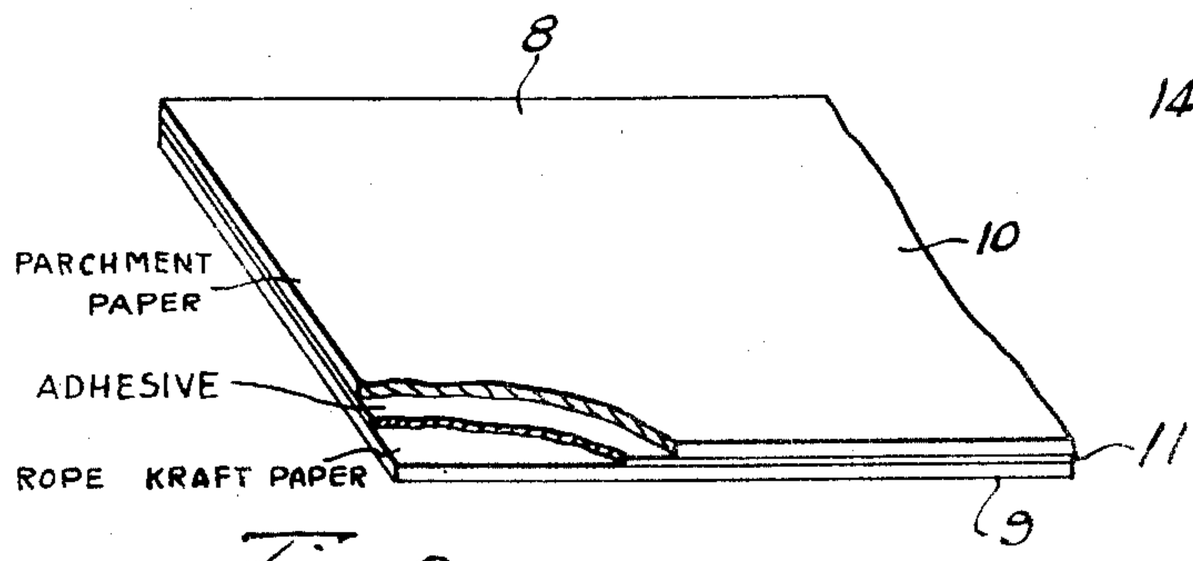

Fig. 2.

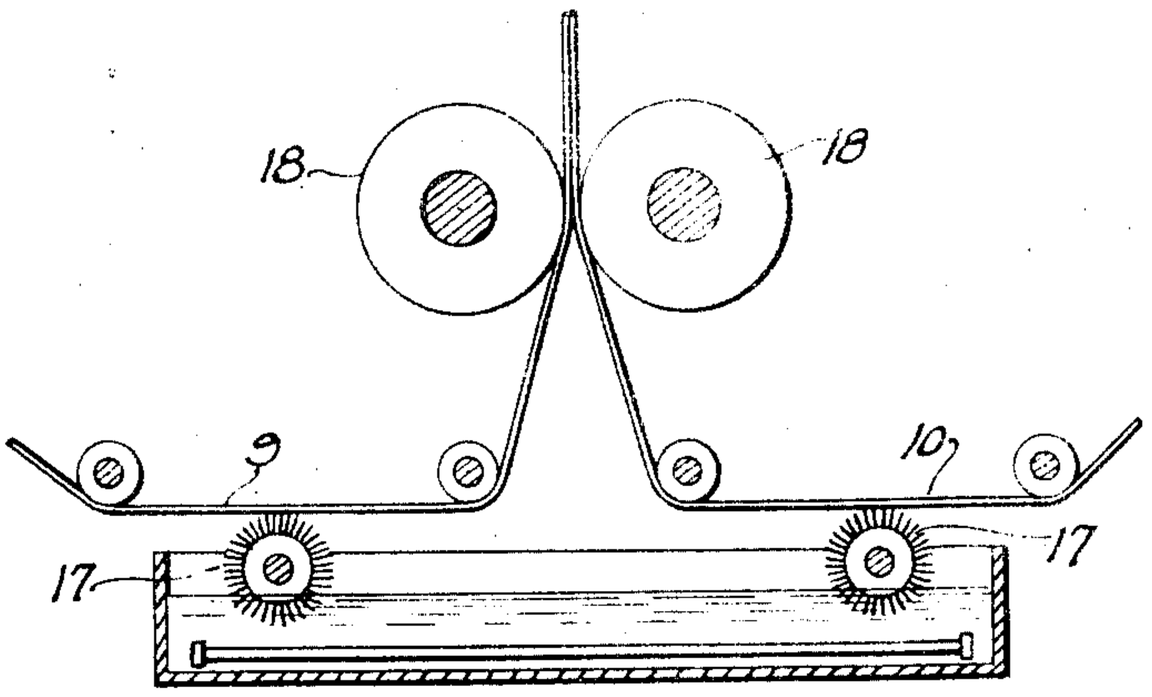

Fig. 3.

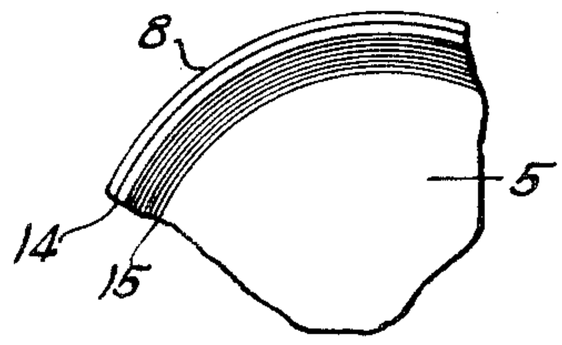

Fig. 4.

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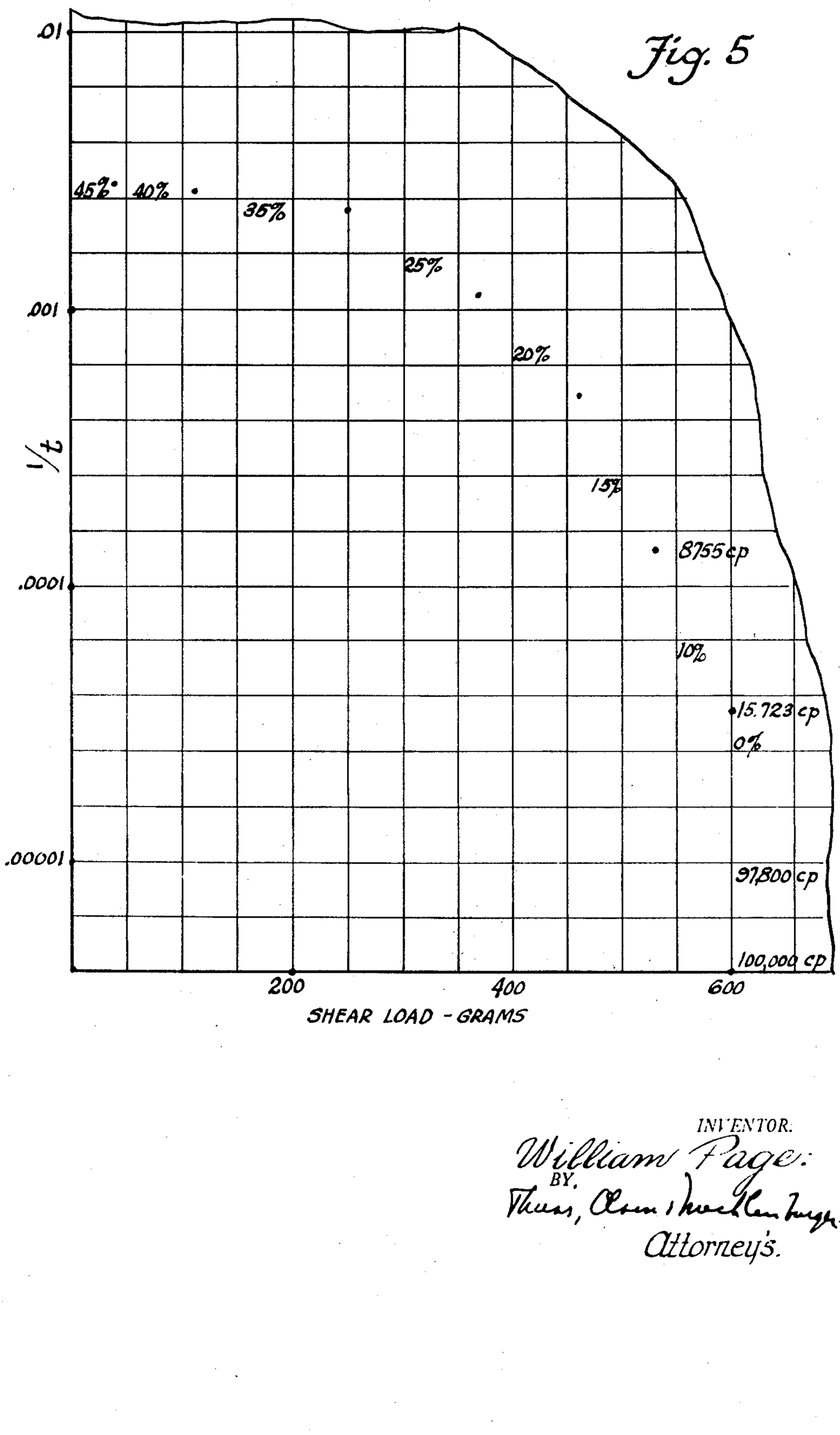
Fig. 5



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UNITED STATES PATENT OFFICE

2,544,279

TYMPAN

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Application July 28, 1948, Serial No. 41,070

6 Claims. (Cl. 154—54.5)

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This invention relates to tympan paper used in printing apparatus and more particularly to the laminated type of tympan disclosed in United States Patent No. 1,487,158 granted March 18, 1924, to George W. Gould.

In the operation of printing presses, one of the important problems is the maintenance of a uniform impression pressure between all points of the type and the surface being printed. This pressure is extremely critical, especially in certain types of printing, and a variation of one-thousandth of an inch will produce blurring or fading and a rejection of the work. However, to minimize wear of the type a cushioning action is necessary and it is essential that such cushioning action be also maintained if the uniform impression pressure is to be maintained. Packing and a protecting tympan therefor are accordingly used about the impression roller. However, to serve its purpose the tympan should be of uniform thickness to assure uniform impression pressure, it should have a high strength against tearing and a hard outer surface, and it should be resilient to protect the type against excessive wear due to the repeated pounding by the type as the printing impressions are made. The repeated pounding by the type tends moreover to destroy in a short time the resilience of the tympan and then the tympan itself. It was found that in the type of tympan disclosed in the aforesaid patent the parchment would separate from the kraft or under sheet after several hundred thousand impressions as the result of the resilience being destroyed by a breakdown of the glue or paste between these layers. Failure of a tympan to have a life in excess of several hundred thousand impressions is costly because the press must be shut down each time the tympan must be replaced and the packing and type readjusted each time to secure the uniform impression pressure between the type and impression roller.

An object of the invention is to provide an improved form of tympan of the type disclosed in the aforesaid patent that is of uniform thickness, high tear strength, hard outer surface and a resilience that will persist and not be destroyed by the pounding of the type throughout a continuous printing operation greatly exceeding anything heretofore experienced and running as high as five million impressions without a change.

Specifically the invention is directed to a combination of an under sheet or layer of high tensile strength and an outer layer having a hard surface such as parchment, these layers being combined by an adhesive or paste capable of maintaining its bonding action under repeated pounding of the type.

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A further object of the invention is to provide in a tympan of this character an adhesive or paste that will maintain a firm backing for the parchment and will prevent a separation of the parchment from the under layer as well as provide the desired resilience for the tympan.

A still further object of the invention is to provide, in connection with this type of tympan, an adhesive of a composition preferably employing a starch paste having a predetermined viscosity and an aqueous emulsion of a resin. It is found that the proper preparation of the starch paste and its viscosity are quite essential to the character of the adhesive, after the emulsion of resin is added, to produce a tympan of the long life desired.

Other objects and advantages of the invention will be apparent from the following detail description when taken in connection with the accompanying drawings, in which:

Figure 1 is a diagrammatic sectional view illustrating a form of press employing a tympan sheet embodying the invention;

Fig. 2 is an enlarged perspective view of the tympan sheet, a portion being broken away to show the two layers thereof and the adhesive therebetween;

Fig. 3 illustrates diagrammatically a preferred method of making this tympan sheet;

Fig. 4 is an exaggerated section of a portion of an impression cylinder to show the packing and make-up below the tympan paper; and

Fig. 5 is a chart showing a flow curve to be referred to in determining the flow properties of the adhesive at the time the aqueous emulsion of cellulose acetate is added.

In the usual rotary press, the sheet of paper 1 being printed passes between an impression cylinder 2 and printing cylinder 3 which prints upon one side of the sheet, and then passes between a printing cylinder 4 and an impression cylinder 5 which prints upon the other side of the sheet 1. The side of the sheet of paper 1 being printed by the printing cylinder 3 must be protected against impairment as it passes over impression cylinder 5. To this end, a laminated tympan sheet 8 covers the peripheral surface of the cylinder 5, which sheet may be secured thereto in the manner disclosed in the aforesaid patent or in any suitable way.

Tympan sheet 8 preferably comprises a sheet 9 of material possessing relatively great tensile

strength and a sheet 10 of parchment paper. Preferably sheet 9 may be rope paper, kraft paper or jute, or other paper possessing considerable tensile strength. Both sheets 9 and 10 are then firmly bonded together by an adhesive which I shall now describe.

The adhesive is preferably a composition embodying a starch paste to which an emulsion of a resin is added, the starch paste being characterized by a predetermined viscosity at the time the emulsion of resin is added in order to obtain the desired new result. The preparation of the starch paste should be conducted under controlled conditions in order that the starch paste will have said predetermined flow property or predetermined viscosity at the time the emulsion of resin is added.

It is found that this flow property or viscosity may be obtained when the following is adopted: First, mix dry a suitable amount of starch, say corn or tapioca starch, with a suitable amount of diastase enzyme. Then add water and knead the mixture to a uniform consistency and hold until the enzymes convert the starch to a form which produces a paste of low viscosity. In this step, the temperature and holding period are factors determining the viscosity of the paste which will be obtained. It is also found that the addition of a suitable preservative such as pentachlorphenol prevents bacterial growth by the enzymes during the conversion period. As soon as the conversion has taken place, the temperature may be raised sufficiently to destroy the enzymes.

Specifically, to every 100 lbs. of corn starch approximately 4 oz. of diastase enzyme such as "Diastase BB" may be used, and, after well mixed dry, 138 lbs. of water at 75° C. may be added to the mixture. The temperature of the water may vary between 60° C. and 78° C., but the mixture, after kneaded to a uniform consistency, is heated to 75° C. and held at this temperature for, say, 30 minutes when the preservative, to the extent of 1% on the basis of the dry starch used, is added. After this preservative is added to prevent bacterial growth, the mixture is heated to 93° C. or slightly above to destroy the enzymes and, of course, stop further conversion. It is then cooled to a temperature of approximately 38° C.

When the starch paste is treated in the above manner, it should have a viscosity range permitting the mixture to receive an aqueous emulsion of a resin combined with triethanolamine and a thinner such as water. The triethanolamine is a coagulant inhibitor and may be omitted if coagulation does not occur. It is found that the adhesive combining the parchment and kraft will produce a tympan paper giving the desired result when starch paste has this viscosity range at the time the resin and triethanolamine are added. For 100 lbs. of starch initially treated as above described, it is desirable first to take 50 lbs. of an aqueous emulsion of a resin obtainable in a form commercially known as "Glu-Bond," which is composed of approximately 35% of cellulose acetate, 16% of butyl carbitol and 48% of water, the cellulose acetate being made stable by combining it with the butyl carbitol and a fractional per cent of mineral or saponifiable oil, and then stirring the same if desired in ½ lb. of triethanolamine dissolved in 10 lbs. of water as a thinner. The combined aqueous emulsion resin and triethanolamine is then mixed with the starch paste to produce the adhesive

designated 11 combining the parchment 10 and the kraft 9.

If the viscosity of the starch paste after the first cook is not in the correct range, additional unconverted starch may be added before the inclusion of the aqueous emulsion of resin and the triethanolamine. The viscosity may be measured prior to the cooling step and after the conversion has been checked. While the starch paste is still at, say, 75° C., portions may be tested at different shear loads with a Stormer type viscometer and the results compared with the graph or chart shown in Fig. 5. A flow curve may be plotted, and, if this cure intersects at or below the 10% range indicated on the chart in Fig. 5, the viscosity range is within proper limits and satisfactory to receive the aqueous emulsion of resin and the triethanolamine. If the flow curve intersects above the 10% range, the viscosity of the batch must be corrected by adding dry starch to the first cook in an amount equal in percentage to the pounds of wet paste made. For example, if 100 lbs. of wet paste is made and the flow curve intersects the curve illustrated on the chart shown in Fig. 5 at the range indicated by 25%, then 25 lbs. of dry starch should be added to the first cook, but without a further cooking step. The curve shown in Fig. 5 is empirical in character in that it has been arbitrarily formed by trial method. The abscissa values are in terms of shear loads in grams and the ordinate values are in terms of $1/t$ where t is the number of seconds per 100 revolutions of the Stormer type of viscometer. Any other viscometer may be used if it is of the shear type.

However, with the Stormer type of viscometer used in the preparation of the chart, it has been determined that the point designated 0% represents a viscosity of 15,723 centipoises, while the point designated as 10% represents a viscosity of 8,755 centipoises. The viscosity in the range below the zero mark will increase to approximately 97,800 centipoises as indicated in Fig. 5. Consequently, the viscosity range for the starch at the time the aqueous emulsion resin is added, is between 8,755 to 100,000 centipoises. Outside of this range, a correction is desirable and the above chart may be conveniently used to effect such correction. If the chart is not used, the viscosity of the starch may be measured in any known way in terms of centipoises or equivalent units of measurement.

Other resins as ethyl cellulose, acrylic and vinyl resins, etc., may also be used.

To prevent ink from gathering upon the outer surface of the tympan paper, a felted roller 12 is usually positioned below impression cylinder 5, as shown in Fig. 1, to contact this outer surface and thereby wash the same with any suitable ink solvent.

Fig. 4 illustrates diagrammatically in cross section a typical impression cylinder with its packing designated 14 and its make-up as 15. Make-up 15 usually comprises a plurality of thin layers of paper that compensate for any unequal pressure between the type and plates and the impression cylinder so that each impression will be made with a uniform pressure throughout if the tympan is of uniform thickness and a proper adjustment of the type is made. The slightest variation is detrimental to good work and often a pressman will labor for hours to secure equalization. During this period the press remains idle, which is costly and very undesirable.

I find that the adhesive 11 between the parch-

ment 10 and the sheet 9 maintains a firm but resilient backing for parchment sheet 10 and protects packing 14 and make-up 15 so that as many as several million impressions may be now made compared to the several hundred thousand impressions as heretofore by the tympan paper disclosed in the aforesaid patent. Not only may this greater number of impressions be now made without replacement of the tympan, but the press may operate continuously without requiring shutdowns to rebuild the make-up or adjust the type before a run is completed.

I propose to apply the adhesive 11 uniformly to the inside surface of both sheets 9 and 10. As illustrated in Fig. 3, sheets 9 and 10 may be fed over roller 16 so that these sheets pass rotating brushes 17 that wipe a thin layer of the adhesive thereon at substantially the same time so that the time interval these sheets carry the adhesive in wet form is the same before they are pressed firmly together by passing between press rolls 18. It will be understood that this adhesive 11 may be applied uniformly in other ways.

Without further elaboration, the foregoing will so fully explain the gist of my invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, without eliminating certain features, which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to me by the following claims.

I claim:

1. A washable tympan for printing presses consisting of a laminated sheet made up of a sheet of paper possessing relatively great tensile strength and a sheet of parchment paper forming the exposed surface of the tympan, and an adhesive between the two sheets consisting of a starch paste of a predetermined viscosity and an aqueous emulsion of cellulose acetate resin.

2. A washable tympan for printing presses consisting of a laminated sheet made up of a sheet of paper possessing relatively great tensile strength and a sheet of parchment paper forming the exposed surface of the tympan, and an adhesive between the two sheets consisting of an enzyme treated starch paste having a predetermined viscosity and an added cellulose acetate resin emulsion.

3. A washable tympan for printing presses consisting of a laminated sheet made up of a sheet of paper possessing relatively great tensile strength and a sheet of parchment paper forming the exposed surface of the tympan, and an adhesive between the two sheets consisting of a converted starch paste having a viscosity in a range between 8,755 centipoises and 100,000 centipoises and a resin emulsion.

4. A washable tympan for printing presses consisting of a laminated sheet made up of a sheet of paper possessing relatively great tensile strength and a sheet of parchment paper forming the exposed surface of the tympan, and an adhesive between the two sheets consisting of a starch paste of a viscosity in a range between 8,755 centipoises and 100,000 centipoises and a mixture of an aqueous emulsion of resin and a coagulant inhibitor.

5. In a tympan for printing presses consisting of a sheet of relatively great tensile strength and a sheet of parchment forming a hard exposed surface of the tympan, an adhesive between the two sheets comprising enzyme converted starch substantially in the ratio of 100 parts of starch and 138 parts of water and approximately 50 parts of a resin emulsion wherein the resin comprises in the neighborhood of 35% of the emulsion.

6. In a tympan for printing presses consisting of a sheet of relatively great tensile strength and a sheet forming a hard exposed surface of the tympan, an adhesive between the two sheets comprising a starch paste of a viscosity between 8,755 centipoises and 100,000 centipoises mixed with a resin emulsion.

WILLIAM PAGE.

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The following references are of record in the file of this patent:

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