

May 17, 1932.

J. R. DUFFORD

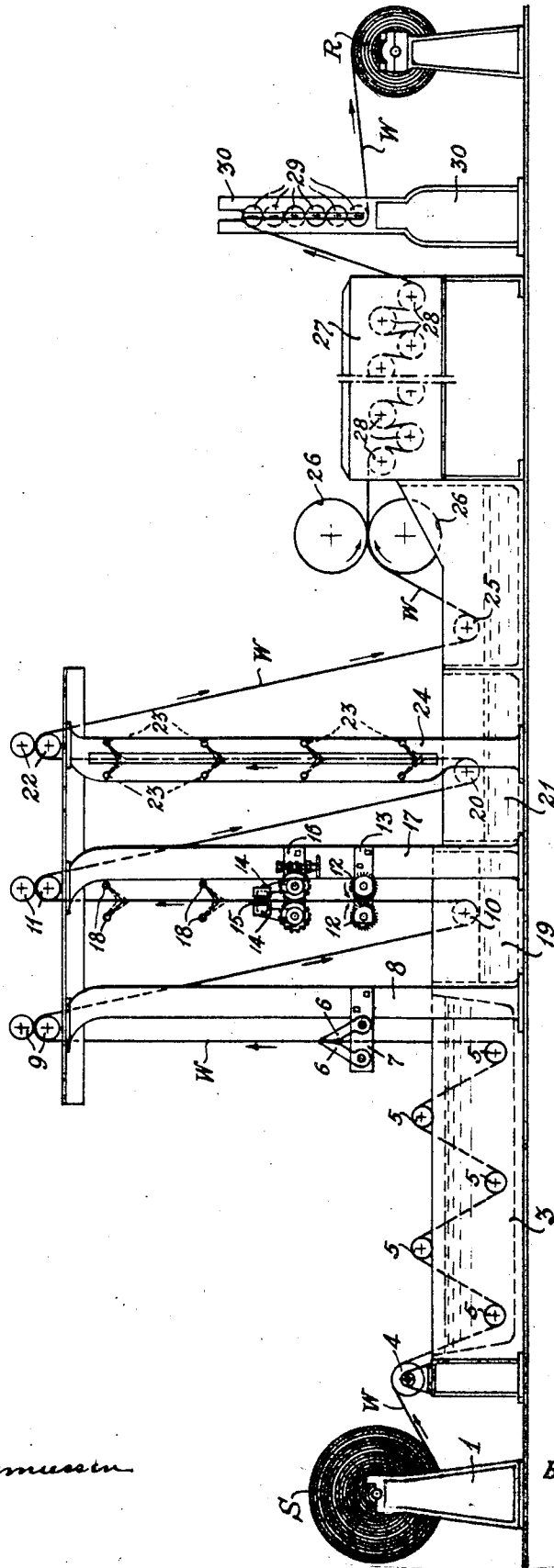
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RECLAIMING USED VEGETABLE PARCHMENT TYMPANS

Filed Sept. 18, 1929

2 Sheets-Sheet 1

Fig. 1.



WITNESS
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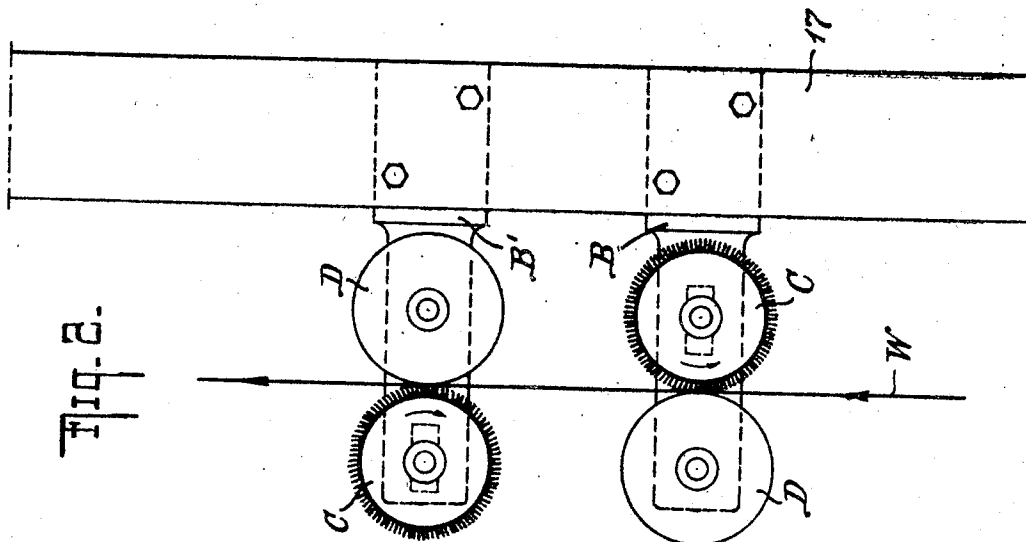
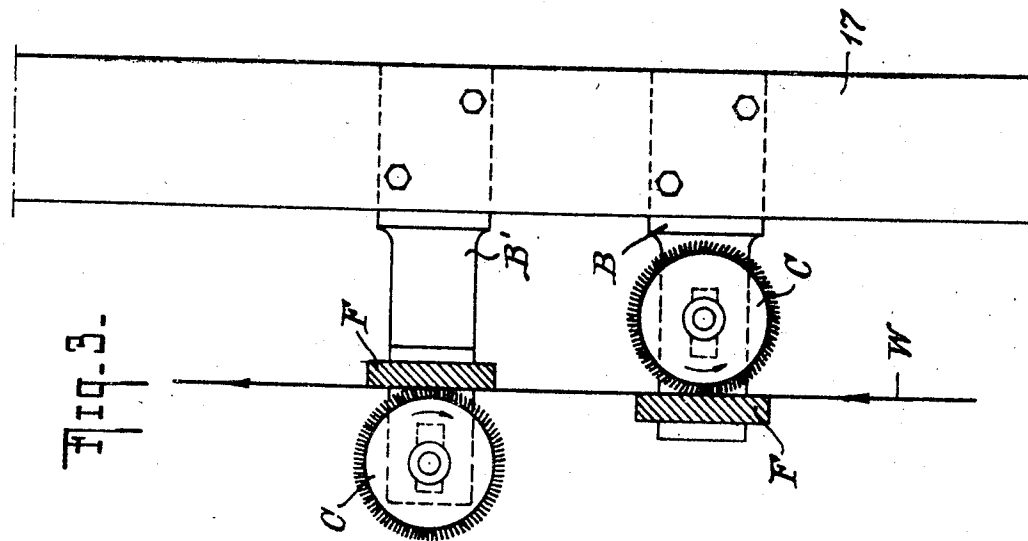
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2 Sheets-Sheet 2



WITNESS

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UNITED STATES PATENT OFFICE

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RECLAIMING USED VEGETABLE PARCHMENT TYMPANS

Application filed September 18, 1929. Serial No. 393,374.

The present invention relates to printing tympan, and more particularly to the reclamation of used tympan, which are covered with ink smudge or offset and to such re-claimed tympan.

In the art of printing, it is well known that tympan have been used for preventing smudging or offset of the printing on magazines, catalogs, and the like. After the 10 tympan have been in use for a period, the printing ink smudge accumulates to such an extent that it prevents their further satisfactory use. The smudged tympan, when constituted of ordinary paper, were subjected 15 to de-inking processes commonly used in the de-inking of newsprint or magazines paper for the recovery of the paper fiber or pulp. When parchmented paper was used as the tympan material, however, the prior art 20 processes which worked practically and satisfactorily with ordinary paper failed completely.

The aforesaid prior art processes may be divided, generally speaking, into three classes. 25 One class comprised purely mechanical processes which involved subjecting the paper to severe beating in the presence of water by knives, beaters, drums, and shredders. A second class comprised purely chemical processes wherein the paper was first shredded or 30 otherwise broken up mechanically and then the shredded paper was cooked with strong chemical under steam pressure for long periods of time ranging up to fifteen hours. 35 The third class comprised combined mechanical and chemical processes in which the mechanical steps were applied prior to or simultaneously with the chemical steps. In all of these processes the old product was destroyed 40 and de-inked pulp was obtained which was used in conjunction with fresh, raw pulp for making paper on a paper-making machine.

Proposals to apply any of the aforesaid processes to the de-inking of parchmented 45 tympan were wholly unsuccessful and unsatisfactory. When parchmented tympan were treated by the aforesaid processes, a confetti-like mass of small shredded or cut pieces of paper were obtained which would 50 not mat or knit together to form a web of

paper when put on a paper-making machine. Various attempts have been made to modify the prior art pulping processes so that parchmented tympan could be satisfactorily treated. None of these proposals, as far as 55 I am aware, has been practical, satisfactory, and successful in commercial operation. The printing trade, not having any use available for smudged, parchmented tympan or a process for reclaiming them, burned the 60 smudged, parchmented tympan in furnaces, incinerators and the like and, in some cases, used the soiled tympan for filling in swamps and waste land. Although the problem of reclaiming parchmented tympan 65 has been confronting the art for some years, no solution, as far as I am aware, has been found.

I have discovered, contrary to expectations or a priori reasoning from the prior art, a 70 process by the use of which ink-smudged, parchmented tympan can be reclaimed in sheet form in such a manner that the re-claimed tympan can be re-used by the printing trade for tympan purposes or other suitable purposes. 75

It is an object of the present invention to overcome the shortcomings of the prior art noted hereinabove.

It is another object of the invention to 80 provide a process of de-inking parchmented paper which is simple, economical, and satisfactory in commercial practice.

A further object is the provision of a continuous de-inking process for treating parchmented paper in a continuous web. 85

Another object within the contemplation of my invention is to provide a process of de-inking parchmented paper without 90 changing the form of the paper.

Other objects will become apparent from the following description taken in conjunction with the accompanying drawings, in which Fig. 1 depicts somewhat diagrammatically an elevational view of a system capable 95 of carrying my invention into practice; and Figs. 2 and 3 illustrate fragmentary detail views of modified brushes.

Parchmented tympan paper, as is well known (see patent to O. P. Smith, No. 100

1,766,957), is generally speaking a web of calendered kraft paper which has been passed through a bath of strong sulfuric acid for a brief period of time, followed by complete washing-off of the acid and re-calendering. This treatment parchmmentizes the surfaces of the vegetable fibres constituting the paper web and results in the production of a hard, tough, sheet which does not require compression in use as tympan paper. Such parchmmentized tympan paper, while apparently smooth, has parchmmentized surfaces composed of myriads of projections minutely spaced apart. The crevices between the projections, not coming into direct contact with the ink of the printed sheet with which the tympan cooperates, participate in the perfections of the operations, acting so to speak, as a depository for a part of the ink which the tympan takes from the printed sheet. The unevenness of the surface of the tympan also gives it a better grip against the impression cylinder and counteracts the tendency to slip. If a used and ink-smudged tympan paper is to be treated in such a way as to make it reavailable for tympan use, it is obvious that the method used must be one which will at least preserve the essential characteristics of the tympan paper as described and one which will not injuriously affect the capacity of the de-inked paper of functioning as tympan paper when used for that purpose. The fundamental feature of the present invention is therefore the discovery that the process to be described will not only remove ink deposited in the crevices of used tympan paper, but that the method of reclaiming or de-inking used by me will not, although somewhat modifying the surface of the treated sheet, modify it in any direction which alters its fundamental characteristics as a fibrous web whose surfaces are acid-parchmmentized vegetable fibres appearing on the surfaces as myriads of projections with intervening crevices or valleys.

Broadly stated, my invention comprises first treating smudged parchmmentized paper in sheet form, preferably as a continuous web, on its superficial surface with a chemical medium for a very short period of time, preferably of the order of minutes, and then subjecting the thus-treated paper, still in sheet or web form, to mild physical actions which are restricted in their activity to the surface or faces of the tympan. This procedure may be carried out in various specific ways but the following example will illustrate a practical and satisfactory mode of carrying my invention into practice.

Referring more particularly to Fig. 1, the reference character S designates a roll of smudged and inked parchmmentized paper mounted in a suitable support 1. From the rolls, a web of paper W passes into treatment bath 3 by first passing over roller 4 and then

under and over a plurality of rollers 5 mounted in the bath. The bath preferably contains a solution of soda ash which is capable of reacting with the constituents of the ink or rather with that part of the ink which serves as the vehicle for the pigment. The concentration of the bath can vary between wide limits but for economic reasons it may be desirable to use a concentrated solution in the treatment bath. The concentrated solution, however, is diluted by coming in contact with water at a subsequent stage of operations. The degree of dilution is automatically effected by the water washing and the desired loosening effect on the ink is accomplished. The concentration can be varied widely according to particular circumstances, including the type of chemical used, the temperature of the bath and the amount and kind of ink smudge. In practice a 5% bath at ordinary room temperature has been found to give satisfactory results. Any given portion of the web of tympan is kept in the bath for a sufficient time, say 30 seconds, to loosen the ink from the projections and crevices constituting the surface of the tympan. This may be effected by drawing the web of paper through the bath at a suitable speed or by having the bath long enough. The time of immersion of the tympan will, of course, vary with the amount of ink contained thereon, the pressure with which the ink was applied, the type of ink employed and other related factors. In any particular case, it will be an easy matter to determine how long the smudged and inked tympan is to remain in the bath by making a few tests with any of the reagents mentioned herein. In any event the time of exposure of a smudged parchmmentized tympan paper to the soda ash solution will always be so limited as to be discontinued as soon as the chemical agent has caused loosening of the ink from the projections and crevices of the surfaces of the tympan and before the chemical agent begins to be able deleteriously to affect the parchmmentized surface of the paper. It is well known that a 5% caustic soda solution will develop the tendency to deparchmmentize parchmmentized paper, at room temperature, on extended exposure, but this effect will not be produced within any period of time such as is required for the mere loosening of the ink from the surface of any smudged or inked tympan, irrespective of the amount of ink, the pressure with which it was applied, or the type of ink or any of the other related facts.

After the ink has been thoroughly loosened from the surface of the tympan, the latter is then subjected to mild physical actions to separate the loosened ink from contact with the projections and crevices constituting the surfaces of the tympan. By a mild physical action is meant an action of such limited in-

tensity as to be capable of removing the loosened ink from the projections and crevices of the faces of the used tympan, while preserving without injury thereto the parchmentized fibrous character of the surfaces of the de-inked tympan. In the present instance, a scraper or doctor blade 6 bears against each side of the tympan to remove as much of the soda ash solution adhering to the web W as desirable and to return this solution to bath 3. Scrapers 6 are herein shown as being adjustably secured to bracket 7 which projects from column 8. From scrapers 6 the web W passes between a pair of rollers 9, 9 which may or may not be driven.

The web W passes under roller 10 and then vertically upward to a pair of rollers 11, 11, similar to rollers 9, 9. Between roller 10 and rollers 11, 11, mechanical devices of a suitable nature are positioned to act upon the exposed surfaces of the tympan. A variety of mechanical devices may be used but in the present instance, a pair of rotatable brushes 12 are mounted on bracket 13 to bear against the tympan faces. By rotating the brushes toward each other and preferably in the direction indicated by the arrows, a major portion of the loosened ink can be removed from the tympan. The brushes may be rotated in either direction, but when traveling in the same direction as the web at the line of contact should always be operated at a speed higher or lower than the speed of the traveling tympan. In other words, there should be a speed differential in order to obtain a wiping action on the face of the tympan. If desired several pairs of rotatable brushes can be used in series to effect complete removal of the loosened ink. Instead of additional pairs of brushes I have used a pair of scrapers 14, 14 which have their faces 15, 15 constituted of material capable of bearing substantially uniformly across the face of the tympan and wiping off surface smudge without tearing or otherwise defacing the tympan. Sponge rubber is preferably used although cloth, chamois, leather and other appropriate materials can be used. These scrapers are adjustably mounted on bracket 16 so that the degree to which they bear against the tympan can be controlled and adjusted. Brackets 13 and 16 are secured to and project from column 17.

Located above brushes 12 and scrapers 14 are several sets of water sprays 18 containing preferably high pressure water jets. These water sprays impinge against the faces of the tympan and wash off from them loosened ink and alkali remaining on the tympan. The wash water issuing from sprays 18 drains downwardly into a receiving tank 19 which is connected to a sewer or to a treatment system wherein the water is reconditioned for reuse in the sprays if desired.

From rollers 11, 11, the tympan web W

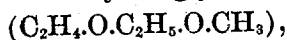
travels downwardly under a guide roller 20 situated in a second tank 21 and then upwardly to a pair of rollers 22, 22. As the tympan moves upwardly, it is sprayed with water from a plurality of water sprays 23, 70 which are supported by column 24. This washing further removes particles of loosened ink from the faces of the tympan and frees the tympan of substantially all of the alkali adhering thereto. In any particular case 75 where one column of water spraying is not sufficient, one or more additional columns of water sprays can be provided after column 24.

When the tympan is thoroughly washed, it passes under guide roller 25 and then between squeeze rolls 26. From rolls 26, the washed and de-inked tympan goes through a dryer 27 of the type commonly used in the paper making art and travels over and under a plurality of heated cylinders 28. In the dryer 85 the tympan is dried to the desired extent, say practically dry. The thus dried tympan, if desired, is next calendered by a plurality of rolls 29 in a calender 30. After calendering, the tympan is rewound on roll R as completely reclaimed paper which is practically like new tympan and can be used in printing work as such. Of course, the edges of the tympan may have to be trimmed slightly to make them even and straight. It will be observed from the drawings that the web of tympan paper is carried through its reconditioning operations under tension. The purpose of this feature of the procedure is to avert or to counteract the tendency to wrinkle, 100 which is developed in material such as tympan paper when passing from a wet to a dry state. Tympan paper, when passed through a liquid, becomes wet throughout, i. e., not only at its surface, but in its interior fibrous structure, and accordingly develops a tendency to become "cockled" or wrinkled unless maintained as a smooth web during the reconditioning operations.

In Figs. 2 and 3 modified brushing devices 110 are shown. The device illustrated in Fig. 2 comprises brackets B and B' upon each of which are mounted a bristle roll C and a solid roll D. In bracket B the bristle roll is positioned upon one side of the paper whereas in bracket B' the bristle roll is on the other side. In Fig. 3, on the other hand, the solid rolls are replaced by flat plates F. The bristles used in the bristle rolls are preferably of a fairly stiff character. 120

Instead of using soda ash solution in bath 3, other appropriate chemicals may be used. For instance, ammonium hydroxide, sodium silicate, tri-sodium phosphate, sodium perborate, caustic soda, alkaline sodium hypochlorite, and the like. Moreover, I have found that I can use glacial acetic acid to effect loosening of the ink smudge on the surface of the tympan. This shows, in my opinion, that the operation of ink removal from 125 133

the surface of the parchmented tympan is quite different from the operation of de-inking newsprint or similar paper. In addition to the foregoing I have been able to obtain satisfactory results by using one of the following organic materials: ethyl alcohol, butanol. Not only have I found that alcohols can be used but that the following organic materials can be satisfactorily employed:—monoethyl ether of ethylene glycol ($C_2H_4OH.O.C_2H_5$), monomethyl ether of ethylene glycol ($C_2H_4OH.O.CH_3$), ethyl methyl ether of ethylene glycol



nitrate of monoethyl ether of ethylene glycol ($C_2H_4.NO_3.O.C_2H_5$) or diethylene glycol. Furthermore, I have found that when caustic soda is dissolved in monoethyl ether of ethylene glycol not only can the tympan be de-inked of the ordinary black printing inks but the so-called process inks, usually colored, can also be de-inked from the faces of the tympan.

It will be noted that my invention provides a process which is capable of reclaiming parchmented tympan and removing the ink smudge therefrom while preserving the sheet or web form of the tympan.

It will also be noted that my invention provides a process which is of a very mild and short character and in some instances is practically and relatively instantaneous which is in sharp contrast to the severe and long chemical treatments to which the pulped newsprint or the like was subjected.

It will be further observed that my invention provides a process of continuous nature and of such a character that deleterious or detrimental treatment of the tympan, which would occur with the prior art processes due to the severity thereof, is avoided.

Furthermore, my invention provides a procedure wherein the tympan are restored to their original condition without in any way detrimentally affecting the constitution or the properties thereof, so that the restored or reclaimed tympan can be used just like new ones.

Moreover, the present invention provides a process where easy and mild operations are involved in contradistinction to prior processes and which involved severe and strenuous mechanical action, such as beating of the newsprint or other papers to be de-inked or shredding into a fibrous mass or the like, intensive chemical action such as boiling with strong chemical agents for hours under steam pressure.

Parchmented vegetable tympan paper to be used in the printing art must be produced in accordance with known methods, with respect to the special requirements of that art with the result that methods of reclamation of smudged tympan, such as might suggest themselves in reclaiming other types of paper

cannot be foreseen to be capable of beneficial use when applied to parchmented vegetable tympan. The essence of the present invention resides in the discovery that parchment paper tympan when smudged with printers ink to such an extent as to be no longer suitable for use as tympan paper can be made to release the accumulated ink by agencies such as are hereinabove described without destruction of the web or sheet formation of the paper and without rendering the paper unfit for further uses.

While I have described a specific embodiment of my invention and one system for carrying it into practice merely by way of illustration, it is to be understood that I am not to be confined to the exact steps, reagents, temperatures, proportions or particular devices mentioned hereinabove as they are to be regarded only as illustrative and typical. For instance, mechanical devices can be incorporated in the chemical bath or the rotary brushes and the sponge rubber scrapers can be replaced by other devices having equivalent functions. Similarly, other washing arrangements can be substituted for the water sprays.

In a similar way, although the present invention is concerned primarily with a parchmented vegetable paper made by treating kraft waterleaf in baths of sulfuric acid for a very short time and then promptly washing with water, it can be applied to other parchment papers made by treating paper or the like with zinc chloride or phosphoric acid or other equivalent parchmentizing agents. Then again mechanical scrapers, brushes or the like can be incorporated in the treatment bath, if desired.

Various modifications of my invention may obviously be readily made by those skilled in the art without departing from the spirit and scope of my invention as defined in the appended claims.

I claim:

1. The process of reclaiming used vegetable parchment tympan paper, which comprises subjecting such used tympan paper to a chemical agent capable of reacting with the constituents of the ink and thereby reducing the adhesive capacity of the ink in the devices, subjecting the surface of the chemically treated used tympan to a physical wiping action of such limited intensity as to remove the loosened ink from the crevices of the faces of the used tympan while preserving the parchmented fibrous character of the surfaces of the de-inked tympan, washing and finally calendering the de-inked tympan.

2. The process of reclaiming used vegetable parchment tympan paper which comprises subjecting such used tympan paper to a chemical agent capable of reacting with the constituents of the ink and thereby reducing

the adhesive capacity of the ink in the crevices, subjecting the surface of the chemically treated used tympan to a physical wiping action of such limited intensity as to remove the loosened ink from the crevices of the faces of the used tympan while preserving the parchmentized fibrous character of the surfaces of the de-inked tympan, washing and drying the de-inked tympan.

3. The process of reclaiming used vegetable parchment tympan paper which comprises subjecting such used tympan paper in the form of a continuous web to a chemical agent capable of reacting with the constituents of the ink and thereby reducing the adhesive capacity of the ink in the crevices, subjecting the surface of the chemically treated used tympan to a physical wiping action of such limited intensity as to remove the loosened ink from the crevices of the faces of the used tympan while preserving the parchmentized fibrous character of the surfaces of the de-inked tympan, washing and drying the de-inked tympan.

4. The process of reclaiming used vegetable parchment tympan paper which comprises subjecting such used tympan paper to a chemical agent which is destructive on longer exposure of the parchmentized surface of the tympan but capable of more rapidly reacting with the constituents of the ink and thereby reducing the adhesive capacity of the ink in the crevices, removing the chemical agent after it has caused loosening of the ink and before it has been able deleteriously to affect the parchmentized surface of the paper, subjecting the surface of the chemically treated used tympan to a physical wiping action of such limited intensity as to remove the loosened ink from the crevices of the faces of the used tympan while preserving the parchmentized fibrous character of the surfaces of the de-inked tympan, washing and drying the de-inked tympan.

5. The process of reclaiming used vegetable parchment tympan paper which comprises subjecting such used tympan paper to the action, for a relatively short period, of a chemical agent capable of reacting with the constituents of the ink and thereby reducing the adhesive capacity of the ink in the crevices, and thereupon applying a mild mechanical action to the thus treated tympan paper to remove the loosened ink from the crevices of the faces of the tympan while preserving the parchmentized fibre character of the surfaces of the de-inked tympan, treating the faces of the tympan with a relatively large amount of water to wash off loosened ink and to remove the chemical used in the first step and thereafter drying and calendering the de-inked paper.

6. The process of reclaiming used vegetable parchment tympan paper which comprises subjecting such used tympan paper to

the action, for a relatively short period, of a chemical agent capable of reacting with the constituents of the ink and thereby reducing the adhesive capacity of the ink in the crevices and thereupon applying a mild mechanical action to the thus treated tympan paper to remove the loosened ink from the crevices of the faces of the tympan, while preserving the parchmentized fibre character of the surfaces of the de-inked tympan, treating the faces of the tympan with impinging jets of water to wash off loosened ink and to remove the chemical used in the first step and thereafter drying and calendering the de-inked paper.

7. The process of reclaiming used vegetable parchment tympan paper which comprises subjecting such used tympan paper to the action, for a relatively short period, of a soda ash solution, until the adhesive capacity of the ink in the crevices is overcome and thereupon applying a mild mechanical action to the thus treated tympan paper to remove the loosened ink from the crevices of the faces of the tympan, while preserving the parchmentized fibre character of the surfaces of the de-inked tympan, treating the faces of the tympan with impinging jets of water to wash off loosened ink and remove soda ash solution from the faces of the tympan and thereupon drying the tympan and calendering the dry de-inked tympan.

In testimony whereof I have hereunto set my hand.

JOHN R. DUFFORD.