Sept. 11, 1962 J. F. HECHTMAN ET AL 3,053,718

COMPRESSED TOP PRESS SHEET

Filed July 3, 1958 2 Sheets-Sheet 1

FIG. 1

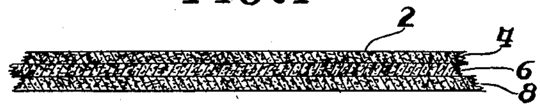


FIG. 2

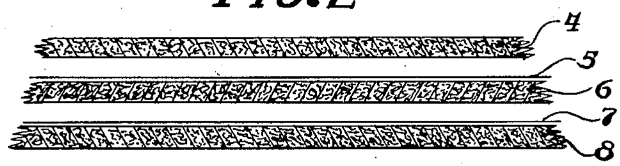


FIG. 3

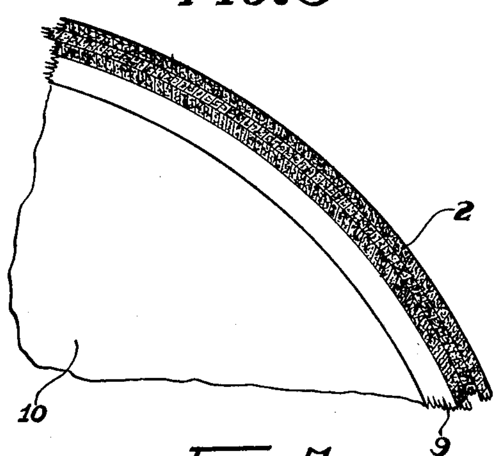
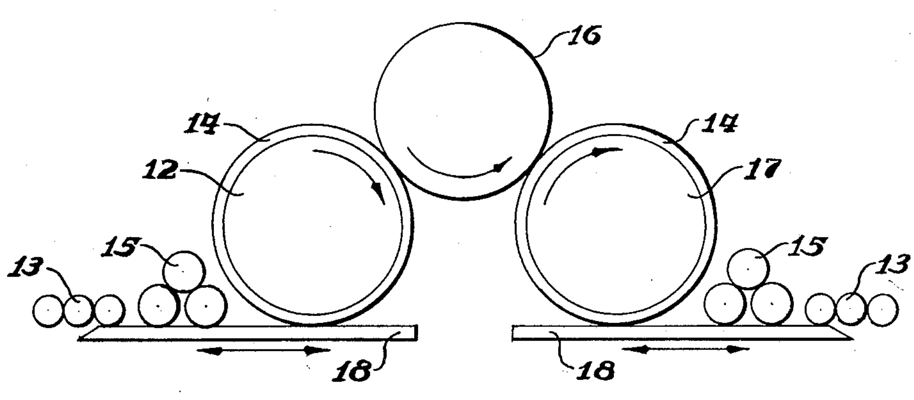


FIG. 4



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COMPRESSED TOP PRESS SHEET

Filed July 3, 1958 2 Sheets-Sheet 2

FIG. 5

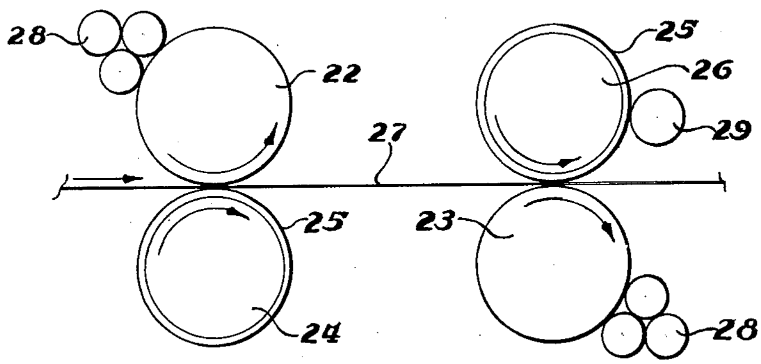
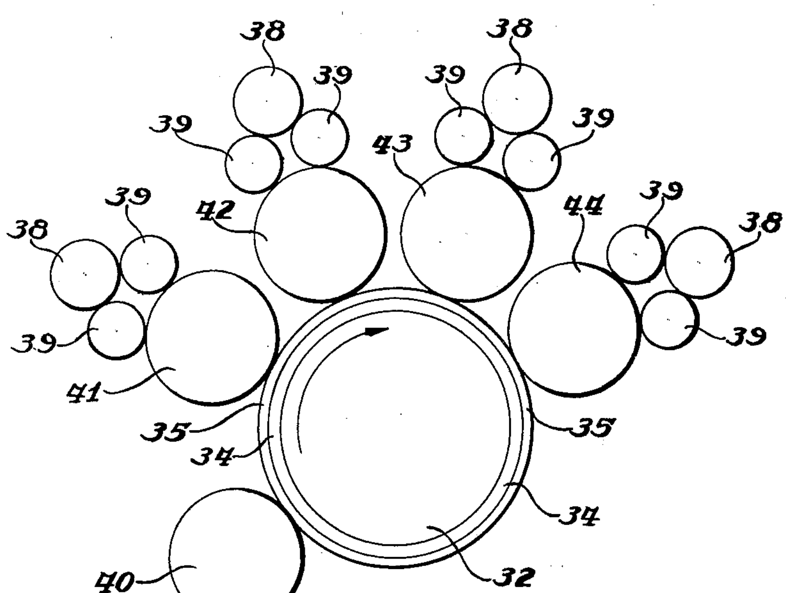


FIG. 6



3,053,718
Patented Sept. 11, 1962

3,053,718

COMPRESSED TOP PRESS SHEET

John F. Hechtman and Edwin G. Greenman, Munising, Mich., assignors to Kimberly-Clark Corporation, Neenah, Wis., a corporation of Delaware

Filed July 3, 1958, Ser. No. 746,554
6 Claims. (Cl. 154—54.5)

This invention relates generally to an improved resilient sheet and its method of manufacture. It is concerned more particularly with sheets for packing the impression cylinders of printing presses.

One of the well known and continuing problems in the printing art is the proper preparation of the press to maintain an equalized effective printing pressure between the printing surface and the web of paper being printed.

Obtaining the proper degree of pressure before the press run begins, and maintaining that pressure during a printing run of several hundred thousand impressions is extremely critical. This is especially true in color printing, where minor variations in pressure may produce blurring or faded reproduction and rejection of the work.

The necessity for preparing the press originates in part from the need for differing degrees of pressure at various portions of the plate surface, and in part from ordinary inequalities of the type or type holding equipment. It may also be required because of unequal wear or similar causes. Generally, highlight areas require less pressure than heavy solid color areas for good sharp printing reproduction. To provide proper pressure during the printing operation, and to overcome the effect of the inequalities mentioned above, subsequently preventing injury to the type and the paper during a press run, it has become common practice to pack the surface of the impression cylinder with compensating material and cover this overall with a resilient top sheet. This top sheet is variously known in the art as a top press sheet, a printing press tympan, a draw sheet, or a press roll cover.

The process of preparing the press for printing is generally known as make-ready. In this process the impression cylinder is usually built up with one or more so-called overlays. These overlays may comprise separate sheets of paper, pieces of pressed fiberboard or vulcanized fiber, process or handmade overlays, or the like. They are arranged on the surface of the impression cylinder to produce areas of varying thickness complementary to corresponding portions of the surface of the printing plate. The overlays are in turn covered by a top press sheet. The top press sheet serves to hold the make-ready overlays in place and more important, provides a smooth outer surface on the impression cylinder.

This composite packing assembly is subjected to extremely hard usage when in place on an operating printing press. It is constantly exposed to repeated high localized pressures on the order of 3 to 5 tons per square inch. Each printing impression imposes severe rubbing force and abrasion against the top press sheet along with a high impact energy. This punching and pushing action is highly destructive ordinary materials. Were heat set inks are used, the impression roll coverings and packing materials may also be subjected to heat energy which may have a degrading effect on them. Solvents in the printing inks themselves or oil wipes used to keep the top press sheet clean may have a deleterious effect also.

Prior art arrangements designed to meet the rather severe conditions outlined above have been generally unsatisfactory. These include such materials as rubber sheeting, laminations of hard-sized and slack-sized paper, woven textile plies coated and impregnated with rubber, laminations of glue-glycerine sized felts and textiles, felted materials of comminuted cork combined with other fibers, plastic coated fabrics and felts, granular coated

fabric and felts, parchment type papers, oiled manila sheets, impregnated reinforced felts, and various combinations of the above. None of these materials or any combinations thereof prior to this invention combined all the desirable characteristics required to withstand the destructive forces of the printing process described previously. Under conditions of extended press runs, when prior art arrangements were used, shut-downs of one kind or another have been necessitated for adjustment of the packing and top press sheet, replacement of the entire make-ready assembly, or replacement of cracked plates.

The ideal impression cylinder packing material should have the following properties:

(1) Low compressibility.
(2) High recovery.
(3) Good dimensional stability.
(4) Uniform caliper.
(5) Uniform density.
(6) A smooth surface.
(7) Resilient stretch.
(8) Resistance to printing inks and solvents.
(9) Resistance to the forces of shear and tension.
(10) Heat stability.

By low compressibility is meant that the top press sheet presents a firm resistance to the printing forces and compresses only slightly under the heavy loads to which it is subjected.

By high recovery is meant that the top press sheet returns as nearly as possible to its original thickness after having been subjected to temporary compression forces.

By good dimensional stability is meant that the top press sheet does not deform easily under the repetitive stresses involved, and retains its original dimensions under these stresses.

By uniform caliper is meant that the top press sheet is of a similar thickness throughout its entire area.

By uniform density is meant that the top press sheet has good formation and is as homogeneous as the paper-making limitation allows.

Smoothness is defined in terms of Gurley smoothness measurements as hereinafter described.

Resilient stretch can be described as resistance against permanent elongation. For example the punching, pushing action of the printing operation forces the impression cylinder packing to move in a wave in front of the printing nip. If the top press sheet does not have resilient stretch, the punching and pushing action will eventually stretch it beyond its elastic limit and require a stopping of the press to readjust the packing components to their original tightness.

By resistance to printing inks and solvents is meant that the top press sheet will not deteriorate from contact with the ink or with solvents when the latter are applied for washing or wiping purposes.

By resistance to shear is meant that the top press sheet will not rupture under the shearing force imposed by the sharp edges of the type in the printing form. If a top press sheet does not meet this requirement and is ruptured, fibers will pull out and tend to pick up ink, causing offset and unsatisfactory printing work.

By heat stability is meant that the top press sheet will not deteriorate as a result of the build up of heat which develops when the packing is contacted by heated rolls.

As previously noted, none of the materials used heretofore satisfactorily meet the rather stringent requirements outlined above. The product in accordance with our invention, as described hereinafter, meets all of the above requirements to the degree necessary to make that product a successful article of commerce.

The general object of the present invention therefore is to provide an improved top press sheet and packing material for the impression cylinders of printing presses.

A further object of the invention is to provide a top press sheet and packing material having low compressibility, high recovery, uniform thickness and density, a hard smooth surface, resilient stretch, resistance to degradation from solvents and heat, and resistance to damage from shear and tension forces.

Still another object of the invention is to provide a process for manufacturing the improved top press sheet and packing material.

Additional objects and advantages of the invention will be apparent from the following detailed description of certain preferred embodiments of the invention together with the accompanying drawings, in which:

FIGURE 1 is an enlarged cross section of a portion of one embodiment of the top press sheet of this invention.

FIGURE 2 is an enlarged cross section of a portion of the laminae which form the top press sheet of FIGURE 1, before the laminated assembly is compressed and cured.

FIGURE 3 is an enlarged cross section of a portion of the top press sheet of FIGURE 1 shown in place on an enlarged section of a printing press impression cylinder.

FIGURE 4 is a schematic diagram illustrating one type of printing press in which the top press sheet of this invention may be utilized.

FIGURE 5 is a schematic diagram illustrating another type of printing press in which the top press sheet of this invention may also be utilized.

FIGURE 6 is a schematic diagram illustrating a multicolor printing press with a common impression cylinder on which the top press sheet of this invention may also be utilized.

One embodiment of the top press sheet of this invention, as shown in FIGURE 1, consists of a laminated, compressed, and cured sheet **2** made up of three layers **4**, **6**, and **8** of an elastomer impregnated fibrous web.

Layers **6** and **8** as shown in FIGURE 2, are coated with an elastomer similar to that used to impregnate the sheets to be laminated. This coating acts as an adhesive to unitize the top press sheet during the compression and curing phases of its manufacture.

In FIGURE 3 the packing material **2** of this invention is shown in place as the top press sheet on a printing press impression cylinder **10**, and is drawn tightly over overlay **9**, which may be a single, or multiple layers of various sheet materials. The overlay may include a sheet or sheets of the packing material of this invention.

In a printing press of the general type illustrated in FIGURE 4, the form or printing plate is normally held upon a suitable support or carrier **18** which is arranged for longitudinal and reciprocal movement upon rollers not shown. The printing form is located upon the upper side of the carrier **18** and is inked by means of form rollers **15** and inking rollers **13**.

In the printing operation, the paper is fed between the impression cylinder **12** and the intermediate transfer cylinder **16** by a suitable automatic mechanism, not shown, and is printed as it passes around the impression cylinder **12** in contact with the form carrier **18** which is moved longitudinally from one side of the machine to the other in tangential contact with the impression cylinder. Then as this contact is broken, the impression cylinder **12** continues to revolve and pass the printed sheet on to the intermediate transfer cylinder **16** while the form carrier **18** moves in the opposite direction for reinking. After being printed by the first form, the sheet is picked up by the intermediate cylinder **16** and fed to the second impression cylinder **17** whereby a second color is printed on the sheet in register with the first color and in the same manner. Additional color printing sections may follow on the same press, before the printed sheet is delivered to a receiving table, not shown.

The impression cylinders **12** and **17** are provided with the usual packing which includes a layer or layers of overlays and a top press sheet, the latter being pulled taut over these overlays by means of clamps not shown.

In the printing press schematically illustrated in FIGURE 5, the paper web is printed on both sides in one pass through the press. As the web **27** passes between the first press section it is printed on its top side by the printing cylinder **22** which has been inked in a conventional manner by form rolls **28**. The impression cylinder **24** is provided with a packing **25**, again consisting of the usual overlays and a top press sheet. The web **27** which has been printed on its top side now passes between the second printing cylinder **23** and a second impression cylinder **26** packed in a similar manner as the first impression cylinder **24**. When printing is done on both sides of the paper web, the second impression cylinder **26** may be provided with a wipe roll **29** rotating against it. The wipe roll **29** is continually supplied with a thin oil or an ink solvent to keep the surface of the top press sheet free of any ink from the first printing operation and prevent its transfer back to the printed web.

FIGURE 6 diagrammatically illustrates a multicolor sheet fed printing press with a common impression cylinder. Although a sheet fed press is shown, this type of press is easily adapted to continuous web printing. The sheet is fed by suitable delivery means around transfer roll **40** and against impression cylinder **32**. It then passes consecutively between the individual color printing cylinders **41**, **42**, **43**, and **44** and the common impression cylinder **32** before leaving the press to be deposited on a receiving table, not shown. The printing cylinders **41**, **42**, **43** and **44** are inked in the usual manner by form rolls **38** and **39**. The impression cylinder **32** has its surface covered with the usual hard packing **34** and a top press sheet **35**. A top press sheet consisting of the packing material of this invention is especially useful on a press of this type because on such presses it is not possible, as it is on other kinds of presses, to adjust the packing for the individual colors. A top press sheet having low compressibility, high recovery, uniform caliper, uniform density, and a relatively hard smooth surface, is especially advantageous in such instances.

The top press sheet according to the present invention may be of single ply or multi-ply construction, however the latter is preferred. Each ply is similar in form and comprises selected cellulosic fibers impregnated with a synthetic elastomer on a saturating press or similar apparatus. The fibers used may include the usual fibers obtained by known commercial pulping processes, although it is preferred to use alpha fibers to take advantage of the improved formation characteristics of the latter.

The preferred elastomer is a butadiene-acrylonitrile copolymer containing from about 55 to 80 percent butadiene and about 20 to 45 percent acrylonitrile. Other elastomers which may be used include materials such as butadiene-styrene copolymers, polychloroprene, copolymers of an alkyl acrylate and an unsaturated carboxylic acid, copolymers of an alkyl acrylate, an unsaturated carboxylic acid and an alkyl methacrylate, polymerized methyl, ethyl, or butyl acrylate, or methyl, ethyl, or butyl acrylate copolymerized with acrylonitrile or ethyl, methyl, or butyl methacrylate, polystyrene, and the like.

Impregnating is usually done from an aqueous dispersion although solutions in suitable solvents may also be used. The amount of solids in the impregnating medium may range from about 20 to 40 percent. The desirable degree of retention is 50 to 70 parts by weight of solids per 100 parts of dry fiber although the amount of retention may range from about 35 to 140 parts of solids per 100 parts of dry fiber and still be satisfactory.

In addition to the elastomer, the impregnating mixture usually contains special additives to enhance certain specific properties. These additives include curing agents such as zinc oxide, sulphur, zinc dibutyl dithio-carbamate or dicumyl peroxide; resins such as phenol formaldehyde; fillers such as clay, carbon black, and one or more of the carbonates; dyes and pigments. After the sheet is impregnated and dried, and before final curing, it may be calendered or supercalendered to minimize any variations in formation.

The sheet is then coated on one side with an elastomer similar to that used as the impregnating medium. This coating is indicated by numbers **5** and **7** in FIGURE 2. In addition to the elatomer, the coating mixture may also contain minor amounts of modifiers such as a paraffin wax emulsion and a phenol formaldehyde. The preferred coating weight on a dry basis is 8 pounds per 17" x 22"-500 sheet ream, although weights from 6 to 12 pounds per ream are satisfactory.

After coating, the web is cut into sheets of a size suitable to fit into the openings of a plywood or similar press. These sheets are plied-up in groups of from 2 to 5 sheets with the coating located between the adjacent plies so that the outer surfaces of the plied-up assembly is free of coating. The embodiment shown in FIGURE 2 indicates that one of the plies **4** need not be coated. These plied-up assemblies are inserted between smooth faced cauls which may be of metal such as polished stainless steel or aluminum, and the entire assembly is placed in the openings of the press. The number of caul plates per press opening is limited by both the size of the press being used, and by the degree of heat transfer required to properly laminate and cure the assembly. A practical limit, at present, is seven to eight assemblies per opening. Although more than one such plied-up unit may be inserted between a single set of cauls, it is preferred to have one caul on each side of a single unit assembly. In that way a more uniform thickness and density is obtained and both sides of the finished product have surfaces with a high level of smoothness. This uniformity in thickness, density and smoothness permits the sheet to be used in the printing operation with a minimum of make-ready. To secure better uniformity in the product, it has been found important to provide relatively level press platens together with caul plates of uniform caliper.

The level of smoothness in the finished product is expressed in terms of Gurley smoothness values hereinafter defined. For printing jobs where marginal levels of reproduction can be tolerated, top press sheets having a Gurley smoothness value as low as 40 are satisfactory. However, for jobs of the high quality usually demanded in color printing, Gurley smoothness levels of 80 or higher are desirable. Generally, the higher the level of surface smoothness, as indicated by Gurley smoothness values, the better is the printing reproduction obtained.

After these assemblies are in place in the plywood press, the press is allowed to be closed at its rated pressure for a brief period. Then the pressure is released to allow residual moisture and steam to dissipate. After this so called bleed time, the pressure is again restored and held for a period of sufficient length to permit the laminated product to become substantially cured.

The pressures used in the press should be in the range of about 200 pounds to 800 pounds per square inch. The preferred pressure is approximately 500 pounds per square inch. Pressure should be sufficient to provide a product having a uniform thickness and an apparent density of from 5.5 to 7.0, the preferred range being from 6.0 to 6.8.

The temperature of the press when using impregnating materials of the type previously listed, may range from 225 degrees Fahrenheit to 350 degrees Fahrenheit, the preferred temperature being in the range from 275 to 325 degrees. After this simultaneous pressing and curing process the top press sheets are removed and cut to the various sizes required by the printer and are ready for use. Some additional curing may take place as a result of the residual heat in the sheet as it is removed from the press.

Products of this invention suitable for use in packing impression cylinders may range in uniform thickness from 10 to 40 mils, have a compressibility range of 6 percent to 20 percent, and a recovery range of 50 percent to 90 percent. Particularly satisfactory results are obtained with sheets having a uniform thickness of 24 to 34 mils, a compressibility of 7 to 12 percent, and a recovery of at least 60 percent.

Definitions for the physical properties which are cited throughout this specification are as follows:

Basis weight is the weight in pounds of a 17" x 22"-500 sheet ream.

Caliper is the thickness in mils, i.e., thousandths of an inch.

Apparent density is basis weight in pounds divided by caliper in mils.

Compressibility is the percent the top press sheet compresses under a load of 50 pounds per square inch pressure for a period of 10 seconds.

Recovery is the percent the compressed top press sheet recovers within 60 seconds after the above pressure is removed.

(Compressibility and recovery factors are determined according to the standard procedure of the American Society for Testing Materials, reference 1955 Edition, Part 6, pp. 1249–50. American Society for Testing Materials designation D 1147–53 T, "Tentative Method of Test for Compressibility and Recovery of Gasket Materials." Figures are based on the averages of at least three tests of separate samples. They cover short-time compressibility and recovery of sheet materials and are calculated as follows:

$$\text{Compressibility, percent} = \frac{P-M}{P} \text{ by } 100$$

$$\text{Recovery, percent} = \frac{R-M}{P-M} \text{ by } 100$$

where P=thickness under preload in inches
M=thickness under major load in inches
R=recovered thickness in inches
Preload for treated and untreated papers is 1 pound for 15 seconds.
Major load is 50 pounds, reached in 10 seconds, and held for 60 seconds.
Recovery is measured 60 seconds after major load is removed.)

Gurley smoothness is measured according to the testing methods of the Technical Association for the Pulp and Paper Industry, Code No. T479sm–48, dated April 1948, "Smoothness of Printing Paper." (Briefly, this consists of the rate of air leakage between an optically flat surface and the surface being tested. Further details of this method of measurement can be found in Report No. 11 to the Central Grading Committee of the American Pulp and Paper Association, Instrument Program.)

The following examples will more clearly illustrate specific embodiments of the invention. They are given by way of illustration only and are not intended as a limitation of the scope of the invention.

EXAMPLE I

A fibrous web composed of 85 percent bleached spruce, alpha fibers prepared by the kraft process and 15 percent bleached hardwood, alpha fibers prepared by the sulphite process having a basis weight of 28.3 pounds per ream, was impregnated in a conventional manner with a synthetic elastomer. The impregnant consisted essentially of the following ingredients expressed in parts by weight: 100 parts of a copolymer consisting of 68½ percent butadiene and 31½ percent acrylonitrile, 5 parts of zinc oxide, 2 parts of sulphur, 2 parts of zinc dibutyl dithio-carbamate, 2 parts of rosin soap, 2 parts of non-ionic soap, and

5 parts of phenol formaldehyde resin. The impregnant was in the form of a 35 percent aqueous dispersion.

After impregnation the treated web was dried and wound into rolls. Tests indicated a retention of 60 parts by weight of solids per 100 parts of dry fiber.

The impregnated sheet was then run through a four nip calender stack and rewound.

Those portions of the impregnated web which were to be used in the lower plies of the laminate were then coated on one side. The coating consisted of the following ingredients, all parts by weight: 100 parts of a copolymer of 68½ percent butadiene and 31½ percent acrylonitrile, 10 parts of a paraffin wax emulsion and 5 parts of a phenol formaldehyde resin. The coating was applied in a 35 percent aqueous emulsion at the rate of about 8 pounds per 17″ x 22″-500 sheet ream. The coating was dried under increasing graduated temperatures to a final temperature of 300° Fahrenheit, cooled, and wound into rolls for subsequent sheeting.

The coated and uncoated impregnated web was then cut into 40″ x 76″ sheets, to fit the press openings of a plywood type press. The sheets were then assembled in groups of two coated and one uncoated plies, with the coated surfaces facing inwardly. The three ply assembly was inserted between polished cauls, and groups of eight caul plates and seven of the three ply laminates were inserted in each opening of the press. The press was then closed and brought up to 520 pounds per square inch of pressure at a temperature of 300 degrees Fahrenheit. After two minutes the pressure was released to allow the residual moisture to dissipate. The press was then closed again and returned to 520 pounds per square inch pressure for eight minutes. After the pressure was released the laminated and cured sheets were removed, cut to smaller size sheets, and packed for shipment. The compressed and cured top press sheet of this example had the following physical properties: Basis weight 155.3 pounds, caliper 23.4 mils, apparent density 6.64, compressibility 7.9 percent, recovery 74.5 percent, Gurley smoothness 157.

EXAMPLE II

The impregnating and coating conditions of Example I were repeated. As in Example I, three plies of the treated sheets (two coated and one uncoated) were assembled. Two of these assemblies instead of one as in Example I, were placed between a pair of the smooth, polished caul plates. Five caul plates and eight of the assemblies were placed in each opening of the press. The same conditions of pressing and curing as noted in Example I were used.

The properties of the finished top press sheets were as follows: Basis weight 156.1 pounds, caliper 24.6 mils, apparent density 6.35, compressibility 9.3 percent, recovery 66.4 percent, Gurley smoothness (side in contact with caul) 88, Gurley smoothness (side in contact with companion sheet) 3.

EXAMPLE III

The impregnating, coating, and pressing operations were the same as in Example I. The basic difference of this example from Example I was the use of four plies of the material (three coated and one uncoated) in the press for curing instead of the three plies as in Example I. The physical properties of these top press sheets were as follows: Basis weight 208.0 pounds, caliper 31.4 mils, apparent density 6.62, compressibility 7.5 percent, recovery 76.9 percent, Gurley smoothness 71.

EXAMPLE IV

The conditions of impregnating, coating, and pressing of Example II were repeated. The difference in conditions in this example was that four plies of the treated sheets (three coated and one uncoated) were used in the press instead of three plies as in Example II. The physical properties of the finished top press sheets were as follows: Basis weight 204.2 pounds, caliper 32.3 mils, apparent density 6.32, compressibility 11.1 percent, recovery 67.0 percent, Gurley smoothness (side in contact with caul) 68, and Gurley smoothness (side in contact with companion sheet) 2.

In a test run on a commercial four color printing press, a sheet according to Example II of this invention was used as the top press sheet in packing the impression rolls for two of the colors. A conventional tympan or draw sheet was used as the top press sheet in packing of the impression roll for the other two colors. By the end of the complete run of 510,000 impressions the cover sheet according to this invention was still in good operating condition. During the run several "smashes" occurred which damaged the conventional cover on the other two impression rolls and they required two packing changes each. The top press sheet consisting of the packing material of this invention was not affected by the smashes which damaged the conventional top sheets.

"Smashes" occur when the gripper picks up two or more sheets which come through the press simultaneously. This either cracks the plate, which is a fairly rare occurrence, or marks up to the top press sheet which has little or no resilience. Such smashes require shutdown of the press and a complete repacking job.

The commercial test run cited above clearly demonstrated the superiority of the packing material of this invention over conventional top press sheets. Additional runs showed that when major smashes occurred of the nature which usually damaged both packings and plates, only the plates required replacement when our packing material was used as a top press sheet. Heretofore, such conditions required replacement of both plates and packings. The resilient top press sheets of the present invention were in all such instances not affected by smashes, and did not require patching, this being so even in cases where the overlays in the packing were themselves damaged.

Further runs demonstrated that the top press sheet of our invention has remarkable dimensional stability. It did not require tightening, as do rubber sheets, and did not show a canvas pattern, as do woven, reinforced sheets.

In another test run the packing material of this invention was used exclusively as the cover sheet for the impression roll packing. A run of 1,200,000 impressions was completed and the original top press sheets of our material were still in good condition at the end of this run. Again this conclusively demonstrated that when our material was used fewer press stops were necessary for register alignment, packing changes and other adjustments necessitated because of smashes. In addition the top press sheet showed desirable resistance to solvents and was easily and quickly washed when required.

It was found further that when the packing material of our invention was used less make-ready time was required. An unexpected result was that other printing jobs could be run on the same press without changing the top press sheet made of our material. This was impossible heretofore with other type top sheets.

Although the emphasis throughout this specification has been placed on the special utility of our packing material as a top press sheet, it has been found to be quite effective when used as the packing material underneath other top sheets, such as manila tympans or Mylar film (Dupont's polyethylene terephthalate film). The improved features of our invention apparently transmit themselves through the other top sheets to compensate for, or overcome some of the marginal failings which exist when the latter sheets are used independently.

Prior art sheets are often made spongy deliberately in an effort to increase resiliency. We have found conversely that a high degree of compaction in fabricating the top press sheet improves this function. If the density of the top sheet is too low, the printing plate will indent or sink into the impression cylinder packing too far and cause indistinct or blurred reproduction, especially around the edges. A dense, resilient, and smooth surface on the impression roll gives a sharp, true printing reproduction.

Prior art top press sheets made from impregnated fibrous webs had a tendency to disintegrate under the extreme pounding received during the printing operation. We have found that when the fibers are stressed through the uniform compaction of the sheet during the curing operation, they are prevented from breaking down under the repeated high pressure impacts of the printing plate and give the top press sheet an unexpectedly long useful life.

In general, a top press sheet made in accordance with our invention, and having in combination a relatively hard smooth surface, a uniform thickness and density, a low compressibility, and a high compression recovery, has decided advantages over materials used heretofore. The advantages over prior materials are particularly evident when the product of this invention is made with a surface having a Gurley smoothness value of at least 80, a uniform thickness in the range of about 10 to 40 mils, a uniform apparent density in the range of about 5.5 to 7.0, a compressibility in the range of about 6 percent to 20 percent and a compression recovery in the range of about 50 percent to 90 percent.

It will be understood that other methods and means of applying the principle of the invention herein described may be used without departing from the spirit and the scope of the invention as specifically pointed out and described in the above specification and the appended claims.

We claim:

1. A laminated top press sheet for packing printing press impression cylinders consisting of a unitary highly-compacted assembly of alpha fiber webs in which said fibers are retained in a highly stressed compacted condition by an elastomer cured while said assembly is held under a pressure of at least 500 pounds per square inch, said assembly consisting of a plurality of elastomer-impregnated webs of alpha fibers and a coating of elastomeric adhesive interposed between said webs, the fibers in said assembly being maintained in compacted condition by said elastomer impregnant and the webs being positively attached to each other by said elastomeric adhesive, said elastomer impregnant being present in said webs in an amount of from 35 to 140 parts by weight per 100 parts of fiber, and said elastomeric adhesive coating being interposed between said webs in an amount of from 6 to 12 pounds by weight per ream of said webs, said assembly being characterized by a uniform apparent density in the range of 5.5 to 7.0, a compressibility in the range of 6 to 20 percent, and a compression recovery of from 50 to 90 percent.

2. The top press sheet of claim 1 in which the elastomer impregnant and elastomeric adhesive are selected from the group consisting of butadiene-acrylonitrile copolymers; butadiene-styrene copolymers; polychloroprene; copolymers of an alkyl acrylate, and an unsaturated carboxylic acid; copolymers of an alkyl acrylate, an unsaturated carboxylic acid, and an alkyl methacrylate; polymers of methyl, ethyl, and butyl acrylate; copolymers of methyl, ethyl, and butyl acrylate with acrylonitrile; copolymers of ethyl, methyl, and butyl acrylate with ethyl, methyl, and butyl methacrylate; and polystyrene.

3. A laminated top press sheet for packing printing press impression cylinders consisting of a unitary highly-compacted assembly of alpha fiber webs in which said fibers are retained in a highly stressed compacted condition by an elastomer cured at elevated temperature while said assembly is held under a pressure of at least 500 pounds per square inch, said assembly consisting of a plurality of elastomer-impregnated webs of alpha fibers and a coating of elastomeric adhesive interposed between said webs, the fibers in said assembly being maintained in compacted condition by said elastomer impregnant and the webs being positively attached to each other by said elastomeric adhesive, said elastomer impregnant being present in said webs in an amount of from 50–70 parts by weight per 100 parts of fiber, and said elastomeric adhesive coating being interposed between said webs in an amount of about 8 pounds by weight per ream of said webs, said assembly being characterized by a uniform apparent density in the range of 6.0 to 6.8, a compressibility in the range of 7 to 12 percent, and a compression recovery of at least 60 percent.

4. The top press sheet of claim 3 in which the elastomer impregnant and elastomeric adhesive are selected from the group consisting of butadiene-acrylonitrile copolymers; butadiene-styrene copolymers; polychloroprene; copolymers of an alkyl acrylate and an unsaturated carboxylic acid; copolymers of an alkyl acrylate, an unsaturated carboxylic acid, and an alkyl methacrylate; polymers of methyl, ethyl, and butyl acrylate; copolymers of methyl, ethyl, and butyl acrylate with acrylonitrile; copolymers of ethyl, methyl, and butyl acrylate with ethyl, methyl, and butyl methacrylate; and polystyrene.

5. A method of making a sheet material for packing printing press impression cylinders which comprises, impregnating a cellulosic web of alpha fibers with an aqueous dispersion of a synthetic elastomer, drying the impregnated web, applying a coating of a synthetic elastomer to one surface of the impregnated and dried web, forming a stack consisting solely of a plurality of the impregnated and dried webs superposed in a manner to position said coating intermediate adjacent webs, heating the stock to a temperature in the range of 225° to 350° F. to cure the elastomer while simultaneously applying a pressure of at least 500 p.s.i. to the stack for a period sufficient to cure the elastomer, said simultaneous application of heat and pressure causing said fibers to remain in a highly stressed compacted condition in the laminated and pressed sheet.

6. The method of claim 5 in which the elastomer is selected from the group consisting of butadiene-acrylonitrile copolymers; butadiene-styrene copolymers; polychloroprene; copolymers of an alkyl acrylate and an unsaturated carboxylic acid; copolymers of an alkyl acrylate, an unsaturated carboxylic acid, and an alkyl methacrylate, polymers of methyl, ethyl, and butyl acrylate; copolymers of ethyl, methyl, and butyl acrylate with ethyl, methyl and butyl methacrylate; and polystyrene.

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