March 4, 1969 J. B. NETTLEMAN 3,430,560

COVER ASSEMBLY FOR IMPRESSION CYLINDER OF PRINTING EQUIPMENT

Filed July 19, 1965

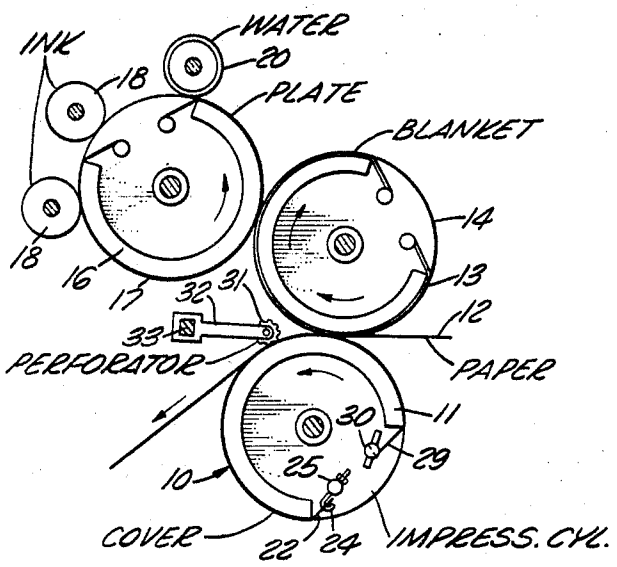

FIG. 1.

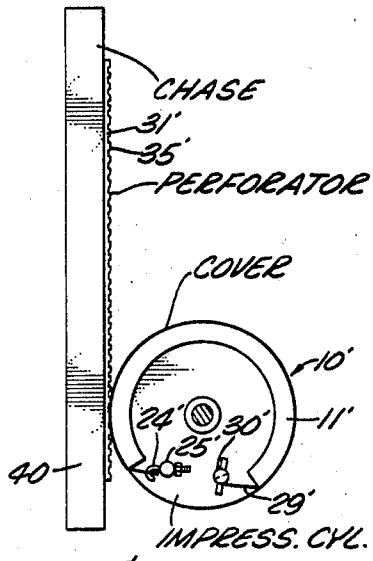

FIG. 4.

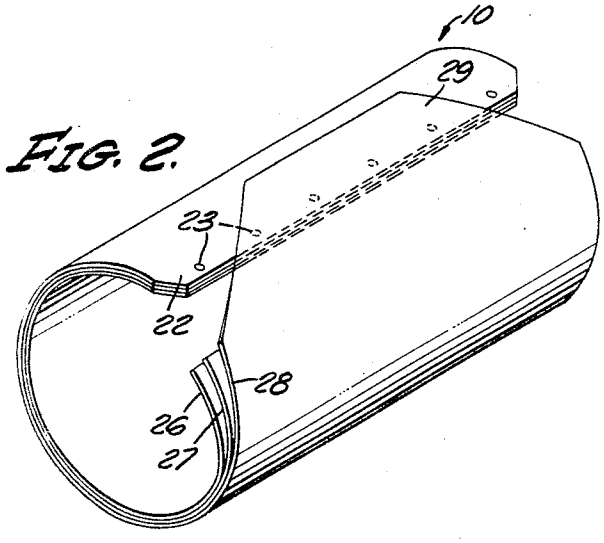

FIG. 2.

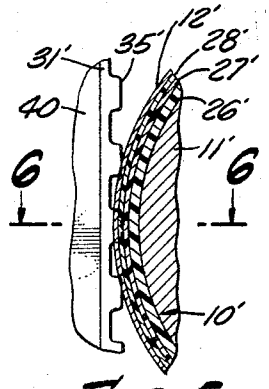

FIG. 5.

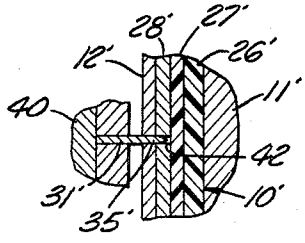

FIG. 6.

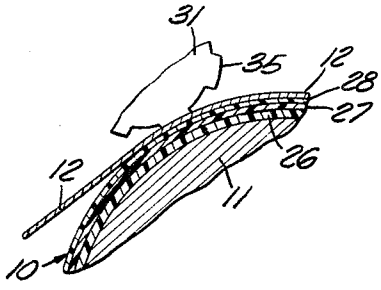

FIG. 3.

INVENTOR.
JOHN B. NETTLEMAN
BY
ATTORNEY

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COVER ASSEMBLY FOR IMPRESSION CYLINDER OF PRINTING EQUIPMENT

John B. Nettleman, Long Beach, Calif., assignor to Cowan Pressroom Products, Inc., Hollywood, Calif., a corporation of California

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Int. Cl. B41l 37/02; B41f 29/02

This invention relates to printing equipment and more particularly to a new and improved cover assembly adapted to be quickly applied to and removed from the impression cylinder in lieu of make-ready oftentimes applied by hand utilizing trial and error technique and providing a highly versatile resilient backup supporting sheet material undergoing printing, scoring, blanking, perforating or other similar operations and having additional functions and advantages to be disclosed in full hereinbelow. In a typical embodiment, the improved cover assembly comprises a plurality of nonlaminated thin flexible sheets secured together transversely of one end and including a longer outer sheet of resilient smooth surfaced transparent plastic capable of rapid and repeated recovery from deformation. One or more of the underlying sheets are preferably of plastic material having the same or similar properties as possessed by the outer sheet. The outer plastic sheet shears along a clean sharp edge when brought into pressure contact with the sharp edge of perforating, slitting and blanking equipment and wipes across the faces of such sharp edges to hone and maintain the sharpness and efficiency of the latter over periods of use many, many times longer. The invention cover assembly is not intended for nor suitable for use on the printing cylinder of an offset press.

The invention cover represents an important innovation in the operation and use of printing equipment and has manifold advantages not previously available. Typical of the problems encountered in the use of printing equipment is the need for compensating for slight irregularities and variations in the height of type face. These irregularities produce varying shades of imprinted indicia and many imperfections occur therein directly traceable to these face height irregularities. In efforts to minimize such defects, it is customary to apply improvised make-ready on the surface of the impression cylinder or other rigid backup surface for sheet material undergoing printing. Make-ready customarily comprises varying numbers of sheets of paper, tissue or other sheet stock employed "shim-fashion" on the face of the impression cylinder and exhibiting some slight degree of resiliency found reasonably suitable to compensate for variations in type height while serving to press the sheet being printed against each type face despite the nonuniform height thereof. Make-ready sheets are customarily applied to the cylinder by hand and secured in place by various expedients including pressure sensitive tape, adhesives or some suitable manner following which several sheets of paper are passed through the press and inspected to determine the sufficiency of the make-ready and areas in need of more or less make-ready. Usually, it is necessary to make a series of these trial runs using various sheets of differing thicknesses and consistencies of make-ready until a reasonably satisfactory impression can be obtained on the material being printed.

Another problem for which the present invention provides a highly satisfactory solution is that of providing a suitable backup for scoring, perforating and blanking blades whenever performance of these operations is desired on either printed or nonprinted material. The uniform practice heretofore has been to apply a high accuracy, thin metal backup to support the sheet material while being scored, perforated or blanked. As is well known, and in spite of all efforts made to avoid and correct the difficulty, such metal backup sheets have a relatively short service life. This is because such sheets become deformed after a brief period of use. Such deformation is evidenced initially by a shallow but wide groove directly opposite the perforating or scoring edge of the blade. The magnitude of this deformation increases progressively and eventually results in severance of the metal sheet along a characteristically rough edge. In other words, metal materials lack the requisite resiliency and elasticity, the high operating pressures found necessary in processing the printed material being effective to deform these metal sheets and there being only slight recovery from this deformation in the interval between scoring and perforating cycles. Cyclic reapplication of the pressure results in further deformation, apparent crystallization of the metal, progressively inferior scoring and slitting, and premature failure of the backup sheet.

The foregoing and other serious disadvantages of existing practice and use of printing equipment are substantially eliminated and new advantages are made available by the present invention comprising the provision of a simple, lightweight, inexpensive, highly versatile cover assembly easily installed on an impression cylinder of a wide variety of printing equipment. Typically, this cover consists of a plurality of sheets of a suitable plastic composition superimposed upon one another and arranged to be easily and snugly applied against the surface of the impression cylinder and having advantages, characteristics and properties not heretofore available.

For example, it is found that a cover assembly made of sheet plastic of the type more particularly identified below has remarkably superior resiliency properties and the capability of recovering from deformation of its surface substantially instantaneously and repeatedly over a very long period of use. This material exhibits substantially no permanent deformation and any failure which occurs is by shear action along a smooth flat surface lying normal to the face of the sheet proper. In other words, the failure has the appearance of a sharp-edged slit. Furthermore, the face edges of the slit proper merge with the face surfaces of the sheet along sharp-edged right angles. In consequence, continued operation of the printing equipment results in the cutting or forming edges of the blade used to perforate or slit acting in high efficiency shear thereby forming substantially invisible but sharply cut slits or perforations in the sheet material being processed. Furthermore, the sharp edges and faces of the slits proper formed in the plastic cover material are found to perform a high efficiency honing action on the faces of the slitting or perforating blade thereby continually renewing the sharpness of the blade and in fact increasing its sharpness with prolonged use of the equipment.

Still another time-saving and valuable feature is to be enjoyed if at least the outer sheet of the cover assembly is formed of transparent material. When so made, a thin sheet carrying the matter being printed can be sandwiched between the two outermost sheets of the cover and held immovably in place thereby for the guidance of the printer in making registry adjustments of the printing equipment to perform an additional printing operation on material already processed through an initial operation and greatly facilitating precise registration between the new and the last performed printing operation.

Accordingly, it is a primary object of the present invention to provide a new, simple, inexpensive, disposable cover assembly adapted to be secured about the face of an impresson cylinder and providing a resilient backup of

great versatility in carrying out various printing equipment operations.

Another object of the invention is the provision of a multiple-layer cover assembly securable to an impression cylinder of printing equipment and usable in lieu of make-ready.

Another object of the invention is the provision of an improved and superior resilient cover assembly for use as a backup for printed material being processed for scoring, perforating, slitting, blanking and the like.

Another object of the invention is the provision of a nonmetallic backup assembly for use on printing equipment when performing scoring, slitting, blanking and perforating operations on sheet material and functioning far more effectively and efficiently than previously available backup expedients.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a schematic representation of components of an offset printing machine incorporating the invention cover assembly and while in use to perform a perforating operation;

FIGURE 2 is a perspective view of the preferred embodiment of the cover assembly;

FIGURE 3 is a fragmentary cross-sectional view on an enlarged scale showing the perforator of FIGURE 1 in operation to perforate printed material;

FIGURE 4 is a fragmentary schematic showing of a different conventional type of printing press having the invention cover assembly mounted on the impression cylinder and arranged for perforating;

FIGURE 5 is an enlarged fragmentary sectional view through the cover of FIGURE 4 and showing details of the perforating operation; and

FIGURE 6 is a fragmentary view on an enlarged scale taken along line **6—6** on FIGURE 5.

Referring first more particularly to FIGURES 1 and 2, there is shown a preferred embodiment of the invention cover assembly, designated generally **10**, snugly and smoothly clamped to the surface of an impression cylinder **11** of offset printing equipment. Since printing equipment of this type is well known, only a few of the essential cooperating components are illustrated herein and these only diagrammatically. In this type of equipment, the characters and indicia to be impressed upon sheet material **12** undergoing printing is offset onto the surface of a blanket **13** suitably secured to the surface of a printer or transfer cylinder **14**. A third cylinder **16** has mounted on its surface a plate **17** having treated surface areas representing print characters and shaped to correspond with the indicia desired on sheet material **12**. The plate generally is first dampened by contact with a water applying roll **20** following which the indicia areas are coated with ink carried on inking cylinders **18, 18**. This ink is then transferred to the surface of cover **13** on cylinder **14** and thereafter offset a second time onto paper sheet **12** passing between cylinder **14** and impression cylinder **11**.

Cover **10** carried by cylinder **11** in lieu of commonly employed make-ready preferably includes two or more nonlaminated sheets of high uniformity nonmetallic sheet material having the requisite resiliency properties and characteristics so important to the objectives of this invention. It will be understood that the thickness and compositions of the constituent sheets of the assembly may vary widely and will depend upon the requirements of the type of printing equipment on which it is being used. The properties and dimensions of a cover found to produce highly satisfactory results on a Miehle letter-type press are typical and representative. The cover there used consisted of three sheets of transparent polyethylene terephthalate plastic known commercially under the trade-

mark Mylar, grade A, and having the military specification number MIL–1–631D, type G. This material has a highly uniform caliper so important in its use as a backup cover on the impression cylinder of printing equipment. It is highly nonabsorbent and does not become statically charged in use, a most critical characteristic. A Rockwell hardness rating found to provide satisfactory results include D–60 through D–70. This material has a high density and a high modulus of elasticity and substantially no elongation under the tensible stress requirements of the use herein disclosed. Various thicknesses of this material can be used and it will be understood that sheets of the same or widely varying thicknesses can be used in combination. One combination employed in a highly satisfactory manner utilized an inner sheet about 2 mils thick sandwiched between a pair of outer face sheets each having a thickness of about 6 mils.

The surfaces of all sheets desirably are highly calendered and smooth and secured together as by fusion or an adhesive transversely of the mounting edge **22**. To facilitate mounting, this edge is punched with mounting openings **23** to fit over pins or J-screws **24** carried in suitable support bars **25** mounted between the ends of impression cylinder **11**.

The two inner sheets **26** and **27** of cover **10** preferably have the same length and are sufficiently long to cover the circumferential extent of the cylindrical portion of impression cylinder **11**. The outermost transparent sheet **28** is longer than the others and its projecting end **29** has tapering lateral edges forming a tongue for reception in a slot extending diametrically through the central portion of a suitable takeup roll **30** suitably supported between the end plates of impression cylinder **11**. After the tongue **29** has been inserted through the slot in takeup roll **30**, the latter is rotated about its own axis to wrap the tongue thereabout until the entire cover is snugly seated against the surface of cylinder **11**. It will be understood the described mounting and clamping are merely illustrative and that any suitable devices may be employed to hold cover **10** detachably applied to the impression cylinder.

The blade means selected to perform a desired operation on sheet material **12** is illustrated in FIGURES 1 and 3 as comprising a rotating type perforating blade **31** mounted on a bracket **32** and slidable along a pressure applying support or "press" bar **33** carried on brackets attached to the main frame of the printing equipment. It will be understood that mounting bar **33** has a large cross-sectional area so as not to be subject to deflection or bending. Although not illustrated, it will also be understood that brackets **32** include suitable means well known in this art for adjusting the position of the edge of blade **31** with preciseness relative to sheet **12** and cover **10**. This type of mounting and supporting means for a rotating perforating, slitting or scoring blade is well known in the art and, for this reason, further showing and description is deemed unnecessary.

The edge of blade **31** is here shown as notched to provide intervening sharp-edged slitting blades **35** having a circumferential length corresponding to the length of the perforations desired in sheet material **12**. Its supporting bracket **32** is so adjusted that the slitting or perforating blades **35** penetrate through sheet material **12** and a slight additional distance to insure a well formed row of perforations. In consequence, it is found in practice that blade **31** eventually shears through the outer plastic sheet **28** of cover **10**. Initially, the several components of the cover are merely deformed inwardly as the pressure of the blade is applied and a cylinder **11** rotates past the blade under the requisite pressure. Eventually, however, the blade will cut through the outer layer following which the sharp edges of the slit so formed wipe the adjacent faces of cutting blades or teeth **35** thereby honing and maintaining and even increasing the sharpness of these cutting edges more or less indefinitely. The plastic material itself possesses a natural lubricity

and softness relative to the very hard material of the perforating blade edges with the result that substantially no wear occurs on the slit edges and only sufficient minimal wear on the face of the teeth to maintain the cutting edge razor sharp.

Referring now to FIGURES 4, 5 and 6 showing the invention cover **10'** mounted on the impression roll **11'** of a Miehle type letterpress, it is pointed out that the cover operates in substantially the same manner and with the same efficiency and effectiveness as on the equipment shown schematically in FIGURE 1. In letterpress equipment, the tpe and the slitting blade means are customarily mounted in a conventional rigid chase **40** comprising a rigid rectangular frame here shown as mounted for reciprocation vertically in pressure contact with one side of impression cylinder **11'**. It will be understood that impression cylinders of substantially all printing equipment are provided with suitable gripper fingers, not shown, but carried inwardly of one edge of the usual depression extending longitudinally of the cylinder. These gripper fingers are arranged to grip the leading edge of the material to be printed automatically and thereby to hold the sheet firmly in place against the face of the cylinder while being carried through the operations then being performed upon the sheet material. Cover **10'**, constructed as described in connection with FIGURE 2, is secured to impression roll **11'** in the same manner described above in connection with FIGURE 1.

If desired, both printing and a slitting or a perforating operation may be carried on simultaneously since both the type and the slitting blade means are locked in proper position in chase **40**. The type face is not illustrated in the drawing but it will be understood that the ink-carrying surface of the type or other indicia forming means lies at an appropriate height with respect to the cutting edge of the slitter blade as to print stock **12'** simultaneously with the slitting operation. Since some of the ink-carrying surfaces of the type invariably are located at slightly different heights, the several layers of cover **10'** and the highly resilient nature of the material employed in these layers mutually cooperate to compensate for these variations in type face heights and serve to hold the juxtaposed surface of stock **12'** pressed in firm contact with the type faces despite these height variations. Owing to the unusual capacity of this material to recover repeatedly from deformation, the invention cover has a remarkably long and highly efficient service life.

It is further pointed out and emphasized that the showing of the thickness of the cutting edges **35'** of blades **31'** is greatly exaggerated in FIGURE 6. In actual practice the portion of the cutting edge actually penetrating outer cover layer **27** is small and typically of the order of 2 or 3 mils. It is further pointed out that the opposite edges of slit **42** formed by the blade normally lie immediately in contact with one another and are forced momentarily laterally by contact with the opposite faces of the perforating blade. It is this repeated opening of the slit edges which applies honing pressure to the blade. Both edges **42** of the slit lie parallel to one another and normal to the surface of layer **27'**. Although the foregoing description has been made in connection with a showing of only a perforating type slitter, it will be understood that other types of slitting blades may be used in lieu thereof such as, for example, those employed in blanking or semiblanking operations. Also, a scoring blade may be used alone or concurrently with a perforating, slitting or blanking blade and operates in the same general manner although, as is known, a scoring blade does not normally penetrate more than superficially into the outer surface of plastic sheet **28** or **28'**.

Although an impression cylinder has been illustrated and described herein it will be understood that cover **10** has the same advantages and functions when supported against an impression platen. Accordingly impression cylinder and impression member or platen will be understood as used interchangeably in the specification and claims.

While the particular cover assembly for impression cylinder of printing equipment herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A cover assembly readily mountable snugly against the surface of the impression cylinder of a printing press in lieu of conventional make-ready and effective to provide a resilient backup for sheet material while being pressed against rigid type and the like, said cover assembly comprising a plurality of separate nonlaminated superimposed sheets of homogeneous plastic each a few mils thick including an exterior transparent sheet free of fibers and of greater length than the others, means securing one transverse edge of all of said sheets together to provide a mounting margin by which said cover is adapted to be anchored to one edge of the longitudinal depression customarily present along the surface of a printing press impression cylinder, the opposite end of said long sheet being adapted to be gripped and tensioned along the other edge of said longitudinal depression to hold said cover snugly and smoothly in place against the cylindrical surface of an impression cylinder and to hold a sheet of printed material sandwiched between the two outermost sheets with the printed material facing outwardly and readily visible through said transparent outer sheet, and the layers of said resilient plastic material providing a resilient backup for sheet material resting thereagainst while being pressed against the slightly nonplanar surface of indicia-producing means in rolling contact with the sheet material and supported by said cover and impression cylinder.

2. A resilient cover assembly for use as a resilient backup for sheet material while being impressed with printing ink carried by the face of rigid type unavoidably supported at times in characteristic slightly nonuniform manner, said cover having a plurality of thin flexible nonfibrous layers of sheet plastic of differing thicknesses each a few mils thick placed loosely one against the other and bound together only along one transverse edge of said cover assembly, said bound edge including means for mounting that edge of the assembly on impression means for supporting the rear side of sheet stock while the front side thereof is being imprinted with indicia, the sheet of said cover adapted to be supported remotely from said impression means being longer than the other sheets and being transparent and adapted to be secured to tensioning means for holding said cover spread smoothly against the surface of said impression means, and the sheets of said cover having sufficient resiliency and recovery characteristics to accommodate long repeated deformation thereof as high type faces of nonuniform height are pressed against sheets supported thereon to receive printing and capable of substantially instant recovery as the pressure of type faces of nonuniform height thereon is relieved therefrom.

3. A resilient cover assembly as defined in claim **2** characterized in that the outermost sheet of said cover has a Rockwell rating of about D–60 to D–70.

4. A resilient cover assembly as defined in claim **2** characterized in that the material thereof does not collect or retain a static charge whereby sheet material flowing therepast separates readily and is not held against said assembly by an electric charge.

5. A resilient cover assembly as defined in claim **2** characterized in that said cover assembly is adapted to be wrapped against and supported on the surface of the printing machine cylinder as a resilient backup for sheet material supported on said cover assembly while the

sheet material is being blanked, scored or perforated and providing a firm but resilient support for sheet material thereon undergoing blanking, scoring, perforating or the like, said outer most flexible sheet failing along a sharp-edged slit by repeated application of a sharp-edged blade against its exterior surface and normal to the surface of said sheet, and said sharp-edged slit being thereafter effective to hone the opposite faces and edge of said blade during each succeeding movement of said blade into and out of said slit.

6. That improvement in printing equipment of the type constructed to perform slitting, blanking and perforating operations on sheet stock utilizing a backup cylinder to press the stock against the edge of a relatively moving sharp-edged blade, said improvement comprising snugly embracing a rotatably supported backup cylinder with a plurality of nonlaminated sheets of thin flexible resilent material and including an outer sheet of highly resilient sheet plastic a few mils thick, rotating said backup cylinder past said sharp-edged blade while the latter is firmly supported in position to slit through sheet stock undergoing processing and into said plastic sheet cleanly and sharply, and utilizing the wiping of the edges of the blade against the edges of the slit formed by the blade in said outer sheet of highly resilient sheet

plastic to hone the faces of said blade edge to renew and maintain the sharpness of its cutting edge.

7. That improvement defined in claim 6 characterized in making said outermost sheet of transparent material and utilizing said outermost sheet to hold a thin sheet of printed material immovably sandwiched between the two outermost sheets of said cover assembly thereby to facilitate and expedite adjustment of the printing press mechanism to obtain accurate registration of another processing operation on a further run of said printed material through the printing press.

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ROBERT E. PULFREY, *Primary Examiner.*

FRED. A. WINANS, *Assistant Examiner.*

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