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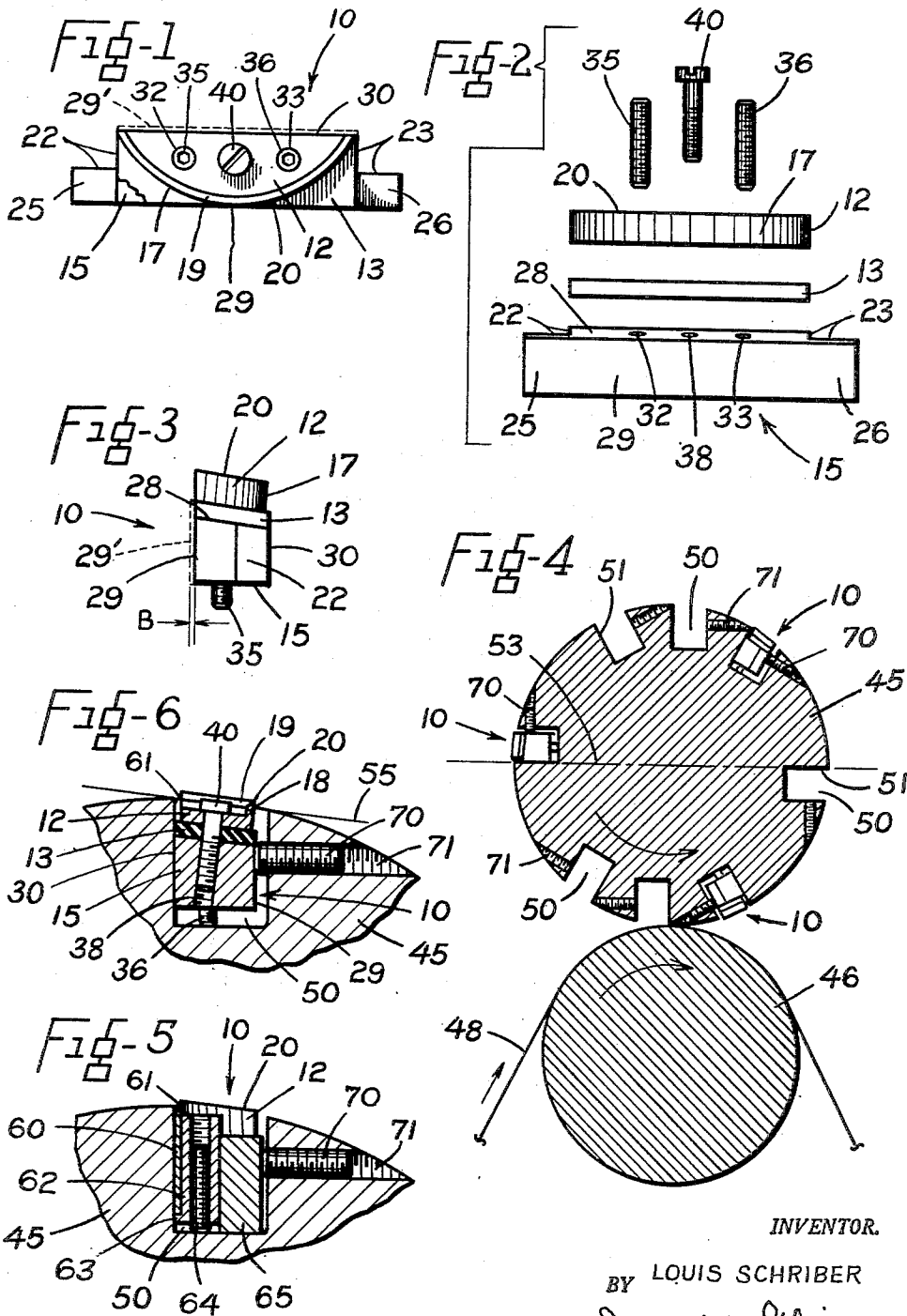
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TAB CUTTER

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2 Sheets-Sheet 1



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TAB CUTTER

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1 Claim. (Cl. 164—28)

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This invention relates to the art of cutting sheet material and embodies more specifically, a cutting knife assembly applicable for use with a cutting cylinder by means of which intermittent or spaced cutting operations on continuous webs of paper and the like may be accomplished effectively in a continuous operation.

Heretofore, it has been the practice to provide cutting knives rigidly mounted either in grooves provided in a cutting cylinder or upon the face of the cylinder to perform intermittent or spaced cutting operations upon a continuous web of material such as paper, carbon paper or other like material. As the web of material advances between the rotating cutting cylinder and a co-operating back-up roll, rotating in an opposite direction, the cutting knife or knives carried by the cutting cylinder will advance and contact the web of material and perform a cutting operation.

To perform a cutting operation on material such as paper or carbon paper, the latter being relatively thin, a great deal of time, skill and care must be exercised when adjusting the cutting knife or knives in or on a cutting cylinder so that the knife or knives will cut completely through the material over the entire area desired to be cut. At the same time the adjustment must be so made as to maintain a minimum amount of contact between the knife or knives and a back-up roll. Undue pressure between the knife or knives and the back-up roll will measurably reduce the time of useful service of the cutting edge of the knife, this being especially true of knives fixed rigidly to a cutting cylinder.

The importance of maintaining the knife or knives in or on a cutting cylinder in perfect alignment with a back-up roll as well as effecting adjustment to assure cutting through the thickness of the material being run, is therefore readily understood. Such prerequisites are even more appreciable when performing a cutting operation upon a relatively thin material such as carbon paper wherein the knife or knives are adjusted to close tolerances, as for example, a thousandth of an inch.

To overcome the undesirable aspects of a rigidly mounted knife, as pointed out above, the present invention provides for a resilient means to support the knife in a "floating" condition. In the practice of this invention, the knife portion of the cutting assembly or unit is preferably attached to a mounting base portion with a suitable thickness of resilient material, such as rubber or like material. With the provision of a resilient material, the knife of the cutting assembly is supported in a "floating" condition while the base portion of the unit is rigidly connected to the cutting cylinder. It has been found that this "floating" arrangement enables the knife or knives to be self aligning and thereby meet deviations either in the

mounting of the cutting assembly, in the material or in the rolls.

Accordingly it is the principal object of the invention to provide a cutting assembly having a resilient mounting means to support the cutting knife or knives in a floating or cushioned condition.

It is also an object of the invention to provide a cutting unit having the cutting knife adapted to be self aligning during a cutting or perforating operation.

A further object of the invention is to provide a cutting assembly of predetermined size and dimension adapted to be adjustably and removably mounted in a cutting or perforating cylinder.

A further object is to provide such an assembly which is adapted for use with cutting or perforating cylinders of various diameters and linear dimensions.

A still further object is to provide a cutting assembly adapted to be mounted in a predetermined location independently of cooperating cutting members in a cutting or perforating cylinder.

It is also an object of the invention to reduce excessive wear caused by improper mounting of the knives and to substantially reduce the need of precision adjustments of the cutting assembly.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claim.

In the drawings:

Fig. 1 is a top plan view of the cutting assembly in accordance with the invention;

Fig. 2 is an exploded view of the component parts of such an assembly;

Fig. 3 is an end elevation;

Fig. 4 is a diagrammatic sectional view through the cutting cylinder and back-up roll;

Fig. 5 is a sectioned view of the cutter assembly mounted in the cutting cylinder, the section being taken on the line 5—5 of Fig. 7, the cylinder is shown fragmentarily.

Fig. 6 is a sectioned view taken on the line 6—6 of Fig. 8;

Fig. 7 is a plan view of a portion of a cutting cylinder showing one method of mounting the cutting assembly in relation to a perforator bar;

Fig. 8 illustrates another method of mounting the cutting assembly in relation to a perforator bar;

Figs. 9 and 10 illustrate a single and triple width of carbon paper respectively, showing tabs formed by the cutting assembly of the present invention;

Fig. 11 illustrates a single width of carbon paper showing a modified form of cut or tab formed by a cutting cylinder of the invention; and

Fig. 12 is a still further modified cut or tab made in a single width of carbon paper by a modified cutting assembly of the invention.

Referring in detail to the drawings, with particular reference to Figs. 1 to 8, it will be seen that the cutting assembly illustratively shown is indicated generally by the reference character 10. Referring more particularly to Fig. 2, it can be seen that the assembly essentially comprises three component parts, a knife 12, resilient mounting member 13 and a base member 15. The knife 12 is illustrated as arcuate in form, for an example of application but can be made in various configurations to perform particular desired cutting operations. The curved portion 17 has an upwardly extending flange 18 having a bevel 19 formed on the inner or outer edge thereof defining a sharp cutting edge 20.

The base member 15 is generally rectangular in shape having cut out portions 22 and 23 formed in opposite corners thereof in turn providing lug portions 25 and 26 to facilitate mounting of the device in the cutting cylinder 45. The top surface 28 of base 15 is formed on an angle in relationship to the front and rear faces 29 and 30 respectively, the purpose of which will be hereinafter described in connection with the mounting of the assembly 10 in the cutting cylinder grooves.

The mounting member 13 is made preferably of a resilient material, as for example, rubber or other like material possessing a quality of resiliency and may be rectangular in form and of a suitable thickness. The width corresponds to the width of the base 15 and the length corresponds to the length of the overall length of knife 12. The mounting member 13 is adhesively secured to the surface 28 of base 15 and the knife 12 in turn is adhesively secured to the member 13 completing a unitary cutting assembly 10. It should be noted that the knife 12 assumes an angular position corresponding to the angle of surface 28 on base 15.

The assembly is provided with a pair of bores 32—33 spaced apart and adapted to receive adjusting screws 35—36. The bores in the knife 12 and mounting member 13 serve as access holes for an Allen wrench to adjust the screws threadedly received in the base 15. A third bore 38 located between bores 32—33 is shown in Fig. 6 as drilled at a right angle to the surface 28 of base 15. The bore 38 in the base is threaded and adapted to receive a locking screw, not shown, that serves to hold the component parts, when first assembled, in proper alignment until the component parts are properly bonded together. The locking screw is then replaced by a safety screw 40 threadedly held by the tapped bore in the base 15. Screw 40 is not completely tightened and serves only as a precautionary measure to hold the parts together in case of a possible breakdown. The bore 38 in the knife 12 is of such diameter as to provide a sliding fit adjacent the shank of screw 40; thus during each revolution of the cylinder 45, the sliding fit provided by the bore 38 in conjunction with the resilient member 13 upon which the knife 12 is mounted permits unimpeded movement of the knife for a given distance in all directions, thereby assuring a "floating" or receding movement of the knife during each time that a knife 12 contacts and cuts a travelling web, the head of the screw 40 being disposed a suitable distance below the plane of the cutting edge 20 of knife 12.

Fig. 4 diagrammatically illustrates a cutting cylinder 45 and a back-up roll 46 as used in a machine generally known as a Carbon Press and further illustrates a web of paper 48, as for ex-

ample, carbon paper, travelling between the nip of the cylinder 45 and the back-up roll 46. The rotational direction of the cylinder 45 and roll 46 as well as travel direction of web 48 is indicated by directional arrows.

A plurality of longitudinal grooves 50 are provided spaced about the periphery of cylinder 45 and extending the full length thereof. It should be noted that the lead walls 51 of grooves 50, that is the wall portions of grooves 50 approaching roll 46, of diametrically opposed grooves are on a common line incident to the center point of the roll, this line being indicated at 53. The grooves are tangential to the roll but offset from line 53 as shown in Fig. 4. It is for this reason that the particular angle of surface 28 on base 15 is provided in order to support the member 13 at a similar angle which in turn supports and directs the knife at a position parallel to the periphery of the cylinder. A parallel line is indicated at 55 in Fig. 6, so drawn with the line contacting the outermost edges of the grooves 50, and the cutting edge of the knife is in alignment with line 55.

The grooves 50 in cylinder 45 are so arranged to accommodate a plurality of cutting members 10 in combination to effect equally spaced intermittent and continuous cutting operations upon the advancing web of carbon paper 48. Fig. 4 illustrates three of the cutting units in position in grooves 50, the grooves so selected to provide equal spacing of the cutters.

Figs. 5 and 7 show a method of installation where a cutter assembly 10 of the invention is used in connection with a perforator cutting bar. For purposes of description, a particular application of a cutting operation is selected in connection with a carbon sheet or sheets used for making a copy record or records in manifold forms. Such forms usually consist of two or more continuous lengths of printed forms interleaved with carbon paper or transfer sheets. The composite forms are advanced through a machine by which the operator applies certain data thereon, a completed form being separated from an adjacent form by the expedient of a perforation formed therein and extending from the marginal edge and across the width of the forms. It is then necessary to withdraw the carbon sheet or sheets that are interleaved with the original and the carbon copies. With the foregoing in mind, it is the purpose of the knife and perforator to perform a cutting and perforating operation on the carbon sheet to provide the perforations and in addition a tab portion as shown in Fig. 10. The tab portion on the carbon sheet illustrated is arcuate in form and adapted to extend outwardly of the edges of the separated forms to facilitate quick removal of the carbon sheets.

When performing such a cutting and perforating operation in accordance with this invention, the perforator cutting bar 60, having a bevelled surface 61 formed thereon and defining a notched cutting edge, is mounted in grooves 50 in cylinder 45, the bar 60 extending substantially the length of the cylinder. Bar 60 is adjustably supported in the groove 50, with the bevel portion 61 facing in the direction of travel of cylinder 45, by means of perforator adjuster bars 62. Adjuster bars 62 are provided with a projecting ledge 63 upon which the lower edge of the perforator rests. In addition the bars 62 are provided with a plurality of spaced adjusting screws 64 threadedly received therein.

The cutting member 10, so formed to cut a tab

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portion in the carbon sheet or web 48, is positioned in the groove 59 as shown in Fig. 7. Face 29 of base 15 is positioned against the rear face of perforator 60, in turn positioning the open end of the arcuate knife 12 in a direction to contact web 48 prior to the subsequent cutting contact of the knife's curved portion 17. The cut out portions 23 of base 15 receive the ends of the adjuster bars 62 positioned on either side of the cutter 10 with the lugs 26 contacting the rear surface of the bars 62. In addition, the installation includes perforator locking gibs 65 located rearwardly of adjuster bars 62 and the ends in abutment with the lugs 26 on cutter 10.

Locking screws 70 provided in the threaded bores 71 in cylinder 46 serve to secure the various parts in position after the perforator cutting bar has been adjusted by adjusting the screws 64 in adjuster bars 62 and likewise adjusting cutting member 10 by adjusting screws 35-36.

An example of a cutting operation as performed by the perforator bar and arcuate knife 12 is shown in Fig. 9. A single width of carbon paper, of the type used in conjunction with a manifold form, has therein an arcuately formed cut 75 defining a tab portion 76 with perforations 77 extending from either side of the cut line 75 to the edges of the sheet. The tab 76 is formed integral with the sheet by grinding a portion of the cutting edge of perforator bar 60 to an out of contact point positioned below the plane of cutting edge 20 of knife 12. The portion ground out is indicated by the dimension line A in Fig. 7. Fig. 10 illustrates a sheet of carbon comprising three widths of manifold carbon inserts having a similar cutting operation performed by assembling three of the knife units 10 to a groove, in cutting cylinder 46.

An alternative method of mounting knife 12 and perforator bars 60 is shown in Figs. 6 and 8. The knife member 10 is modified to the extent of providing a projecting face 29' shown by dotted lines in Figs. 1 and 3. The projection 29' extending a distance, outwardly of the cutting knife, equal to the thickness of perforator bar 60 and indicated by the dimension line B in Fig. 3. Sections of the perforator 60 are disposed on either side of the knife member 10, the inner ends of perforations 60 being in abutment with cut out portions 22 and 23. This method of mounting obviates the necessity of a grinding operation as described in connection with Figs. 5 and 7. The balance of this installation is the same as described in detail concerning the preferred method of mounting. It should be understood that the projecting portions of knife 12 and perforator bar 60 projecting outwardly of the cylinder 46 are exaggerated in regard to the adjustment thereof, Figs. 5 and 6, and is meant to be illustrative only.

A modification of the knife is shown in Fig. 8 in the form of a relatively narrow cut out notched portion 80 centrally located in the cutting edge 20 of curved portion 17. A resulting cut, illustrated in Fig. 11, provides a small integral portion 81 to temporarily connect the tab to the main body of the sheet, portion 76 being effectively separated when adjacent manifold forms are separated at the perforation line.

A modified form of tab 85 which may be produced by the device of this invention is shown in Fig. 12, the tab being triangular in shape with

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the cut lines 86 being formed by a correspondingly shaped knife.

From the foregoing it can be seen that the features of the resilient mounting of the knife 12 will inherently perform outstandingly effective cutting operations. In addition, the self aligning feature and the shock absorbing characteristic of the resilient mounting will measurably prolong continued use of the knife. Based on commercial operations, it has been found that prolonged use of the knife assembly of this invention will also result in a saving of time since frequent replacement of the cutting members is obviated, in turn reducing substantially lost operating time caused by setting up operations. Moreover, the resilient mounting possesses an added advantage over a rigidly mounted knife in regard to errors made in the adjustment of the knife by the operator during a setting up operation. For example, adjustment of the knife in a direction to cause binding contact with the back-up roll causes damage to the cutting edge of a knife when rigidly mounted. In comparison, a resilient mounting offsets possible errors usually made during a setting up operation of the knife or knives on a cutting cylinder.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claim.

What is claimed is:

In a paper cutting and perforating machine including a cylinder having a transverse groove in the peripheral portion thereof, said groove having sides and a bottom, and a cooperating back-up roll, the provision of a cutter assembly comprising a metal base member having a top surface disposed at an angle other than a right angle with respect to the sides of said groove, a cutter blade, a mounting member of resilient material and uniform thickness interconnecting said blade and the top surface of said base member, a pair of adjusting screws extending vertically through said base member and bearing against the bottom of said groove, and means carried by said cylinder for locking said base member in adjusted position in said groove.

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