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(54) PAPER FASTENERS

(71) I, WALTER HENRY LAND, an Australian citizen, of 656 Nepean Highway, Frankston, Victoria 3199, Australia, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to paper fasteners.

Some fastening devices now in widespread use for loose-leaf folders, are of the three piece metal type constructed of thin sheet metal and comprising a base plate with a pair of integral locator arms in the form of thin metal prongs protruding from each end of the base plate and which are adapted to pass through apertures in a file in turn aligned with apertures in leaves of perforated paper. After each prong is passed through an aperture in the file and then through the paper, a separate clamping member has to be placed over and slid down over the straps which are then folded flat against the clamping member and a locking plate or sleeves are then slid horizontally over the clamping member. However the thin metal edges of the components of such fasteners are very sharp and the fasteners frequently clamp too tightly and are difficult and slow to unfasten.

It is therefor for an object of this invention to provide a paper fastener which is adapted for quick and easy fastening and release.

According to the present invention there is provided a flexible paper fastener of plastics material comprising a flat elongate base member with an integral tongue extending from each end thereof, a compressor plate with a tongue-receiving aperture adjacent each end thereof, and a pair of resilient hooks upstanding from the plane of the plate with catch means on the underside thereof for snap locking and release with complementary means on the upper surface of each tongue, said plate having an upstanding transverse locking bar adjacent each aperture, said bar being adapted to frictionally engage and hold a roughened undersurface of each tongue against inadvertent longitudinal displacement from the compressor plate.

Preferably, the plastics material is a polyolefin homopolymer or copolymer such as polypropylene or a copolymer of propylene and ethylene with a major proportion of propylene.

The paper fastener of the present invention may be continuously and automatically formed by injection moulding in conventional moulding machines.

Preferably, the hooks of the compressor plate are transversely opposed with respect to the longitudinal axis of the plate and comprise a post portion integrally moulded with the plate and upstanding from one side thereof, and an arm portion extending horizontally from the post portion over a central aperture formed in "stamped out" relationship to the said post and arm portion.

Preferably, the catch means on the underside of the arm portion of each hook comprises a rib or lug extending transversely along the tongue-receiving and engaging arm of the hook and the upper and outer surface of each tongue is provided with a longitudinally extending groove to cooperate with the rib or lug of the hook and prevent accidental lateral displacement of the tongue from the hook and act in a snap-fit relationship when the tongue is folded over and lies against the upper surface of the plate.

According to other preferred features, the undersurface of each tongue is roughened by means of cross-pattern grooving, stipulated effect, transverse saw-tooth grooves or other gripping or non-slip

means and strap tensioning means is provided by the combination of the locking bar and saw-tooth grooves and the hook rib and tongue groove of the compressor plate and tongues, respectively. Furthermore each locking bar terminates in a knife edge which engages with saw teeth on the tongue. In a variation, the closed tongue-receiving apertures of the compressor plate are replaced by open-ended slots of "key-hole" type configuration. Each tongue is joined to the base by a flexible web to form a plastic hinge to enable the tongue to be bent up and remain in a position at right angles to the base to counteract the plastic memory of the material of the base and tongues. Another preferred feature is the provision on the compressor plate of a peripheral strengthening wall upstanding from the upper surface of the plate.

Several embodiments of the invention will now be described in more detail with reference to the accompanying illustrative drawings in which:—

Figure 1 is a plan view showing the assembled paper fastening device embodying the present invention in the closed position.

Figure 2 is a perspective view of the upper surface of the mounting or clamping member, without straps in place.

Figure 3 is a perspective view of the inner upper surface of the base with strap members, showing gripping teeth.

Figure 4 is a partial underneath perspective view of the base member showing a strap hinge groove formed at the junction of base and strap.

Figure 5 is a section taken on line 5-5 of Figure 1.

Figure 6 is a section taken on line 6-6 of Figure 1.

Figure 7 is a perspective view of a modification of the mounting or clamping member with an open strap-receiving slot at each end.

Referring to the drawings and in particular to the embodiment of Figures 1 and 2 the paper fastener of the present invention shown in use as a two-hole paper binder, is a two-piece construction wherein each component is constructed of a thermoplastics material such as polypropylene-ethylene copolymer and formed by injection moulding in a conventional automatic injection moulding machine. The first component comprises a flat elongate base member or back plate 10 having elongate tongues 11 of narrower diameter extending from each end thereof. In this embodiment each tongue has a roughened upper or inner fold over surface 12 in the form of transverse ridges and grooves 13 in saw-tooth pattern. There is also provided at the junction between each tongue and the back plate or base member 10 a plastic hinge 14 formed as a groove 15 on the underside of each tongue. The bottom or outer surface of each tongue 11 (which is the surface which faces upward and outward when to tongue is folded over and lies along the upper surface of the mounting member) is provided with a longitudinal groove 16 which extends along substantially its entire length.

The second component 17 of the paper fastener is a combination mounting and tongue-clamping and releasing member and comprises a base portion in the form of a flat elongate compressor plate 18 preferably provided with a peripheral strengthening wall 19 and two transversely disposed tongue-receiving apertures 20 adjacent each end thereof and which are of sufficient width and length to receive the tongues. If desired the slot may be key-holed in configuration and is preferably surrounded by a peripheral strengthening wall 21. However the innermost portion of the wall of each aperture (that is to say that portion remote from but facing the ends of the compressor plate) is interrupted by a transverse post-like or rib member 22 which is moulded integrally with the compressor plate and which projects upwardly from the surface of the plate and terminates at its end in a tongue-engaging knife edge 23.

At a distance about half-way between the centre and each end of the compressor plate, there is provided upstanding tongue-engaging and tongue releasing means 24 in the form of a hook 25 having a rigid post section 26 supporting a resilient arm portion 27 set at right angles to the post. Each hook is moulded in stamped out relationship from the plate 18 and is provided with a raised transverse rib 28 on the undersurface of the arm portion 27. As previously described, the outer surface of each tongue 11 is provided with longitudinal groove 16 which is of complementary shape to the rib 28 and in this particular embodiment the rib 28 is V-shaped and is adapted to fit into a complementary V-shaped groove in the tongue. In this arrangement of tongue-groove and hook-rib, when each tongue 11 of the base member 10 is passed through the aperture 20 of the compressor plate 18 and folded inwardly over the compressor plate 18, the knife edge 23 engages in a groove of the tongue and when the tongue is passed sideways into the gap between the arm of the resilient hook and plane of the upper surface of the compressor plate 18, the rib 28 of the hook and the groove 16 of the strap engage in a snap-fit locking arrangement.

In the modification illustrated in Figures 7, the tongue-receiving apertures at each

end of the mounting plate are replaced by tapered, open-ended slots 29 having side entry walls 30 entering into a substantially rectangular transverse slot 31. At the junction of the tapered entry walls and transverse slot there is a shoulder 32 which acts as a snap-fit lock and release against the edge of the tongue.

In a modification not shown, the transverse ridges and grooves of the tongue are replaced by cross-pattern grooving or by a stipuled effect or other gripping or non-slip means.

WHAT WE CLAIM IS:—

1. A flexible fastener of plastics material comprising a flat elongate base member with an integral tongue extending from each end thereof, a compressor plate with a tongue-receiving aperture adjacent each end thereof, and a pair of resilient hooks upstanding from the plane of the plate with catch means on the underside thereof for snap locking and release with complementary means on the upper surface of each tongue, said plate having an upstanding transverse locking bar adjacent each aperture, said bar being adapted to frictionally engage and hold a roughened undersurface of each tongue against inadvertent longitudinal displacement from the compressor plate.

2. A fastener according to claim 1, wherein the plastics material is a polyolefin homopolymer or copolymer selected from polypropylene or a copolymer of polypropylene and ethylene with a major proportion of polypropylene.

3. A fastener according to claim 1 or 2 wherein the hooks are transversely opposed with respect to the longitudinal axis of the plate and comprise a post portion integrally moulded with the plate and upstanding from one side thereof and an arm portion extending horizontally from the post portion over a central aperture formed in "stamped out" relationship to the said post and arm portions.

4. A fastener according to any preceding claim wherein the catch means of the hooks comprises a rib or lug extending transversely across a strap-engaging arm of each hook and the outer or upper surface of each tongue is provided with a longitudinally extending groove to cooperate with the rib or lug of the hook in a snap-fit relationship when the tongue is folded over and lies against the upper surface of the plate.

5. A fastener according to any preceding claim wherein the undersurface of each tongue is roughened by means of cross-pattern grooving, stipuled effect, transverse saw-tooth grooves or other gripping or non-slip means.

6. A fastener according to any preceding claim wherein strap-tensioning means is provided by the combination of the locking bar and saw-tooth grooves and the hook rib and tongue groove of the compressor plate and tongues, respectively.

7. A fastener according to claim 6 wherein each locking bar terminates in a knife edge which engages with saw teeth on the tongue.

8. A fastener according to any preceding claim wherein closed tongue-receiving apertures of the compressor plate are replaced by open-ended tapered slots of "key-hole" type configuration.

9. A fastener according to any preceding claim wherein each tongue is joined to the base by a flexible web to form a plastic hinge to enable the tongue to be bent up and remain in a position at right angles to the base to counteract the plastic memory of the material of the base and tongues.

10. A fastener according to any preceding claim wherein the compressor plate is provided with a peripheral flange or strengthening wall upstanding from the upper surfaces of the plate.

11. A fastener substantially as hereinbefore described with reference to Figures 1 to 7 of the drawings.

12. A fastener substantially as hereinbefore described with reference to Figure 8 of the drawings.

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2. A fastener according to claim 1, wherein the plastics material is a polyolefin homopolymer or copolymer selected from polypropylene or a copolymer of polypropylene and ethylene with a major proportion of polypropylene.

3. A fastener according to claim 1 or 2 wherein the hooks are transversely opposed with respect to the longitudinal axis of the plate and comprise a post portion integrally moulded with the plate and upstanding from one side thereof and an arm portion extending horizontally from the post portion over a central aperture formed in "stamped out" relationship to the said post and arm portions.

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5. A fastener according to any preceding claim wherein the undersurface of each tongue is roughened by means of cross-pattern grooving, stipuled effect, transverse saw-tooth grooves or other gripping or non-slip means.

6. A fastener according to any preceding claim wherein strap-tensioning means is provided by the combination of the locking bar and saw-tooth grooves and the hook rib and tongue groove of the compressor plate and tongues, respectively.

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