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HANDTOOL FOR CUTTING SHEET MATERIAL

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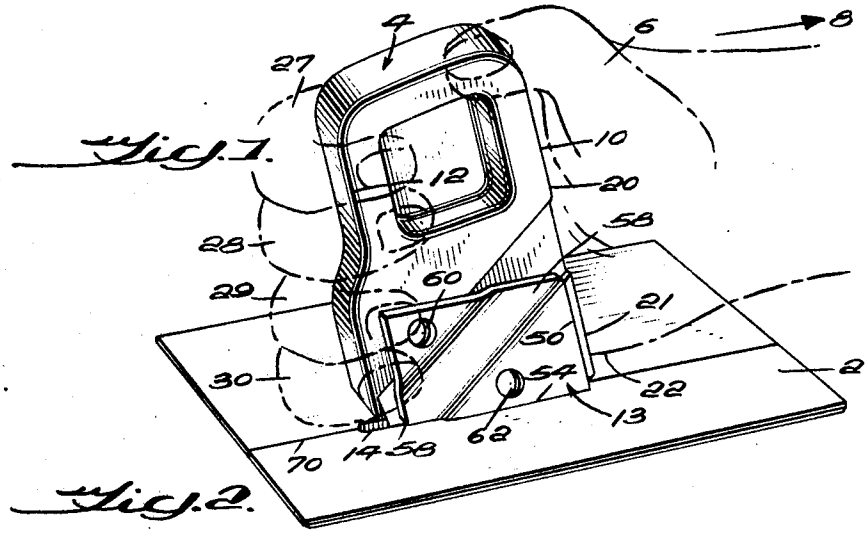


Fig. 1.

Fig. 2.

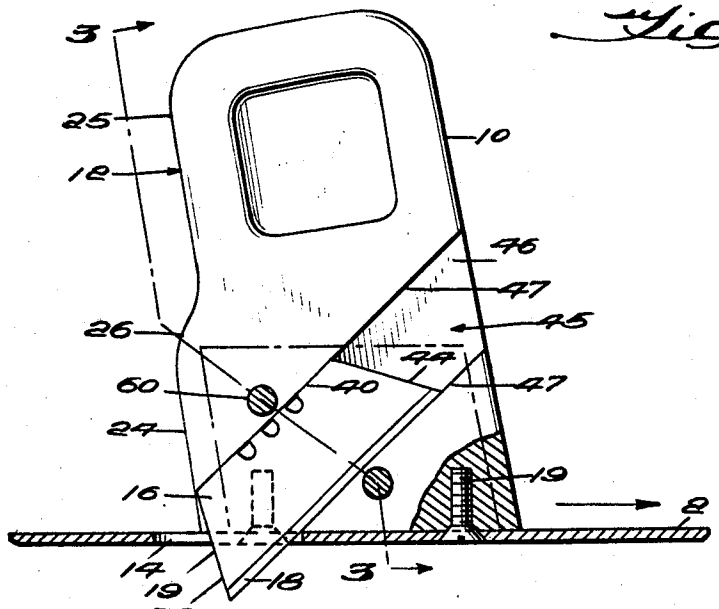


Fig. 3.

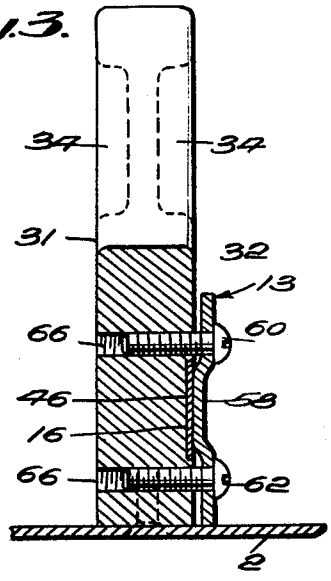


Fig. 4.

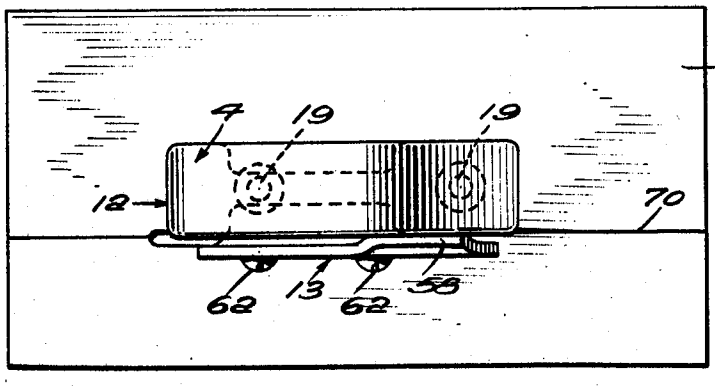
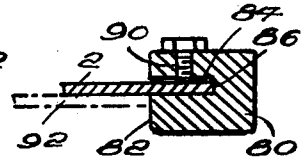


Fig. 5.



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HANDTOOL FOR CUTTING SHEET MATERIAL

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ABSTRACT OF THE DISCLOSURE

A handtool for cutting sheet material such as floor covering materials and the like, is of the pull type intended to be grasped manually by the user and pulled toward the user's body in a forward direction during cutting action of the tool. The tool includes a base plate having a flat lower surface adapted to slide on and across the sheet material. An upwardly projecting handle fixedly secured to the base plate is shaped to be grasped by the user's hand with the palm thereof disposed in a generally vertical plane thumb uppermost, and with the fingers thereof clenched about the handle at the second finger joints. The cutting blade includes a forwardly and upwardly inclined, cutting edge extending through an opening in the base plate from a point spaced below the base plate. Means are provided for fixedly connecting the blade with the handle to hold the blade in cutting orientation.

Background of invention

This invention relates to a handtool of the pull type intended to be grasped manually by a user, and pulled towards the user's body during cutting action of the tool. In particular, the invention relates to a handtool suitable for cutting floor-covering sheet material such, for example, as cushion backed, vinyl surfaced, yard goods.

In preparing sheet material for floor covering or other purposes, it is often necessary to cut sheet material from stock thereof into particular pieces which are subsequently laid edge-to-edge in abutting relation with other similar pieces or in abutting relation with walls or other vertical surfaces. It is necessary, if a good fit is to be achieved, that the cut edges of the various pieces of sheet material should be smoothly contoured and should remain perpendicular to the plane of the sheet, and that abutting edges of adjacent sheets should be complementary.

Various cutting tools have been proposed for this purpose. At least one type includes a vertically extending blade secured to a handle which may be grasped manually by an operator and pushed away from his body across the surface of the material to produce a cut therein. Additionally, the tool may include a horizontal flat plate secured to the handle to assist in maintaining the cutting blade vertically upright. However, tools of the type just described generally have been intended for cutting relatively easily-cut material, such as carpeting or the like, and are not suitable for cutting hard-to-cut materials, such as cushion backed vinyl surfaced yard goods, and the like, for a number of reasons.

For example, in cutting cushion backed vinyl surfaced yard goods, the push force required to be exerted by the user's hand in order to force the cutting blade along is usually sufficiently great to cause considerable unsteadiness of the hand. Such unsteadiness, which increases as the hand becomes fatigued in use, causes a wavering and irregular cut leading to a poor fit between the subsequently mated cut edges of the various pieces of the sheet material.

Other problems may arise in connection with the manner in which the blade is mounted on the handle. Frequently such mounting comprises only a frictional fit between the blade and a slot in the handle, and in such circumstances the blade may eventually work itself loose during cutting.

Another problem associated with the blade mounting may arise if the mounting connecting the blade to the handle does not permit swift and easy replacement of the blades when they become blunt or broken. In this connection, it is important that pieces of broken blade should not be capable of becoming permanently jammed in their mounting in the handle.

Summary of the invention

It is therefore a general object of the invention to provide a hand cutting tool intended to obviate or minimize problems of the type previously noted.

It is a particular object of the invention to provide a hand cutting tool for cutting sheet material so designed as to particularly facilitate the production of a cut edge in the sheet material which may subsequently be mated in close-fitting, edge-to-edge relation with the cut edge of another piece of material.

It is a further object of the invention to provide a hand cutting tool suitable for cutting flat sheet material wherein cutting action of the tool is such as to minimize unsteadiness of the user's hand during cutting.

It is yet a further object of the invention to provide a hand cutting tool having a blade removably secured to a handle wherein the blade is particularly securely fastened and yet may be easily replaced whenever necessary.

One preferred embodiment of the invention intended to accomplish the foregoing objects comprises a hand tool for cutting sheet material such as linoleum and the like. The tool is of the pull type intended to be grasped manually by a user and pulled toward the user's body in a forward direction during cutting action. The tool includes a base plate having a flat, lower, horizontal surface adapted to abut slidingly the flat sheet material. An upwardly projecting handle fixedly secured to the base plate is shaped to be grasped by the user's hand in a partially clenched condition, with the palm thereof disposed in a generally vertical plane, thumb uppermost. The handle includes a vertically extending, straight, forward edge adapted to abut the user's hand along the ball of the thumb and adjacent portions of the base of the palm and a rear edge adapted to be contacted by the user's fingers between the second and third joints thereof with the fingers curled at the second joint. A cutting blade is provided extending through a slot in the base plate. The blade includes a cutting edge extending forwardly and upwardly from a point spaced below the lower surface of the base plate adjacent the rear edge of the handle towards the forward edge thereof. Means are provided for fixedly connecting the blade with the handle.

In the preferred embodiment, the means for connecting the blade to the handle includes a channel in a side surface of the handle shaped to receive the blade and a resiliently deformable closure plate abutting the blade on a side thereof remote from the channel. Means are provided for fixedly securing the closure plate to the handle to retain the blade in the channel in cutting orientation.

The drawings

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of a hand cutting tool according to one preferred embodiment of the invention shown grasped by a user's hand in cutting position;

FIG. 2 is a side view, partially in cross section, of the hand cutting tool shown in FIG. 1;

FIG. 3 is a cross-sectional end view of the hand cutting tool shown in FIG. 2, taken along the line 3—3 therein;

FIG. 4 is a top view of the hand cutting tool; and

FIG. 5 is a cross-sectional side view of a first alternative embodiment of the invention.

Detailed description

Referring to FIGS. 1 and 2, one preferred embodiment of the invention there shown includes a flat, horizontal base plate **2** adapted to abut slidingly any sheet material which the cutting tool is intended to cut. Fixedly secured to the upper side of the base **2** is a handle **4** adapted to be grasped by a user's hand **6** in a partially clenched condition thereof, so that the tool may be pulled towards the user's body in a forward direction (indicated by the arrow S) during cutting action. The handle **4** includes a generally vertical forward edge **10** adapted to abut the ball of the thumb and adjacent portions of the base of the palm of the user's hand **6**. The handle **4** also includes a rear edge **12** adapted to be contacted by portions of the fingers of the user's hand **6** between the second and third finger joints thereof (counting the knuckle joint as the first joint of each finger), with each of the fingers curled generally perpendicularly to the palm at the second finger joint thereof.

Fixedly secured to the handle **4** by a resiliently deformed, closure plate **13** and extending downwardly through a slot **14** in the base plate **2** is a cutting blade **16** having a sharpened cutting edge **18**. The cutting edge **18** extends from a point spaced below the lower surface of the base plate **2** forwardly adjacent the rear edge **12** of the handle **4**, forwardly and upwardly through the slot **14** towards the forward edge **10** of the handle **4**. During cutting, the lower edge of the blade **16** is forced downwardly into the material to be cut and the tool is pulled through the material to provide a smooth cut, while at the same time the base plate **2** maintains the upright orientation of the blade **16**.

The base plate **2** is a longitudinally extending, rectangular, sheet metal plate of uniform thickness. The previously mentioned handle **4** is secured to the upper surface of the plate **2** centrally thereof by two longitudinally spaced, threaded connectors **10** (FIG. 2) having their heads flush with the lower surface of the plate **2**. The previously mentioned forward edge **10** of the handle is flat and extends transversely and upwardly at a slight rearward inclination to the upper surface of the plate **2**. In use, the edge **10** is firmly and abuttingly contacted by the ball **20** of the thumb of the user's hand and by the lower vertical portion of the base of the palm **21**, with the lowest portion **22** of the user's hand contacting the upper surface of the base plate **2**.

The previously mentioned rear edge **12** includes transversely extending, upwardly and rearwardly inclined, lower and upper portions **24** and **25** respectively, connected by an angular, blending portion **26**. The upper portion **25** is spaced forwardly of the lower portion **24** parallel thereto.

In use, with the user's hand **6** partially clenched around the handle **4**, the index and second fingers **27** and **28** respectively, of the user's hand **6** are curled about the upper portion **25** with that portion of each of the index and second fingers between the second and third finger joints thereof (counting the knuckle joint of each finger as the first finger joint) abutting the upper portion **25**. Similarly, the third finger **29** and the little finger **30** of the user's hand **6** between the second and third joints thereof are curled about the lower portion **24**. The pulling force exerted by the user's hand is therefore transmitted through the fingers to the rear edge **12** so that the tool is pulled across the surface of the work. By using a handle of this type the inherently greater steadiness of cut known to be associated with handtools operated in pull (as contrasted to those in push) is obtained, thereby permitting smoother cutting action to be achieved.

The handle **4** also includes a longitudinally and vertically extending flat, first side surface **31** adapted to face toward the user's palm during use of the tool and a second coextensive, transversely spaced side surface **32** remote from the user's palm. In use, the tips of the user's fingers and the top of his thumb are curled about to abut the second side surface **32** to provide additional steadying for the tool. The side surfaces **31** and **32** are provided with rectangular indentations **34** adjacent the upper end of the handle.

In order to permit the blade **16** to pass through the base plate **2**, the previously mentioned slot **14** extending vertically through the base plate **2** is positioned along the second side surface **32** of the handle **4** adjacent the rear edge **12** thereof. The blade **16**, which is replaceable and is of a commercially available type, comprises a thin sheet metal blade having flat, vertically disposed side surfaces. The blade also includes the previously mentioned cutting edge **18**, a top edge **40** spaced above and parallel to the cutting edge **18**, and upper and lower edges **42** and **44** extending upwardly and mutually inwardly from the extreme edges of the cutting edge **18**.

To support the blade **16**, a rectangular cross-section channel **45** is provided in the second side surface **32** of the handle **4** extending downwardly and rearwardly from the forward edge **10** to the rear edge **12**. The channel **45** includes a flat vertically and longitudinally extending rear surface **46** abutting the adjacent flat side surface of the blade **16** and two parallel edges **47** perpendicular to the rear surface **46** and abutting the cutting and top edges **18** and **40** respectively of the blade. The vertical extent to which the lower corner of the cutting edge **18** projects below the base plate **2** may be varied by sliding the blade **16** along the channel **45**. The depth of the channel **45** in a direction perpendicular to the second side surface **32** is such that the side surface **32** and the adjacent outer side surface of the blade **16** are flush.

To securely retain the blade **16** within the channel **45**, the previously mentioned resiliently deformable, metal closure plate **13** is provided. The closure plate **13** is of generally rectangular form having horizontal, longitudinally extending, vertically spaced, upper and lower edges **52** and **54** respectively, and forward and rear, vertical edges **56** and **58** respectively positioned adjacent the forward and rear edges **10** and **12** of the handle. The closure plate **50** is a flat sheet of uniform thickness having a central, transversely offset, depressed portion **58** extending generally diagonally downwardly and rearwardly of the closure plate. The depressed portion **58** is positioned generally centrally along the channel **45** and abuts the adjacent outer side surface of the blade **16**.

The closure plate **50** is fixedly secured to the handle by upper and lower horizontally disposed threaded connectors **60** and **62**, positioned above and below the offset portion **58**, threadedly engaged with tapped sockets **66** provided in the handle. As the threaded connectors **60** and **62** are tightened up, the closure plate **13** is resiliently deformed about the central offset portion **58** abutting the blade **16**, with the result that a stored compressive force exerted by the deformed closure plate **13** acts constantly on the blade **16** to hold it firmly in against the handle in cutting orientation. The method of mounting the blade **18** is also sufficiently firm to prevent lateral torsional deflection of the blade which might otherwise be initiated, for example, by offset embossed portion of the material to be cut. If the blade should become blunt or broken, it may be easily replaced by simply unthreading the connectors **60** and **62**, removing the closure plate **13**, and then removing the unwanted blade. It will be appreciated that jamming of broken portion of the blade is eliminated by the mounting described.

In cutting a straight line across sheet material a metal straight edge may be laid on the material and used as a guide for the cutting tool which is positioned with one longitudinal edge slidably abutting and guided by the

straight edge during cutting. Also to assist the user in guiding the cutting blade **16** along a desired line of cut previously marked on the material, a scribed, longitudinally extending guiding line **70** is provided on the upper surface of the base plate **2**. The guiding line **70** is aligned longitudinally with the cutting edge of the blade **16** and, may be aligned visually with the previously marked line on the material to enable the tool to follow a desired contour.

An alternative embodiment of the invention shown in FIG. 5, otherwise identical to the preferred embodiment previously described, includes a guide bar **80** removably secured to the base plate **2** along the longitudinal edge thereof adjacent the second side surface **32** of the handle. The guide bar **80** is of generally rectangular, cross section and longitudinally coextensive with the base plate **2**. The guide bar **80** further includes a flat vertical guide face **82** perpendicular to the plate **2**. A longitudinally extending horizontal slot **84** having a closed inner extremity **86** receives the longitudinal edge of the base plate **2**. The guide bar **80** is removably, fixedly secured to the plate **2** by threaded connectors **90** extending through tapped portions of the guide bar **80** into abutting, securing contact with the plate **2**. In use the guide bar is adjusted until it is parallel to the blade **18**, after which the flat face **82** of the guide bar **80** is abuttingly slid along a free edge of the sheet material **92** to guide the blade **18** to trim off a constant width of the free edge of the material, as may be required, for example, in trimming selvage. The guide bar in such use eliminates the need for a prior scribed guide line on the material.

In constructing a hand cutting tool according to the present invention, certain significant advantages are provided.

In particular, the use of a cutting tool operated in pull (as contrasted to one operated in push), permits a steadier smoother cut to be achieved thereby providing for a better fit between subsequently mated cut pieces of material.

Also, the provision of the base plate **2** stabilizes the cutting blade against motion out of the vertical plane.

Other advantages are provided by the resiliently deformable closure plate having a joggled, offset center portion which bears against the cutting blade so that the latter is constantly maintained in cutting position and with as little lateral flexing as possible to maintain the desired connection.

Although the invention has been described with reference to a preferred embodiment, it will be apparent to those skilled in the art that additions, deletions, modifications, substitutions and other changes not specifically illustrated and described in the description of the preferred embodiment may be made which will fall within the purview of the appended claims.

I claim:

1. A handtool for cutting sheet material, the tool being of the pull type intended to be grasped manually by a user and pulled toward the user's body in a forward direction during cutting action, said tool comprising:

a base plate having an opening therein,

an upwardly projecting handle fixedly secured to said base plate,

said handle shaped to be grasped by the user's hand in a partially clenched condition thereof with the palm of the hand disposed in a generally upright plane thumb uppermost, said handle including:

a vertically extending, straight forward edge adapted to contact the user's hand along the ball of the thumb thereof and along adjacent portions of the base of the palm of the hand,

an upwardly extending rear edge adapted to be contacted by portions of the fingers of the user's hand between the second and third finger joints with each finger curled generally perpendicularly to the palm at the second finger joint thereof,

said tool having an upwardly extending channel in a side thereof, a cutting blade mounted in the channel and having a cutting edge extending through the opening in the base plate, said cutting edge extending upwardly and forwardly from a point spaced below said lower surface of said base plate adjacent said rear edge of said handle toward said forward edge thereof; and

a resiliently deformable closure plate positioned on a side of said channel remote from said handle, and

connecting means for fixedly securing said closure plate to said handle over said channel to retain said blade within said channel, said closure plate further including:

a central portion continuously abutting portions of said blade facing outwardly of said channel,

offset portions integral with said central portions, parallel thereto and spaced relatively further from said handle than said central portion,

said connection means including threaded elongate connectors positioned on opposite sides of said central portion for connecting said offset portions to said handle.

2. A handtool as defined in claim **1** wherein said blade further includes:

a second edge approximately parallel to and spaced above said cutting edge,

a side surface extending between said second and cutting edges and facing toward said handle,

said handle including:

a channel for receiving said blade,

said channel including wall portions continuously abutting portions of said second edges of said blades and said side surface thereof, said channel extending from a point adjacent the lower end of said rear edge of said handle upwardly towards said forward edge of said handle.

3. A handtool for cutting sheet material, the tool being of the pull type intended to be grasped manually by a user and pulled toward the user's body in a forward direction during cutting action, said tool comprising:

a base plate having an opening therein, an upwardly projecting handle fixedly secured to the base plate,

a cutting blade secured to the handle and having a cutting edge extending through the opening in the base plate,

said handle being shaped to be grasped by the user's hand in a partially clinched condition thereof with the palm of the hand disposed in a generally upright plane thumb uppermost,

said handle including a vertically extending, straight forward edge adapted to contact the user's hand along the ball of the thumb thereof and along adjacent portions of the base of the palm of the hand, and an upwardly extending rear edge adapted to be contacted by portions of the fingers of the user's hand between the second and third finger joints with each finger curled generally perpendicularly to the palm of the second finger joint thereof,

said handle forward edge including a transversely extending, flat generally straight surface extending upwardly from said base plate, said surface inclined rearwardly relative to said base plate to permit the ball of the thumb of the user's hand to overhang the lower portions of the base of the palm of the user's hand,

said rear edge including:

a transversely extending lower portion extending upwardly from said base plate, said lower portion adapted to be grasped by the third and fourth fingers of the user's hand with each of the third and fourth fingers curled at the second finger joints thereof, and

an upper portion extending upwardly from said lower portion, said upper portion adapted to be grasped by the first and second fingers of the user's hand with each of the first and second

fingers curled at the second finger joint thereof, and

a side surface extending between said edges contacting edges adapted to face toward the palm of the user's hand.

4. A handtool as defined in claim 3 further including indicia on an upper surface of said base plate in longitudinal alignment with said cutting blade in position to enable the user to cut along a previously marked contour on the sheet material.

5. A handtool as defined in claim 1 further including:

a guide bar,

means for removably securing said guide bar to said base plate along one edge thereof,

said bar including:

a flat vertical face disposed in a plane parallel to and spaced transversely from a plane in which said cutting edge of said blade is disposed,

said flat face extending downwardly of said base plate and adapted to slidingly abut a free edge of the sheet material.

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