March 8, 1960 R. B. RANSOM 2,927,614

COUNTERSINKING TOOL

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Fig. 1.

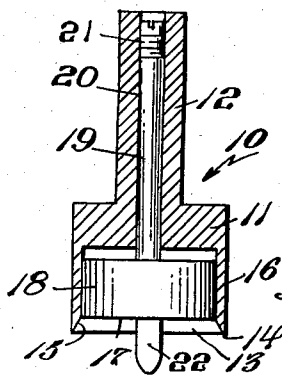


Fig. 2.

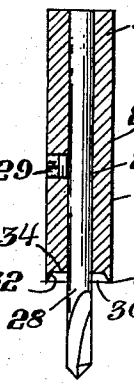


Fig. 3.

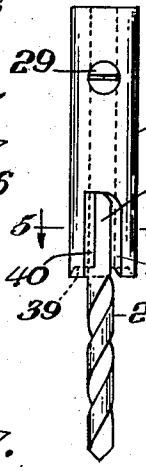


Fig. 4.

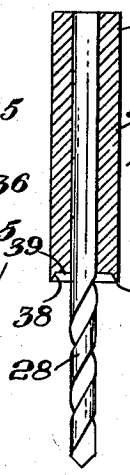


Fig. 5.

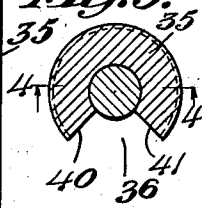


Fig. 6.

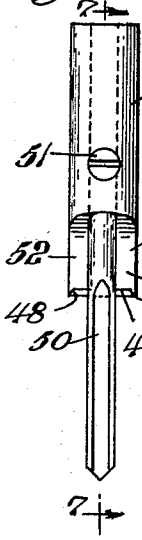


Fig. 7.

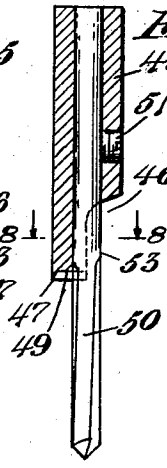


Fig. 8.

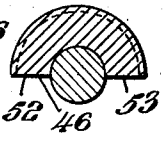


Fig. 9.

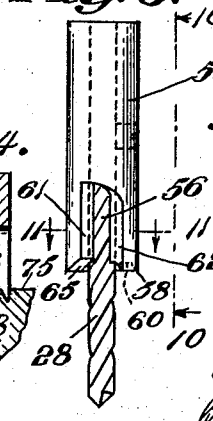


Fig. 10.

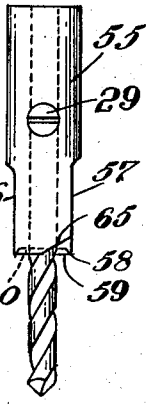


Fig. 14.

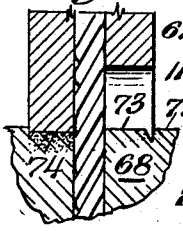


Fig. 12.

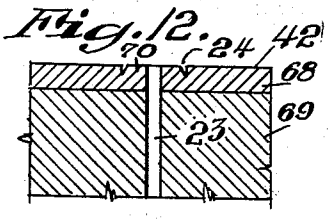


Fig. 13.

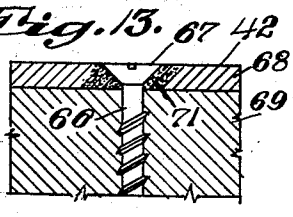
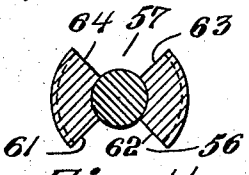


Fig. 11.



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COUNTERSINKING TOOL

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5 Claims. (Cl. 145—123)

This invention relates to a tool for use in sinking the heads of fasteners such as screws and the like into fibrous materials such as wood so that the fastener head will be substantially flush with the surface into which it is positioned or sub-flush with the surface in which it is positioned.

Heretofore a counter sinking tool has been in the general shape of the undersurface of the head to be counter sunk and formed so as to start cutting at the center and gradually increase the size of the hole on an angle or bevel until the desired recess was provided. In accomplishing such a counter sink splintering of the wood is frequently encountered. Fibrous materials, such as wood and particularly plywood splinters very easily and with a gradually increasing diameter or cut, fibers are easily picked up by the edge of the tool and torn from the surface in varying extents which is particularly bothersome in trying to provide a fine finish on a wood surface.

One of the objects of this invention is to provide a tool which may be used to prevent the surface of the fibres of the wood from being torn from a surface larger than the diameter of the head to be sunk therein.

Another object of this invention is to combine a tool having the above desirable features with a drill which will provide a hole for a screw so that as the hole nears completion, the wood will be scored in a manner to prevent splintering beyond the head of the screw as it is forced into the wood.

Another object of this invention is to provide a means for inserting the head of a screw into wood without removing the usual material beneath the head so that the head will compress this material which is somewhat resilient and there will be a firm frictional grip on the underside of the head of the screw preventing it from backing out of the wood and also providing a more secure fastening of the two pieces to be secured by providing a maximum of pressure exerted between the parts fastened together.

A further object of the invention is to provide a surface which will abut against the surface of the work within the area covered by the fastener head to be inserted and limit the insertion of the tool into the work thus avoiding scratching or indenting the surface outside of the circle of the head of the fastener.

Another object of the invention is to provide a limiting surface with a portion cut away which will serve to relieve the chips from the drill with which the tool is combined permitting the chips to pass from beneath the limiting surface and thus make unnecessary an added operation of clearing such chips as the drill and circle sink are inserted into the work.

Another object of the invention is to provide an internal depth stop which may be adjusted as to the sensitiveness required for stopping by reason of the area which is provided for contacting the surface of the work.

A further object of the invention and a secondary object of the forming of a relief in the limiting surface is to permit the tool to act as a counter bore by the use

of a pressure on the tool so that the fibrous material which is of a resilient nature will be compressed beneath the limiting surface leaving a portion at the relieved area to spring upwardly into the relief space of the tool and thus be in a position to be scraped by the edge adjacent the relief for further insertion of the tool into the wood in which case the tool then acts as a counter bore for such length of time as the wood compressing pressure is provided on the tool, thus making it possible to sink the head of a screw or fastening beneath the surface to any desired extent.

Another object of the invention is to provide a depth stop without clearance or relief from a cutting standpoint but which is cut away to provide chip clearance relief and afford a scraping action on the portion of the work which is to be removed or concealed by the head of the fastening.

Another object of the invention is to provide a tool which may be utilized for forming a hole at an angle to the surface which it is to penetrate without slipping or marring the surface into which it is inserted.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a sectional view showing the tool in a simple form and with its stop or limiting surface as adjustable;

Figure 2 is a sectional view illustrating the tool as combined with a bit and with the limiting surface in its simplest form;

Figure 3 is an elevational view illustrating the tool as combined with a bit but with the limiting surface cut away so that the chips from the bit may be removed by the tool action.

Figure 4 is a section on line 4—4 of Figure 5;

Figure 5 is a section on line 5—5 of Figure 3;

Figure 6 is a view similar to Figure 3 showing an elevation of the tool and in a still different modified form and as combined to a bit;

Figure 7 is a section on line 7—7 of Figure 6;

Figure 8 is a section on line 8—8 of Figure 7;

Figure 9 is an elevational view of a still different modified form of tool combined with a bit;

Figure 10 is an elevation on substantially line 10—10 of Figure 9;

Figure 11 is a section on line 11—11 of Figure 9;

Figure 12 illustrates two blocks of wood drilled for the reception of a fastening with the upper block scored as would occur with the use of a bit and tool such as shown in Figures 1–11;

Figure 13 is a view similar to Figure 12 but showing a screw as positioned in the hole of Figure 12 and illustrating the head of a screw as sinking into the outer surface of the work and a compression of the wood beneath the beveled surface of the screwhead; and

Figure 14 is a sectional view illustrating the action of the tool such as shown in Figures 3–11 when sufficient pressure is applied to the same to compress the resilient work into which it is inserted.

The tool here referred to will score the surface of fibrous materials such as wood into which it is desired to sink the head of a fastening. This surface is scored by first contacting the surface in the greatest diameter of the countersink for the fastening head so that should there by any splitting tendency of the surface of the fibrous material, the split will occur inwardly of this outer diameter and in a portion of the surface which is to be removed or hidden by the head of the fastener, thus leaving the exposed part of the surface of the wood clear and free of abrasion. Also, I have provided a stop

to limit the insertion of this scoring edge and located such a stop inwardly of the scoring to keep the area outside of the scoring clear of abrasion. The stop surface is cut away sufficiently so that when this tool is combined with a bit, the chips from the bit may be passed out from beneath the stop without interfering or clogging with the stop surface. The edge of this relief portion is not itself relieved as is usual in tools but I have found that when used upon some resilient material such as wood that pressure sufficient to compress the wood beneath the stop surface will allow the wood in the cut away portion which is not compressed to stand up above the edge of this compressed area and upon rotation of the tool, although this edge is a right angle, it will scrape away the non-compressed work sufficiently so that the tool may be advanced into the work to form a counter bore in the work to the depth desired.

I have also found that by not removing the stock or wood usually removed for a counter sink but by merely scoring a circle, the wood or material which is to be bound by the head of the fastener will be compressed and the head will exert a firmer grip on this portion of the work and a better binding between the two portions of the work to be clamped than has otherwise or formerly been the case and thus many advantages are obtained by the use of the construction which will hereinafter be described in greater detail.

With reference to the drawings **10** designates generally a countersinking tool consisting of a cylindrical head **11** and a shank **12** for the insertion into some operating instrument such as a bit brace or the like for rotating the same. The head **11** is recessed as at **13** and provided with a sharp chisel edge **14** by an inward bevel **15** leaving the outer surface **15** cylindrical and parallel to its axis. Some sort of a stop surface **17** is formed at right angles to the axis and in this particular case this stop surface is at the end of a pistonlike head **18** having a shank **19** which is positioned in the bore **20** of the shank **12**, while a plug **21** threaded into this bore **20** serves to position the abutment surface **17** at a location with reference to the edge **14** to govern the depth of scoring which it is desired shall be made in the work. A projection **22** is provided to enter a previously formed bore so as to guide the operation of the tool **10**. The effect of the tool in operation may be illustrated by the showing in Figure 15 where there has been a bore **23** previously formed and the edge **14** is used to provide a scoring **24** as shown in this view.

In Figure 2 a tool **25** having a cylindrical outer surface **26** and a bore **27** receives in this bore a bit **28** where it is held by a set screw **29**. The tool **25** is recessed as at **30** and provided with a sharp edge **31** formed by the bevel **32** which is similar in many respects to the recess **13**, edge **14** and bevel **15** of the showing in Figure 1. Tool **25** is of such a size that it may fit into a chuck or may have its upper end **33** shaped in any desired manner to fit a chuck for turning the same. This tool shown in Figure 2 may be utilized to in one operation form the hole **23** in Figure 12 also the scoring **24** shown. However, it is found that chips from bit **28** may get into the recess **30** and that it is necessary to blow these chips away just prior to the edge **31** contacting the surface of the work such as shown in Figure 12.

In order to avoid the necessity of blowing the chips away from a construction such as shown in Figure 2, I have cut away a portion of the tool in the development shown in Figure 3 where the tool is designated **35** and the cut away portion is about a quarter of the cylinder and is designated **36** (see also Figure 5). In this showing the tool **35** is cylindrical having a sharp lower edge **37**, an internal bevel **38** and a stop surface **39** similar to the stop surface **34** in the showing in Figure 2. The bit **28** and its set screw **29** are the same as shown in Figure 2 while the edges **40** and **41** are in planes passing through the axis of the tool and bit and are at right angles to the surface of the stop **39**. This tool shown in Figures 3–5 may be utilized in a manner similar to the use of the tool shown in Figure 2 for providing the bore **23**, as shown in Figure 15, and the scoring **24** as there shown. As a pressure necessary to advance the bit into the wood in forming the hole **23** is exerted by hand, a noticeable interruption in the progress of the bit will be felt when the surface **39** engages the outer surface **42** of the work while the chips which emanate from the bit **28** will pass out of the recess **36** and it will be unnecessary to provide any clearing action as the tool approaches the surface **42** for effecting the scoring **24**. In this tool as in the showing in Figure 2 the upper end **43** may be of any suitable form to be positioned in a chuck for rotating the same.

In Figure 6 the tool **45** has provided a cut away portion **46** which is substantially one-half of the cylinder **45** as compared with substantially a quarter of the cylinder **35** shown in Figures 3, 4 and 5. In this case the semicylinder at the lower edge is provided with a sharp edge **47** beveled inwardly as at **48** and provided with a stop surface **49**. The drill as shown at **50** is held in a bore of the tool by a set screw **51** similar to the arrangement described in connection with Figures 2 and 3. The edges of the cut away portions **52** and **53** are on planes intersecting the axis of the bit and tool and are at right angles to the stop surface **49**. This tool may be used to make the hole **23** and scoring **24** as shown in Figure 12 where the bit **50** will bore the hole **23** and the edge **47** will form the scoring **24** and as hand pressure is exerted on the bit a perceptible change will be noted when the surface **49** engages the surface **42** just after the scoring is completed. However, because of the lesser surface **49** than surface **39** of Figure 3, a somewhat more sensitive feel will be required to detect this engagement. I might vary the amount of surface provided for this stop still further depending upon the sensitivity of the operator in utilizing the tool, it being appreciated that the greater the surface area of this stop, the more abrupt change will be provided in the use of the tool.

In Figures 9, 10 and 11 I have shown a tool **55** which is generally cylindrical on its outer surface but is cut away at two locations **56** and **57**, each in substantially the amount of the cut away portion **36** of Figure 3. The remaining cylindrical portion, however, is provided with a sharp edge **58** beveled as at **59** and provided with a stop surface **60** at right angles to the axis of the bit and tool. The bit in this case is the same as in Figure 3 and is designated **28** with a binding or set screw **29** to hold it within the cylindrical bore in the tool **55**. Both surfaces **61** and **62** about the recess **56** and surfaces **63** and **64** about the recess **57** are in planes intersecting the axis of the bit and tool and their leading edges **62** and **64** are at right angles to the stop surface **60**. However, in this case a further modification is provided in that relief is provided at **65** from the stop surface on the trailing portion thereof which serves to further reduce the stop surface **60** which is provided. This tool may likewise be utilized to provide the hole and scoring as shown in Figure 12 as will be apparent from the previous description.

A screw **66** having a beveled head **67** may be utilized to hold the two pieces of wood **68** and **69** as shown in Figures 12 and 13 together and it is unnecessary to remove the portion **70** of the wood (Figure 12) within the circular scoring **24** in order to do this. The screw **66** may be threaded into the hole **23** and as it obtains a grip in the part **69**, its head will be drawn into the material **70** and sunken into the part **68** which by reason of the scoring **24** will prevent splitting of the surface **42** and as this head is drawn into the wood the material **70** will be displaced inwardly and compressed as at **71** beneath the beveled head of the screw serving to increase the friction on the under beveled surface of the screw and to form a very tight binding action. Further pressure exerted by the head of the screw in turn will be trans-

mitted to the contacting surfaces of the parts 68 and 69 and serve to firmly bind them together, in fact, much firmer than had the wood 70 been removed in the usual manner to provide a counter sink for the head 67.

It is found that the combination drill and countersinking tool such as shown in Figures 3, 6 and 9 may have a still further use in the forming of a counter bore when it is desired to position the head of a fastening a substantial distance below the surface rather than in the form shown in Figure 13 and this may be done by exerting a substantial pressure upon the tool sufficient so that the resilient work is compressed beneath the stop surface such as 39, 49 or 60 and by the compressing of this wood beneath this stop surface the wood at the location of the cut away portions 36, 46 or 56 and 57 will spring upwardly as shown at 73 in Figure 14 where I have illustrated a compressed portion of the wood at 74 and the portion 73 extending up above the same while the surface of the wood is designated 75. In this case, the leading edge of the recessed portion such as 41, 53, 62 or 64 will act as a scraper and will remove this non-compressed portion of the wood ahead of it as it is rotated acting just like a cutter even though there is no relief of this surface immediately at its edge, and the tool may be forced into the wood as long as this pressure is applied by these edges serving to scrape away the wood as the tool is rotated. A counter bore may be thus formed to a desired depth to serve for the receiving of the head of a fastening a desired distance below the surface of the work.

From the above it will be apparent that I have provided a stop for the insertion of a drill into a piece of work and at the same time a scoring operation without the necessity of engaging the surface of the work outside of the circle for the head of the fastener to be inserted into the surface of the work, thus preventing marking of the work outwardly of this circle and at the same time I have found that I am able to sink the head of a fastener into a surface thus scored but without counter sinking the surface before the head of the fastener is impressed into the surface which I have not heretofore been able to do without splintering.

I claim:

1. A tool for use in sinking the head of a fastener into the surface of fibrous material comprising a body of a portion of a cylinder with an axially extending projection at its end, the end of the body providing an abutment surface generated by the revolving of at least a portion of a radius line disposed at an angle to the axis of said body, the abutment surface being bounded by a surface generally in a plane passing through the axis of the body and by a cutting edge along the periphery thereof.

2. A tool as in claim 1 wherein said radius line is at right angles to the axis of said body.

3. A tool as in claim 1 wherein said cutting edge is formed by an inclined surface extending from said abutting surface to said cutting edge.

4. A tool as in claim 1 wherein the body is provided with a plurality of portions of a cylinder thereby providing a plurality of similar abutment surfaces.

5. A tool as in claim 1 wherein the body at its lower edge is an interrupted annulus and additional cutting edges are provided along the inner edges of the portions of the annulus.

References Cited in the file of this patent

UNITED STATES PATENTS

2,529,143	Eriksson	Nov. 7, 1950
2,721,592	Baker	Oct. 25, 1955

FOREIGN PATENTS

142	Australia	May 27, 1926
212,876	Great Britain	July 31, 1924
290,382	Switzerland	Aug. 1, 1953