May 27, 1952 P. RINTOUL 2,598,649

SLITTING AND SCORING TOOL

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Fig. 1.

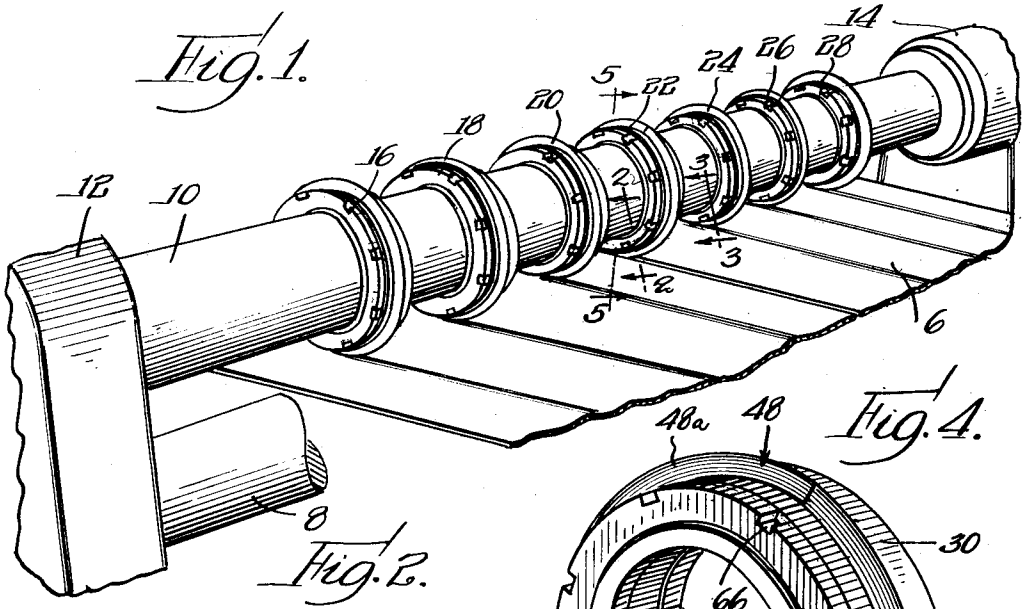


Fig. 2.

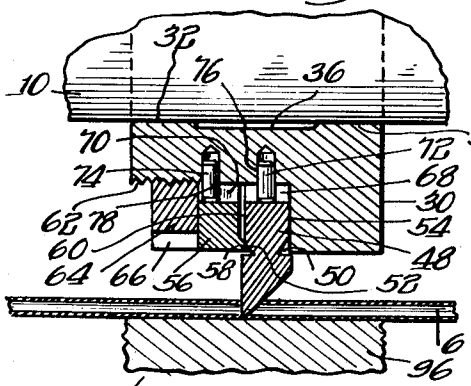


Fig. 3.

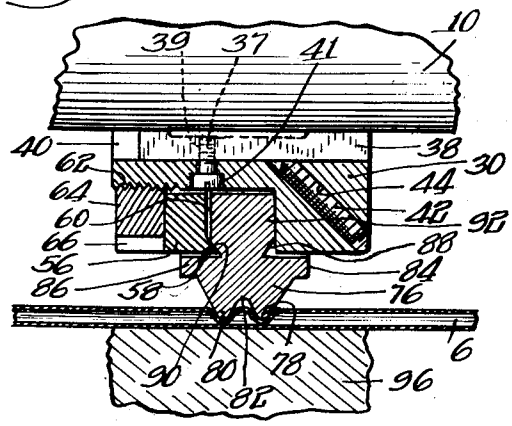


Fig. 4.

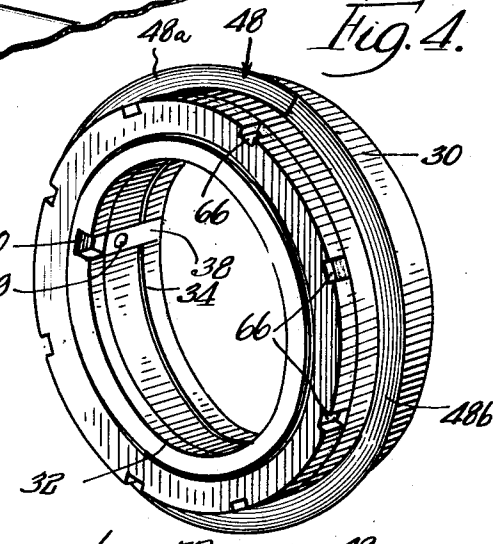
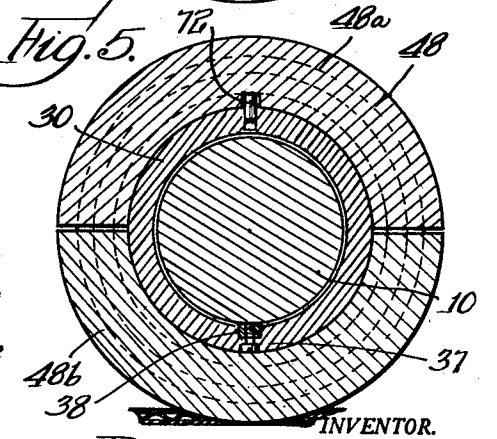


Fig. 5.



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SLITTING AND SCORING TOOL

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3 Claims. (Cl. 164—70)

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This invention is concerned with the manufacture of cardboard boxes or cartons and is more specifically concerned with the structure for slitting and scoring a cardboard blank so that it may be folded into a carton, box, tubing, or the like.

Boxes or cartons are generally made from sheet cardboard by cutting a cardboard blank to the outside dimensions of the various walls and flaps, slitting the blank between the various flaps and scoring the blank so that it may be folded readily between the various walls and between the walls and flaps. To expedite the production of cardboard boxes or cartons, large strips or webs of cardboard are acted upon continuously by slitters and scorers to cut the cardboard blank to the proper lateral dimensions so that it is then necessary only to cut the resulting pieces to the proper length and score them transversely prior to folding them into boxes or cartons. The transverse scoring is of course unnecessary in the manufacture of tubing.

Longitudinal cutting and scoring of the cardboard blank may be readily accomplished by passing a continuously moving strip or web of cardboard between a pair of rotating shafts, one of which carries a number of slitting and scoring heads.

In order to keep the heads sufficiently sharp and to manufacture boxes of different configurations, it is frequently necessary to remove or interchange the slitting and scoring heads. To the best of my knowledge it has heretofore only been possible to effect such an interchange by removing the shaft or arbor on which the heads are mounted and sliding the heads off axially.

Among the important objects of this invention is the provision of slitter knives and scoring profiles which are removable and replaceable without requiring the removal of the heads from the arbor.

More specifically, it is an object of this invention to provide slitter knives and scoring profiles which are segmented so that they can be removed without sliding them axially off of the arbor.

Another important object of this invention is the provision of a readily releasable means for securing the slitter knives and scoring profiles in position on the various heads on the arbor.

A further and more specific object of this invention is to present a holding wedge for securing the slitter knives and scoring profiles in position on the heads.

Other and further objects and advantages will

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be apparent from the following description when taken in conjunction with the accompanying drawing in which:

Fig. 1 is a perspective view showing a cardboard blank being operated on by slitter knives and scoring profiles mounted on a rotating arbor;

Fig. 2 is an enlarged sectional view taken along the line 2—2 of Fig. 1 showing a head and an attached slitter knife;

Fig. 3 is a view similar to Fig. 2 taken along the line 3—3 of Fig. 1 showing a scoring profile in position on a head;

Fig. 4 is an enlarged perspective view of one of the heads carrying a slitter knife; and

Fig. 5 is an enlarged sectional view taken along the line 5—5 in Fig. 1.

Referring now in greater particularity to the drawings, the cardboard blank or web 6 is shown as moving to the right in Fig. 1 above a shaft 8 and below an arbor 10, both of which are carried by a pair of upright supports 12 and 14. A number of slitter and scoring assemblies 16, 18, 20, 22, 24, 26, 28 of which there may be any desirable number, are carried at spaced intervals by the arbor 10 and act on the web 6.

A slitter assembly is shown in detail in Figs. 2 and 4. A head 30 of arcuate configuration has on its inner circumference a pair of finished bearing surfaces 32 and 34 with a relieved portion 36 between them. This relieved portion does not contact any surface and consequently need not be so highly finished as the bearing surfaces 32 and 34. A key 38 fits in a slot 40 in the inner circumference of the head 30 to secure it to the arbor 10 and is held in the slot by a screw 37 threaded into a bore 39 in the key and fitting loosely in a countersunk bore 41 in the head 30. A screw 42, as best seen in Fig. 3, is threaded into a diagonal aperture 44 in the head with its chamfered head bearing on the key 38 so that the latter may be forced against the arbor 10 by rotating the screw 42 in order to secure the head 30 against rotation relative to the arbor 10. The arbor may be provided with a flat or keyway if desired, but such is not shown as the arbor may be of any well-known configuration.

A slitter 46 is in the form of a bisected ring so that there are two slitter halves 46*a* and 46*b* as best seen in Figs. 4 and 5. The cross section of the slitter as shown in Fig. 2 is substantially trapezoidal with arcuate wedge shaped recesses 50 and 52 formed opposite each other in the side wall. The slitter abuts at one side against a shoulder 54 between portions of the head 30 of different outside diameters. An ar-

cuate holding wedge 56 having a flange 58 with its inner wall inclined to cooperate with one of the recesses 50 or 52 is located adjacent the other side of the slitter 48 to secure it in position. Clearance 60 is left between the retaining ring 56 and slitter 48 so that the inclined wall on the flange will force the slitter into seated position. The end of the head 30 adjacent the retaining ring 56 has its external diameter threaded as at 62 and a retaining ring 64 is threaded thereon. The retaining ring 64 is provided with a number of peripheral slots 66 in order that it may be screwed into place. In order to prevent rotation of the slitter 48 and holding wedge 56 relative to the head 30 each of these structures is provided with a transverse slot as 68 and 70 respectively on its inner circumference. Cooperating pins 72 and 74 are driven into apertures 76 and 68 in the head to engage the slots 68 and 70.

A scoring profile assembly is shown in Fig. 3. The scoring profile 76 itself in this particular embodiment has two arcuate portions 78 and 80 with a valley 82 of lesser diameter between them. This particular configuration is used as it is simpler to fold corrugated cardboard or heavy pasteboard when it is scored in two closely adjacent parallel lines than when it is scored in only one line and furthermore this leaves a stronger corner as the strain due to bending is not so localized. Shoulder portions 84 and 86 may be provided on the scorer profile to bear upon the outer peripheries of the head 30 and holding wedge 56 and arcuate recesses 88 and 90 similar to the recesses 50 and 52 of the slitter 48 are provided between the shoulder portions 84 and 86 and the stem portion 92. A transverse slot similar to the slot 68 in the slitter 48 is provided on the inner circumference of the scoring profile 76 for cooperation with the pin 72 to prevent rotation between the head and profile but is not shown in the drawings. The remainder of the assembly is identical with the slitter assembly and it is apparent that the only difference between the slitter and scorer assemblies is in the presence of the slitter 48 or scoring profile 76. Some support carried by the shaft 8 is needed for the cardboard blank or web 6 but as this may be of any desirable form, it has been indicated somewhat schematically as a portion of a cooperating roll 96 in Figs. 2 and 3.

Any desirable number of assemblies or heads 16—28 may be placed on the arbor 10 and left there indefinitely. The heads may be secured at any desirable location on the arbor and may be moved at will by rotating the screw 42 to retract the key 38 and then sliding the head to the desired position. If it is desired to replace a dulled slitter 48 or to interchange slitters or scoring profiles, it is necessary only to back off the retaining ring 64 by unscrewing it, slide the holding wedge 56 axially along the head 30 and remove the two halves of the slitter or scoring profile by a simple radial movement. A converse radial movement places a new slitter or scoring profile in place, and it is then secured by advancing the retaining ring to force the holding wedge against it with the diagonal wall of the flange 58 fitting within one of the recesses 50, 52, 88 or 90 to force the slitter or scoring profile into said position and secure it there. Due to the pair of arcuate recesses on each ring, it is possible to mount the slitter or scoring profile in either of two possible positions as the operator may desire. It is further apparent that the head may be left in position on the arbor without a slitter or scoring profile if there are more heads on the arbor than are needed for a particular operation.

It is apparent that I have herein presented a slitter and scoring profile construction for operating on a continuously moving web of cardboard or the like to slit and score the cardboard so that it may be formed into cartons, boxes, tubes or the like. It is further apparent that I have presented such a construction that slitters and scoring profiles may be readily and quickly removed and replaced without removing the arbor, thus saving considerably in time and effort over a like operation in the old type of construction in which it was necessary to remove the arbor and slide the heads or slitting and scoring assemblies off axially for replacement.

Although I have shown and described a specific embodiment of my invention, it is to be understood that this is for illustrative purposes only that I intend to be limited only by the spirit and scope of the appended claims.

The invention is hereby claimed as follows:

1. A rotary tool for slitting or scoring sheet material comprising an annular head adapted to be mounted upon an arbor, a tool section carried by said head providing a peripheral working edge, said section comprising a plurality of segmental parts, said tool section having like recesses in opposite faces thereof, said recesses each having a cam surface, a collar for detachably clamping said tool section on said head, a cam surface on said collar cooperable with the cam surface in one of said recesses to seat said tool segmental parts and secure them in operative position, a plurality of pins extending radially from said head, said tool section and said collar having aligned radial slots cooperable with said pins to preclude rotation of said tool section and said collar relative to said head, said slots extending only part way into said tool section and said collar from the inner edges thereof, and a retaining ring threadedly mounted on said head to force said collar into clamping position, said retaining ring having a plurality of peripheral notches to facilitate rotation thereof.

2. A rotary tool for slitting or scoring sheet material comprising an annular head adapted to be mounted upon an arbor, a tool section carried by said head providing a peripheral working edge, said section comprising a plurality of segmental parts, said tool section having a recess in one face, said recess having a cam surface, a collar for detachably clamping said tool section on said head, a cam surface on said collar cooperable with the cam surface in said recess to seat said tool segmental parts and to clamp them in operative position, a plurality of pins extending radially outward from said head, one of said tool segmental parts having a radial slot, said collar having a radial slot, said slots extending radially only partially into said part and said collar from the inner edge thereof and extending axially completely therethrough and fitting over said pins to preclude rotation of said tool segmental parts and said collar relative to said head, and allowing movement of said parts transverse relative thereto during seating, and a retainer on said head for retaining said collar in clamping position against said tool section.

3. A rotary tool for slitting and scoring sheet material as set forth in claim 1, wherein the outer periphery of said tool section is asymmetrical in cross section with the peripheral working edge

extending radially outwardly beyond the periphery of said annular head, said collar, and said retaining ring.

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