

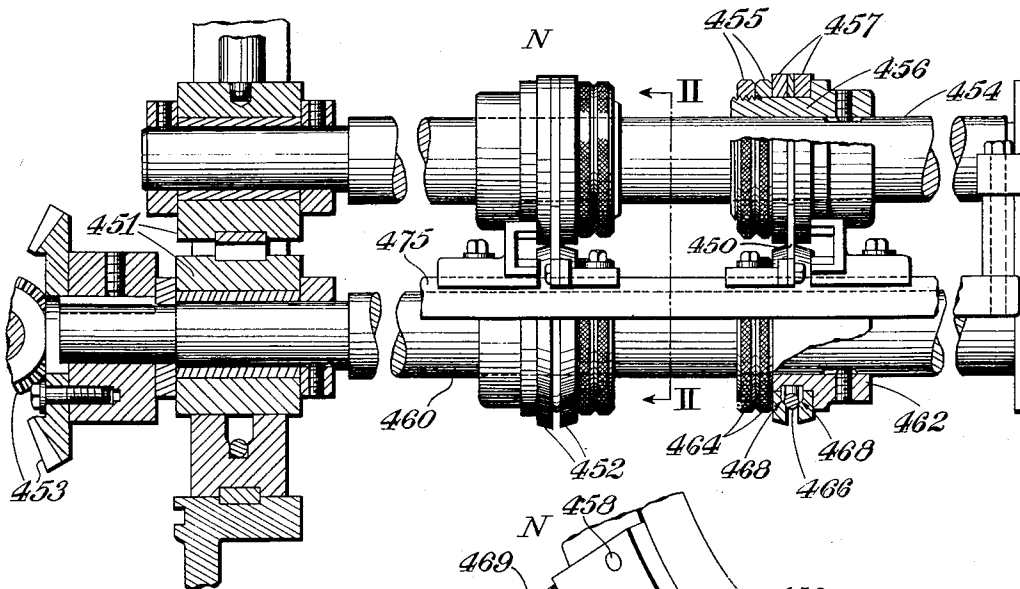
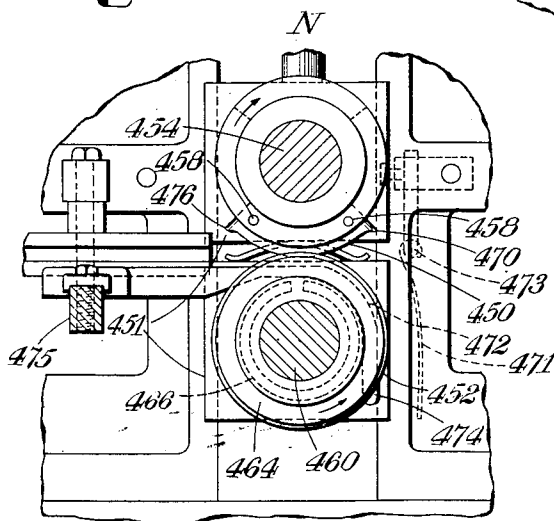
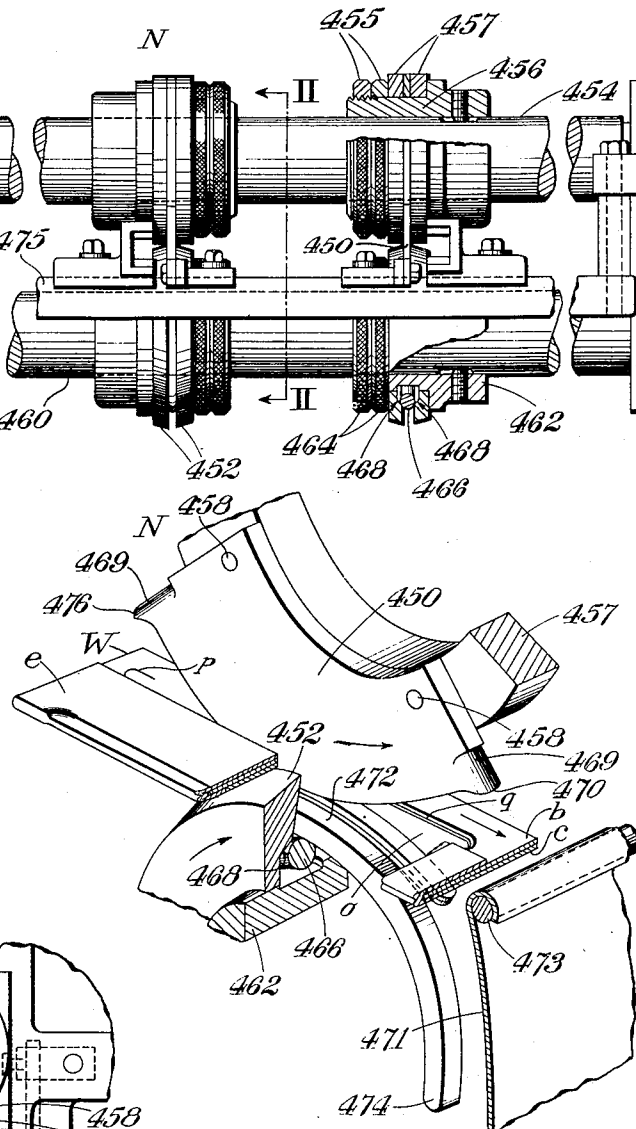
June 19, 1934.

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1,963,369

CUTTING MECHANISM

Original Filed Sept. 8, 1930



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UNITED STATES PATENT OFFICE

1,963,369

CUTTING MECHANISM

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Original application September 8, 1930, Serial
No. 480,518. Divided and this application
March 29, 1932, Serial No. 601,831

30 Claims. (Cl. 164—28)

This invention relates to mechanism for cutting sheet-material. It is of especial utility when forming a part of such blank-making apparatus as that disclosed in the application for Letters Patent filed in my name in the United States Patent Office on September 8, 1930 and bearing the Serial No. 480,518. The present case is a division of such earlier-filed application.

In the manufacture of box-blanks by the apparatus disclosed in application Serial No. 480,518 and in similar connections, there are to be produced adjacent parallel cuts through a sheet or web or material, which cuts may be for the purpose of completing slots therein. An object of my invention is to form incisions of this character at a definite distance from each other cleanly throughout their length, without tearing the material, and in connection with the disposal of scrap created between the cuts, insuring its separation from the surrounding material and its discharge in a predetermined direction.

A feature of the invention whereby this object may be attained involves the manner in which the cutting members co-operate. I have shown herein an inner cutting member and an outer cutting member at each side of the inner, there being a mounting for the outer members which permits them to yield laterally. Preferably, the inner member is furnished by a revoluble segmental shearing plate with a reduced end, and the outer members, consisting of rotatable knives, are arranged to tilt or yield toward and from each other and to be forced apart by the inner member. When the cutting instrumentalities are thus arranged, the space between the incisions is fixed by the thickness of the inner member which definitely positions the outer members, while the yieldability of the outer members and their separation by the inner causes the co-operating members to cut the material evenly and effectively throughout. As illustrated, the means which permits the knives to yield consists of a spring or expansion member situated between said knives and acting on inclined surfaces upon them. This creates forces which are exerted in a substantially uniform manner both radially and laterally of the knives.

Another feature of the invention concerns the removing from the work of the scrap-material. For this purpose, I provide the previously mentioned co-operating cutting members, as the revoluble cutting plate which is between the co-operating rotatable knives, with means, which may consist of a projection, arranged to contact with the scrap produced at one only of the limits

of cutting action. This forces the cut pieces positively from the slot which is being formed out of the plane of the material; and, to make certain that the traveling scrap will continue to be separated from the material, there is included deflecting means, with which contacts the scrap directed outwardly by the projection. Since the separated pieces might remain between the knives and be carried up against the advancing material, I may associate with said knives, whether or not deflecting means is included in the combination, a guide member situated between said knives and emerging therefrom. This, by its contact with the scrap, ejects it from between the knives and directs it out of the mechanism. If desired, each end of the segment may carry a detaching projection, so not only the leading end of the scrap but also the rear extremity may be forced clear of the material.

In the accompanying drawing,

Fig. 1 shows my improved cutting mechanism in front elevation, parts being broken away and in section;

Fig. 2 is a vertical transverse section on the line II—II of Fig. 1; and

Fig. 3 is a perspective view of the elements of Fig. 1 directly co-operating with the work.

For the purpose of disclosing an embodiment of my improved cutting mechanism N, it will be assumed that the work to be done consists in producing a portion of each of a series of slots in a web of material from which boxes are to be made, and in which there have been cut by a previously acting mechanism portions of said slots. In Fig. 3 of the drawing appears a fragment of a web W, consisting of a layer of shell-material b, which may be of pasteboard, having adjacently secured to it a layer of cover-material or paper c turned over the edge of the shell-material at e. Extending longitudinally of this composite web, a series of slots is to be made, one of these in the process of formation being shown at o. The ends of the slots have been cut at p in U-shape before reaching the mechanism N. The web is now to be severed along straight lines q joining the opposite pairs of aligned arms of the U-cuts p, and the resulting scrap disposed of.

To produce the side-cuts q, a cutting member, in the form of a segmental shearing plate 450, forces each section of material to be removed between co-operating circular knives 452, 452. These cutting devices are shown in Fig. 1 as in duplicate. Since they may be identical in character, but one will be described. The cutting edge of each knife 452 is preferably at the junc-

ture of an inwardly inclined inner side surface and an inclined peripheral surface. Each plate 450 is carried by an upper shaft 454 rotatable in bearings 451. Said plate may be secured between rings 457 upon which it is held against peripheral displacement by pins 458. The rings and plate are shown as clamped by nuts 455 against a flange upon a sleeve 456 secured to the roll.

The knives 452 surround a lower shaft 460, being mounted between a flange upon a sleeve 462 fixed to the shaft and retaining nuts 464. This shaft 460 turns in bearings 451 similarly to the shaft 454 and is rotated by gearing 453, while the shaft 454 is turned oppositely thereto by gearing, not shown. The knives are capable of tilting laterally slightly about their mounting, their central openings being sufficiently large to permit this, and are forced from each other against their retaining surfaces by a divided expansible or spring-ring 466, which presses radially outward against inwardly diverging surfaces 468, 468 upon adjacent sides of the knives. The entering end of each segment 450 is somewhat reduced laterally at 469, so it forces its way between the knives without injury to their cutting edges, said knives tilting to allow this, and then moving closely in contact with the opposed surfaces of the segment throughout their co-operation. Effective severing contact is thus assured along the entire cutting length of the segment. This causes a clean cutting action, even during operation upon brittle, non-tenacious stock.

As the forward extremity of the segment 450 approaches the web-material within the pre-formed leading cut *p*, a generally radial projection 470 from the forward end of the segment strikes this portion of the material which is to be ejected as scrap out of the plane of the webs, and forces it down for contact with a curved deflecting apron 471 depending from a rod 473 extending transversely between the bearing-housings just below the path of the web. The bent-down scrap, when retained between the knives by frictional contact therewith, engages a guide-strip 472 mounted upon a bar 475 carried by the housings and extending between the knives where they co-operate with the segment and then forwardly and downwardly, finally emerging from their peripheries at 474. The retained cut-out piece is carried by rotation of the knives along the guide and is finally ejected at the point 474 of emergence, where it may be deposited in the receptacle. The detachment of the other extremity of the scrap is assured by a projection 476 at the rear of the segment, this forcing the cut piece fully from the web. At all times the scrap is prevented by the deflector 471 from following the advancing web.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a cutting mechanism, a rotatable inner cutting member, a rotatable outer cutting member co-operating with the inner member at each side, and a mounting for each of the outer members constructed and arranged to permit it to yield toward and from the associated outer member.

2. In a cutting mechanism, a rotatable inner cutting member, a rotatable outer cutting member co-operating with the inner member at each side, a mounting for the outer members constructed and arranged to permit them to yield toward and from each other, and an expansible

member situated between the outer cutting members and acting to force them apart.

3. In a cutting mechanism, a rotatable inner cutting member, a rotatable outer cutting member co-operating with the inner member at each side and having an inclined surface, a mounting for the outer members constructed and arranged to permit them to yield toward and from each other, and a spring contacting with the inclined surfaces of both outer members.

4. In a cutting mechanism, a revoluble shearing plate, rotatable knives co-operating with said plate at its opposite sides, and a mounting for said knives constructed and arranged to permit each of them to yield laterally in contact with the cutting edge of the shearing plate.

5. In a cutting mechanism, a pair of rotatable cutting members arranged to yield laterally, and a revoluble cutting segment arranged to enter between and force each of the cutting members away from the associated cutting member.

6. In a cutting mechanism, a pair of rotatable knives arranged to yield laterally, and a revoluble shearing segment having a reduced forward end arranged to enter between the knives.

7. In a cutting mechanism, a pair of rotatable shafts, a cutting plate carried by one shaft, a pair of knives mounted upon the other shaft, said knives co-operating with the plate at opposite sides and being arranged to tilt upon the shaft, and means arranged to hold the knives yieldably in their normal positions.

8. In a cutting mechanism, a pair of rotatable shafts, a shearing plate carried by one shaft, a pair of knives mounted upon the other shaft, said knives co-operating with the plate at opposite sides and being arranged to tilt upon the shaft, means for limiting the separation of the knives, and a spring acting to separate the knives.

9. In a cutting mechanism, a pair of rotatable shafts, a shearing plate carried by one shaft, a pair of knives mounted upon the other shaft, said knives co-operating with the plate at opposite sides and being arranged to tilt upon the shaft, retaining means fixed to the shaft at opposite sides of the knives, and a spring situated between the knives and forcing them toward their retaining means.

10. In a cutting mechanism, a pair of rotatable shafts, a shearing plate carried by one shaft, a pair of knives mounted upon the other shaft, said knives co-operating with the plate at opposite sides and being arranged to tilt upon the shaft and having inclined surfaces at their inner sides, retaining means fixed to the shafts at the outer sides of the knives, and an expansible member pressing against the inclined surfaces of the knives.

11. In a cutting mechanism, a pair of rotatable shafts, a shearing plate carried by one shaft, a pair of knives mounted upon the other shaft, said knives co-operating with the plate at opposite sides and being arranged to tilt upon the shaft and having at their inner sides inwardly diverging surfaces, a flanged sleeve secured to the shaft and upon which the knives are tiltably mounted, nuts retaining the knives upon the sleeve, and a divided spring-ring surrounding the sleeve and pressing against the diverging surfaces of the knives.

12. In a cutting mechanism, a pair of rotatable shafts, a shearing segment carried by one shaft and having its forward end reduced laterally, a pair of knives mounted upon the other shaft, said knives co-operating with the segment at

opposite sides and being arranged to tilt upon the shaft, and a spring arranged to hold the knives in their normal positions.

13. In a cutting mechanism, a pair of rotatable shafts, a shearing segment carried by one shaft and having its forward end reduced laterally, a pair of knives mounted upon the other shaft and having adjacent surfaces diverging inwardly, said knives co-operating with the segment at opposite sides and being arranged to tilt upon the shaft, and a spring contacting with the diverging surfaces of the knives.

14. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being provided with means arranged to act only at one of the limits of the cutting action for separating scrap from the plane of the material.

15. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members acting being provided with means arranged to act successively upon opposite extremities of each piece of scrap for separating it from the plane of the material.

16. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being provided with means for separating scrap from the plane of the material, and means for further deflecting the separated scrap from the material.

17. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being provided with means for separating scrap from the plane of the material, means for further deflecting the separated scrap from the material, and means for separating the scrap from the cutting members.

18. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being provided with a projection arranged to contact with one extremity of the scrap.

19. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being in the form of a segment provided with outward projections at its opposite extremities.

20. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being provided with a projection extending beyond the cutting edge and arranged to contact with one extremity of the scrap and separate it from the material, and a deflector arranged for engagement with the extremity of the scrap separated by the projection.

21. In a cutting mechanism, co-operating rotatable cutting members producing scrap from the material operated upon, one of said members being provided with a projection arranged to contact with one extremity of the scrap, a deflector arranged for engagement with the extremity of the scrap separated by the projection, and a guide member toward which the scrap is forced by the projection and deflector.

22. In a cutting mechanism, a revoluble cutting plate, and a pair of rotatable knives co-operating with opposite sides of the plate, there being a projection from the plate arranged to contact with the scrap produced.

23. In combination, cutting mechanism comprising a revoluble shearing plate and a pair of rotatable knives co-operating with opposite sides of the plate, there being a projection from the plate arranged to contact with the scrap cut, and deflecting means with which the scrap detached by the projection contacts.

24. In combination, cutting mechanism comprising a revoluble shearing plate and a pair of rotatable knives co-operating with opposite sides of the plate, there being means for dislodging the scrap from the material, and a guide member for the scrap situated between the knives and emerging therefrom.

25. In combination, cutting mechanism comprising a revoluble shearing plate and a pair of rotatable knives co-operating with opposite sides of the plate, there being a projection from the plate arranged to contact with the scrap cut from the slot, deflecting means with which the scrap detached by the projection contacts, and a guide member for the scrap situated between the knives.

26. In combination, cutting mechanism comprising a revoluble shearing plate and a pair of rotatable knives co-operating with opposite sides of the plate, there being a projection from the plate arranged to contact with the scrap cut from the slot, deflecting means with which the scrap detached by the projection contacts, and a guide member for the scrap situated between the knives opposite their point of co-operation with the plate and extending therefrom outwardly between the knives.

27. In a cutting mechanism, a revoluble shearing plate and a pair of rotatable knives co-operating with opposite sides of the plate, there being a projection from the plate arranged to contact with the forward extremity of the scrap cut from the material and a projection from the plate arranged to contact with the rearward extremity of said scrap.

28. In a cutting mechanism, a revoluble shearing segment, there being a scrap-detaching projection at each end of the segment, and a pair of rotatable knives co-operating with opposite sides of the segment.

29. In combination, cutting mechanism comprising a revoluble shearing segment, there being a scrap-detaching projection at each end of the segment, and a pair of rotatable knives co-operating with opposite sides of the segment, and a scrap-deflecting member situated in advance of the segment and knives.

30. In combination, cutting mechanism comprising a revoluble shearing segment, there being a scrap-detaching projection at each end of the segment, and a pair of rotatable knives co-operating with opposite sides of the segment, a scrap-deflecting member situated in advance of the segment and knives, and a scrap-guide situated between the knives.

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