Aug. 14, 1951 A. J. DE ANGELIS ET AL 2,564,251

PINKING SHEARS

Filed June 9, 1949 2 Sheets-Sheet 1

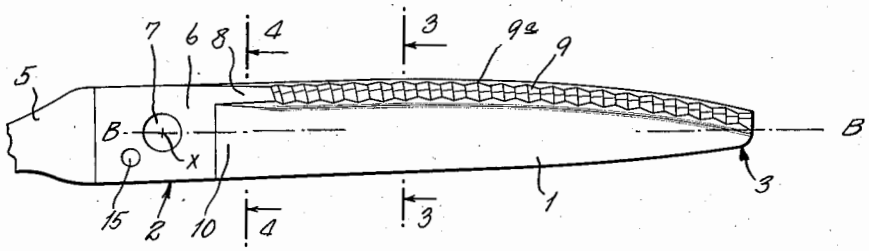

Fig. 1.

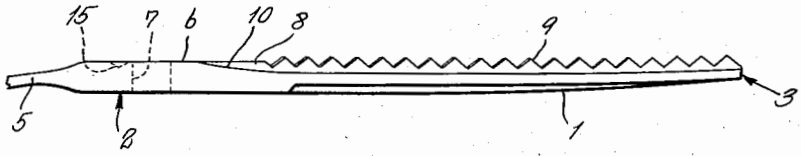

Fig. 2.

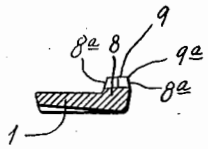

Fig. 3.

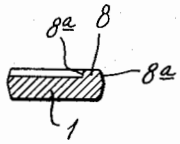

Fig. 4.

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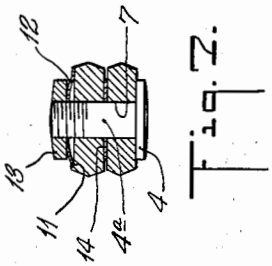

Fig. 7.

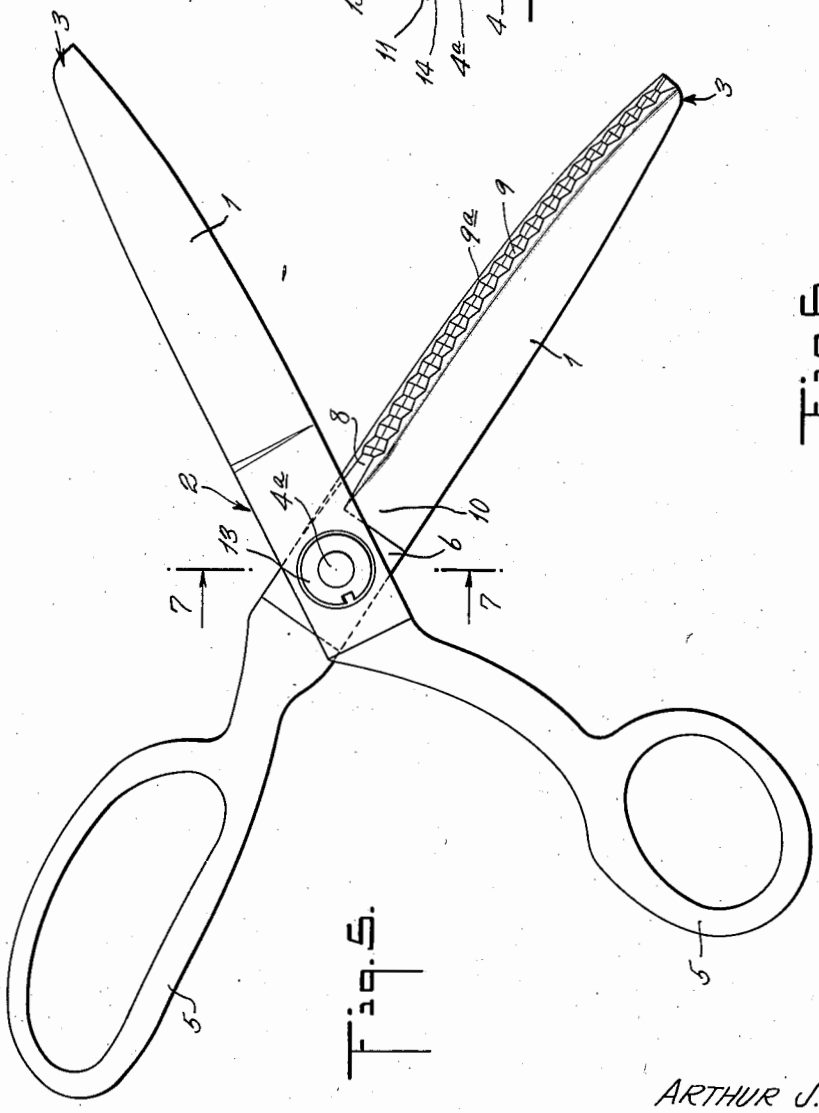

Fig. 5.

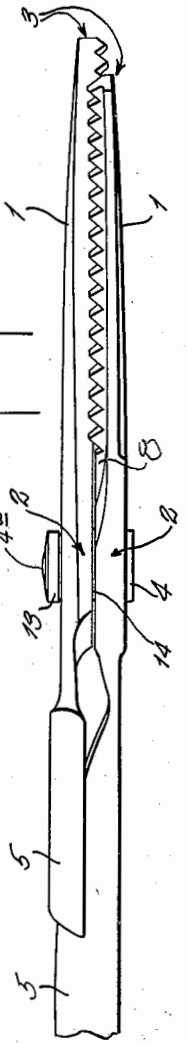

Fig. 6.

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PINKING SHEARS

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6 Claims. (Cl. 30—230)

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This invention relates to pinking shears of the type having integral flanges projecting transversely from the insides of the blades along their leading edges and in which flanges the pinking teeth are formed so that the shearing edges of the teeth of one blade mesh with and pass through the shearing edges of the teeth of the other blade as the blades are closed.

One of the objects is to make such shears with full standard length blades which pink at and near the tips as well and as uniformly as they do closer to the blades' base ends where the pivot fastening is located. Note that the foregoing objective contrasts with the practice of shortening the blades to eliminate the tip end portions where trouble has occurred. Another object is to improve on this type to provide pinking shears capable of satisfactorily pinking both light and heavy weight cloths without readjustment. A further object is to provide pinking shears of the toothed integral flange type having a generally improved feel and pinking ability, and which do not require the use of excessive force on the handles when the teeth at and near the blade tips are doing the work. Other objects may be inferred from the following.

A specific example of pinking shears embodying the present invention is disclosed hereinbelow and by the accompanying drawings for the purpose of explaining the principles and operation of the invention.

In the accompanying drawings—

Fig. 1 is a plan view of the inside face of one of the blades;

Fig. 2 is a side edge view of Fig. 1 looking at the blade from its side edge facing away from the other blade;

Fig. 3 is a cross section taken on the line 3—3 in Fig. 1;

Fig. 4 is a cross section taken on the line 4—4 in Fig. 1;

Fig. 5 is a plan view of the assembled shears with the blades partially closed;

Fig. 6 is a side edge view of Fig. 5; and

Fig. 7 is a cross section taken on the line 7—7 in Fig. 5.

These exemplary shears include a pair of substantially flat steel blades 1 having base ends 2 and tip ends 3 and with a pivot fastening 4 holding their base ends laterally together. The drawings are full scale and thus show that the blades have the full lengths of the original standard commercial pinking shears of the same type. The blades 1 are flatly arranged relative to each other and are capable of pivotally swinging edgewise

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relative to each other. They also can elastically flex laterally at right angles to their swinging directions if forced to do so.

Both blades are similar excepting that their pinking teeth are relatively offset longitudinally respecting the blades as required for the teeth to intermesh. The blades have the usual integrally extending handles shown at 5, and these may be differently shaped in the customary fashion to provide thumb and finger loops respectively. Otherwise the blades are fundamentally alike so similar numerals are applied to the corresponding parts of the respective blades.

The mutually facing insides of the blades integrally have raised solid pivot pads 6 at the base ends 2 and surrounding the fastening 4. The blades have holes 7 which go through these pads and through which the fastening 4 extends by way of a cylindrical shank 4a. This establishes the common pivot center of the blades. The tops or faces of the pads 6 are finished at right angles to the insides of the holes 7.

Further the mutually facing insides of the blades have transverse flanges 8 joining with the pads 6 and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips 3 where the flanges 8 terminate. Note that these flanges are continuous from the pads to the blade tips as contrasted to the old arrangement where the flanges were used only to provide metal for forming the teeth. Coacting pinking teeth 9 are formed in these flanges 8 with the teeth starting at locations spaced outwardly from the pads and extending from and throughout the flanges 8 to their outer ends at the blade tips 3. The flanges are continuous but the teeth start at about the same distances from the pivot as the teeth do in the old original commercial shears of this type. The teeth 9 are formed to point transversely from the blades with the mutually opposed edges 9a of the teeth on the respective blades forming the shearing edges.

All of the parts described so far excepting for the pivot fastening 4 are as to each blade integral solid parts. Each blade starts out as a forging having the pivot pads 6 and the flange 8 formed in it, but without any teeth in the flange 8. Then the teeth are formed in accordance with the method disclosed and claimed by the D. L. Schwartz Patent 2,236,874, issued June 16, 1942. The hole 7 is formed prior to the forming of the teeth. The tops of the pivot pads 6 are machined so their surfaces and the insides of the holes 7 are right angular as described.

As clearly illustrated by Fig. 1 in each instance the opposed or leading blade edges and the flanges 8 are offset towards each other from radial alignment with the pivoting axis x of the fastening. The radial center line of the blade is shown in Fig. 1 by the broken line b to clarify this offsetting. In the case of each blade this offsetting is at distances ranging from a maximum where the flange 8 joins the pad 6 to a minimum as the blade tip end 3 is reached where the flange 8 terminates. At the blade end the flange may touch the radial center line. The flanges 8 and the leading blade edges curve between these maximum and minimum distances with curves causing the shearing edge of only one of the teeth 9 at a time to coact with the shearing edges of the teeth on the other blade as the blades are swung together. In other words the curves are sharp enough in radius so that as the shearing edge of one tooth passes between the shearing edges of the mating teeth on the other blade neither of the teeth on either side of this one tooth and on the same blade is shearing at that time. In the case of the innermost tooth of these two it has already completed its shearing, while in the case of the tooth on the outside it has not yet become engaged with the shearing edges of the teeth on the other blade. Thus the teeth cut one at a time. Determination of the curve required is made by laying out the blades' forms on the drafting board and noting what curve radius is required for the particular dimensions involved. Near the pivot a straight shape produces the result but an unusually sharp curve is necessary as the tip ends are approached.

The two blades 1 are bowed or laterally offset towards each other from their base ends 2 and pads 6 far enough to elastically flex each other apart as the blades are closed together. The bowed forms are formed by permanently deforming or bending the blades. This is done after the shears are assembled and after the teeth are formed with arcuate faces concentric to the shears pivoting axis as described by the mentioned Schwartz patent. Thus this bowing has the effect of throwing the arcuate faces of the teeth on the respective blades slightly from their concentric relationship imparted by the Schwartz method of tooth forming. A competent shears setter can thus bow the blades after the shears are assembled as is the usual practice in setting straight edge scissors. The bow is indicated by Fig. 6 which shows that when viewed edgewise the blades cross each other slightly.

Both the blades 1 and the flanges 8 taper in width from the blade base ends 2 and the pads 6 outwardly towards and to the blade tip ends 3. This is customary in the case of shear blades for the purpose of imparting a better general appearance to the shears but the flanges having the teeth have heretofore been made with a uniform thickness. In the case of the flanges 8 there is also a distinct tapering in the flanges' widths outwardly from the pads 6. This is a novel feature. The tapering of the flanges is not great, but it is enough to be seen and it is enough to make the flanges progressively stiffer from their tips to the pivot pads 6 with their stiffness increasing outwardly of the blades at about the same rate the blade stiffness increases due to the tapering blade shape per se.

As can be seen from Fig. 2 the blades each have their insides smoothly curving at 10 downwardly from the edges of the pads facing the blade tip ends and with the curving extending outwardly to positions or locations behind the

innermost ones of the teeth 8 from which the blades' insides then flatly continue towards the blade tip ends 3. The curving portions 10 are tangent to the flat blade insides. The radius of the curved portions 10 is as great as is possible without forcing the teeth series to start an unusual distance out along the flanges 8 from the pivot pads 6.

It is prior art practice to form the teeth in the prior art flanges so the bases of the teeth are almost flush with the blade insides. This practice is followed in the present new shears. The new flange continuations going from the innermost teeth to the pivot pads are made about half as high as the toothed flange portions because this gives a stiffness comparable to the average stiffness imparted the blades by the toothed flange portions. These continuation or bridging portions prevent the blades from locally flexing excessively between the teeth and the pivot pads. The height of the pivot pads is fixed by what is required to make the teeth intermesh accurately. Therefore the curves 10 of the inside are fixed as to maximum radius because too great a radius causes the blades' insides to interfere with the clearance required behind the innermost teeth. The curves 10 have this maximum radius.

The pivot fastening 4 is a bolt having its cylindrical shank 4a press fitted in the hole 7 most adjacent the bolts head and snugly but pivotally passing through the other one of the holes 7 through the other blade. This permits the blades to pivot relative each other. This other blade has a circular recess 11 surrounding the bolt shank 4a and the latter passes through an inwardly facing spherical cup spring 12, the outside of which is engaged by a nut 13 screwed on the end of the bolt shank 4a. The diameter of the recess 11 is proportioned so that after the nut 13 is pulled up to elastically spread the cup spring slightly to store up resilience therein, the peripheral edge of the cup spring 12 engages the edge of the recess 11 and struts itself so that the spring 12 becomes in effect a rigid unit respecting separation of the blade base ends. This positively and rigidly fixes the pivot pads 6 against separation from each other.

A thin washer 14 surrounds the shank 4a and is positioned flatly between the flatly interfacing pivot pads 6. Customarily this washer has a tongue struck out from it which fits in a recess 15 formed in one of the pivot pads 6. Thus the bolt shank 4a and the washer 14 are anchored against rotative motion.

If the washer 14 wears so it becomes thinner the stored resiliency in the spring 12 works to keep the pivot pads held tightly together at all times. At no time can the pivot pads separate beyond the limits causing the cup spring 12 to spread and strut against the inside of the recess 11.

Not only is each of the flanges 8 tapered in its width as described but its side edges 8a are beveled towards each other throughout the length of the flange 8 including its portion in which the teeth 9 are formed. This bevel is approximately a 15° bevel.

The insides of the blades 1 are ground by a powered rotary abrasive wheel having a diameter providing the described radius of the curved portions 10. This is done prior to assembly of the shears with the blades held with their tip ends towards the wheel and longitudinally moved tangentially in contact with the wheel until the

curved portions 10 are reached with the latter then being automatically finished to a smooth curve. This polishes the blades' insides and makes them smooth from their tips to the pivot pads 6.

The beveled edges 8a which face towards each other when the shears are assembled are ground by an abrasive wheel using a jig to assure maintenance of a uniform bevel angle from end to end of the flanges. This is done after the teeth are formed and the shears are assembled. It serves to provide these side edge faces with a uniform bevel and a smooth finish, and it also serves to sharpen the shearing edges 9a of the teeth. On this side the flange sides are continuations of the corresponding blade edges.

The operation of the shears is as follows:

When the user squeezes the handles in the usual fashion with cloth between the blades of the shears the teeth cut one at a time as the blades close. This meeans that at no time must the user cut with two teeth simultaneously and the shears are therefore easy to use. The curving shapes producing this result also automatically provide substantially the same angularity between all of the various teeth throughout the entire length of the blades as the blades close together. This uniform angularity between all of the various teeth is obtained because of the offsetting relation of the teeth respecting the axis of the blades in conjunction with the curving shapes.

As the shearing edges of the first tooth engages that of the next on the other blade the two blades flex each other apart slightly due to the bow of the blades. At this time the effective lateral spring lever arms are very short but the shearing edges of the teeth are pressed tightly together because the untoothed portions of the flanges 8 stiffen the blades against execessive local flexure and the blades and the flanges have their maximum cross sections and so provide maximum stiffness. As the teeth progressively engage farther out along the blades due to the shear blades closing, the shearing edges of tooth after tooth successively come into play with the edges of only one tooth acting at a time. Thus the tooth interpressure between the blades is in the nature of a shifting point. The lever arms are increasing but the tooth interpressure remains the same because the cross sectional shapes of the blades are decreasing due to the tapering of the flanges and the blades. This permits correspondingly smoother flexure of the blades. This effect continues clear out to the tips, the various parts being proportioned as described so as to result in a substantially uniform tooth interpressure at all times.

It is apparent that the two blades function as two cantilever springs interpivoted at one end and which are crossed by being bowed laterally so that as they are swung together they interengage with resulting cantilever flexure. At all times the blades flex between the shifting point of intercontact and the pivot pads with truly simple flexure curves and thereby at all times is effected the same correct and uniform tooth interpressure. This results to a considerable degree from the flanges 8 which are continued from the teeth clear to and joined with the pivot pads. This prevents the blades from having zones where they can locally flex without flexure of the balance of their lengths clear up to the intercontacting teeth. The pivot pads are positively anchored against lateral separation so that when the blades are properly bowed the setting remains permanently. The teeth do not wear so rapidly as the pivot washer 14 and as the latter wears, looseness is kept out of the shears by the resilience available in the spring 12 to continuously spring bias the pivot pads together.

Due to the novel construction of the shears they function with the same precision and feel as do finely made straight edge scissors because the blades flex at all times with simple flexure curves holding the teeth properly aligned as they coact. The shears pink with precision both very fine silks and heavy cloths because the acceptance angle is the same throughout even at the tips. For the same reasons the new shears pink with precision throughout all the teeth including the teeth located near the blade tips. This eliminates the need for making the pinking shears with abnormal, stubby, short blades for the purpose of avoiding the blade tip pinking difficulties heretofore encountered with pinking shears having the usual full length blades.

The smoothly curving blade inside portions 10 smoothly and gradually distribute the bending stress between the blades and the pivot pads. This further contributes to the blades forming themselves into smooth simple flexure curves at all times between the pivot pads and the shifting point of teeth intercontact. The polished blade insides avoid any chance for localized flexure stress which might interfere with the smooth curving. Thus there is nothing to interfere with the other features performing their functions resulting in the blades working as true cantilever springs providing gradually reduced spring force outwardly along the blades at a rate about equaling but with opposite effect respecting the gradually lengthening effective cantilever arm lengths that lengthen as the blades close together. Thus there is always substantially equal pressure between the teeth throughout the entire blade lengths.

It should be noted that the solid portions of the flanges 8 between the pads 6 and the innermost ones of the teeth constitute distinct and appreciable lengths. They are longer than the width of the teeth bases. Furthermore the solid untoothed flange portions are high enough so that they align or level substantially with the middles of the teeth cut in the flanges. The flanges are high enough throughout so that the teeth bases are substantially as far below the levels of the untoothed flange portions as the teeth tops are thereabove. It is this kind of arrangement that provides the blades with a balanced and uniform bending resistance from their base ends to their tip ends.

We claim:

1. Pinking shears including a pair of substantially flat blades having base and tip ends and with a pivot fastening holding their base ends laterally together with the blades flatly arranged relative to each other and swinging edgewise relative to each other, the mutually facing insides of said blades integrally having raised solid pivot pads at the blade base ends around said fastening and having transverse flanges integrally joining with said pads and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips and in which flanges starting at locations spaced outwardly from said pads coacting pinking teeth are formed to point transversely from the blades with the mutually opposed edges of the teeth on the respective

blades forming shearing edges, said opposed blade edges and flanges being offset towards each other from radial alignment with the pivoting axis of said fastening distances ranging from a maximum at said pads to a minimum as the blade tips are approached and curving therebetween with curves causing the shearing edges of only single ones of said teeth to coact simultaneously as the blades are swung together, said blades being bowed towards each other from their base ends far enough to elastically flex each other apart as they are closed together.

2. Pinking shears including a pair of substantially flat blades having base and tip ends and with a pivot fastening holding their base ends laterally together with the blades flatly arranged relative to each other and swinging edgewise relative to each other, the mutually facing insides of said blades integrally having raised solid pivot pads at the blade base ends around said fastening and having transverse flanges integrally joining with said pads and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips and in which flanges starting at locations spaced outwardly from said pads coacting pinking teeth are formed to point transversely from the blades with the mutually opposed edges of the teeth on the respective blades forming shearing edges, said opposed blade edges and flanges being offset towards each other from radial alignment with the pivoting axis of said fastening distances ranging from a maximum at said pads to a minimum as the blade tips are approached and curving therebetween with curves causing the shearing edges of only single ones of said teeth to coact simultaneously as the blades are swung together, said blades being bowed towards each other from their base ends far enough to elastically flex each other apart as they are closed together, both said blades and said flanges tapering in width from the blade base ends and said pads outwardly toward the blade tip ends, whereby said blades and flanges are progressively stiffer from said blade tip ends to said pads.

3. Pinking shears including a pair of substantially flat blades having base and tip ends and with a pivot fastening holding their base ends laterally together with the blades flatly arranged relative to each other and swinging edgewise relative to each other, the mutually facing insides of said blades integrally having raised solid pivot pads at the blade base ends around said fastening and having transverse flanges integrally joining with said pads and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips and in which flanges starting at locations spaced outwardly from said pads coacting pinking teeth are formed to point transversely from the blades with the mutually opposed edges of the teeth on the respective blades forming shearing edges, said opposed blade edges and flanges being offset towards each other from radial alignment with the pivoting axis of said fastening distances ranging from a maximum at said pads to a minimum as the blade tips are approached and curving therebetween with curves causing the shearing edges of only single ones of said teeth to coact simultaneously as the blades are swung together, said blades being bowed towards each other from their base ends far enough to elastically flex each other apart as they are closed together, said blades having their insides smoothly curving from the edges of said pads facing the blade tip ends outwardly to portions behind the innermost ones of said teeth providing tooth clearance behind each of these innermost teeth and then flatly continuing towards the blade tip ends, the curving portions of the blade insides being tangent to their flat insides, whereby said blades smoothly flex each other apart as they are closed together.

4. Pinking shears including a pair of substantially flat blades having base and tip ends and with a pivot fastening holding their base ends laterally together with the blades flatly arranged relative to each other and swinging edgewise relative to each other, the mutually facing insides of said blades integrally having raised solid pivot pads at the blade base ends around said fastening and having transverse flanges integrally joining with said pads and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips and in which flanges starting at locations spaced outwardly from said pads coacting pinking teeth are formed to point transversely from the blades with the mutually opposed edges of the teeth on the respective blades forming shearing edges, said opposed blade edges and flanges being offset towards each other from radial alignment with the pivoting axis of said fastening distances ranging from a maximum at said pads to a minimum as the blade tips are approached and curving therebetween with curves causing the shearing edges of only single ones of said teeth to coact simultaneously as the blades are swung together, said blades being bowed towards each other from their base ends far enough to elastically flex each other apart as they are closed together, said pivot fastening being provided with a rigid abutment positively holding said pivot pads against mutual outward separation, whereby to force said blades to flex each other apart as they are closed together.

5. Pinking shears including a pair of substantially flat blades having base and tip ends and with a pivot fastening holding their base ends laterally together with the blades flatly arranged relative to each other and swinging edgewise relative to each other, the mutually facing insides of said blades integrally having raised solid pivot pads at the blade base ends around said fastening and having transverse flanges integrally joining with said pads and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips and in which flanges starting at locations spaced outwardly from said pads coacting pinking teeth are formed to point transversely from the blades with the mutually opposed edges of the teeth on the respective blades forming shearing edges, said opposed blade edges and flanges being offset towards each other from radial alignment with the pivoting axis of said fastening distances ranging from a maximum at said pads to a minimum as the blade tips are approached and curving therebetween with curves causing the shearing edges of only single ones of said teeth to coact simultaneously as the blades are swung together, said blades being bowed towards each other from their base ends far enough to elastically flex each other apart as they are closed together, said pivot fastening being provided with a rigid abutment positively holding said pivot pads against mutual outward separation, whereby to force said blades to flex each other apart as they are closed together, and said pivot fastening also being provided with a spring biasing said pads and the blade base ends towards each other.

6. Pinking shears including a pair of substantially flat blades having base and tip ends and with a pivot fastening holding their base ends laterally together with the blades flatly arranged relative to each other and swinging edgewise relative to each other, the mutually facing insides of said blades integrally having raised solid pivot pads at the blade base ends around said fastening and having transverse flanges integrally joining with said pads and extending therefrom along the mutually opposed longitudinal blade edges towards the blade tips and in which flanges starting at locations spaced outwardly from said pads coacting pinking teeth are formed to point transversely from the blades with the mutually opposed edges of the teeth on the respective blades forming shearing edges, said opposed blade edges and flanges being offset towards each other from radial alignment with the pivoting axis of said fastening distances ranging from a maximum at said pads to a minimum as the blade tips are approached and curving therebetween with curves causing the shearing edges of only single ones of said teeth to coact simultaneously as the blades are swung together, said blades being bowed towards each other from their base ends far enough to elastically flex each other apart as they are closed together, both said blades and said flanges tapering in width from their blade base ends and said pads outwardly toward the blade tip ends, the side edges of said flanges being

beveled towards each other in each instance, said blades having their insides smoothly curving from the edges of said pads facing the blade tip ends outwardly to portions behind the innermost ones of said teeth providing tooth clearance behind each of these innermost teeth and then flatly continuing towards the blade tip ends, the curving portions of the blade insides being tangent to their flat insides, said pivot fastening being provided with a rigid abutment positively holding said pivot pads against mutual outward separation, and said pivot fastening also being provided with a spring biasing said pads and the blade base ends towards each other.

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