Oct. 28, 1958 A. J. SARKA 2,857,966

SHEARING SHEETS FROM CONTINUOUSLY ADVANCING STRIP

Filed March 14, 1956 3 Sheets-Sheet 1

Fig. 1.

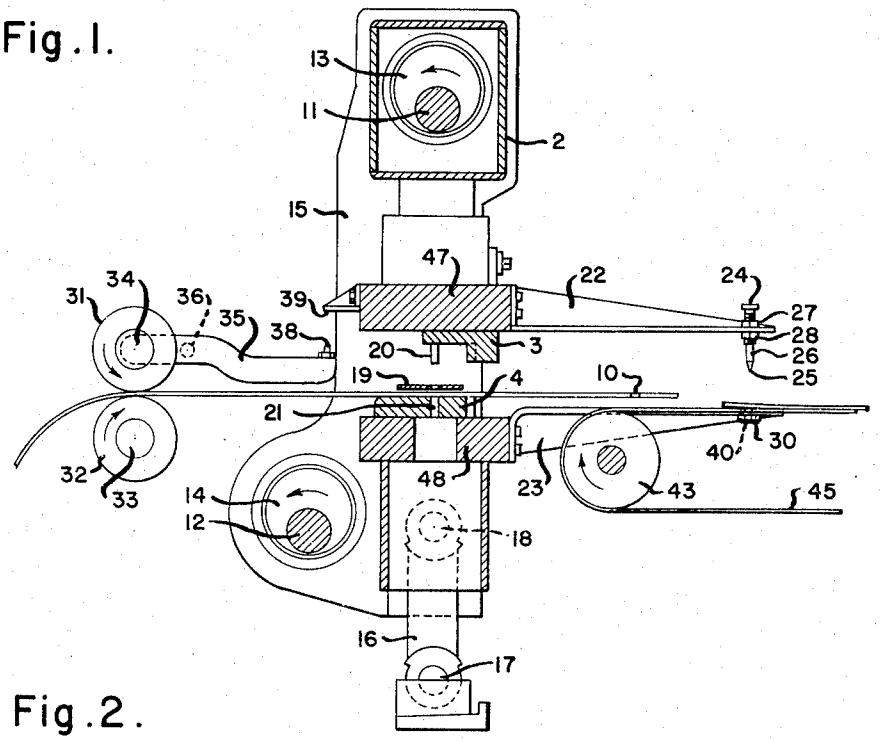
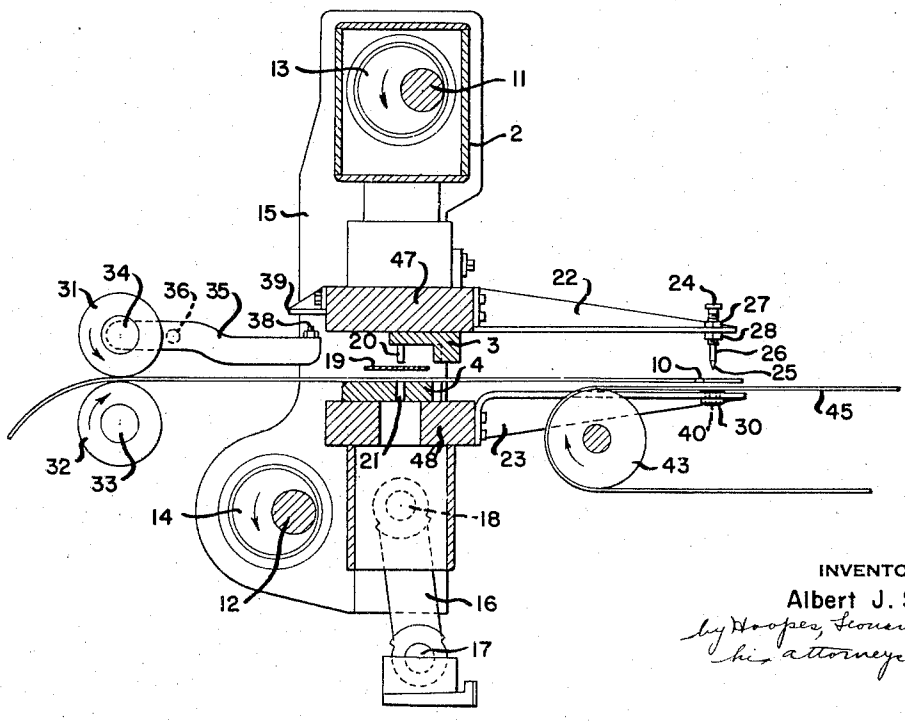


Fig. 2.



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Filed March 14, 1956 3 Sheets-Sheet 2

Fig. 3.

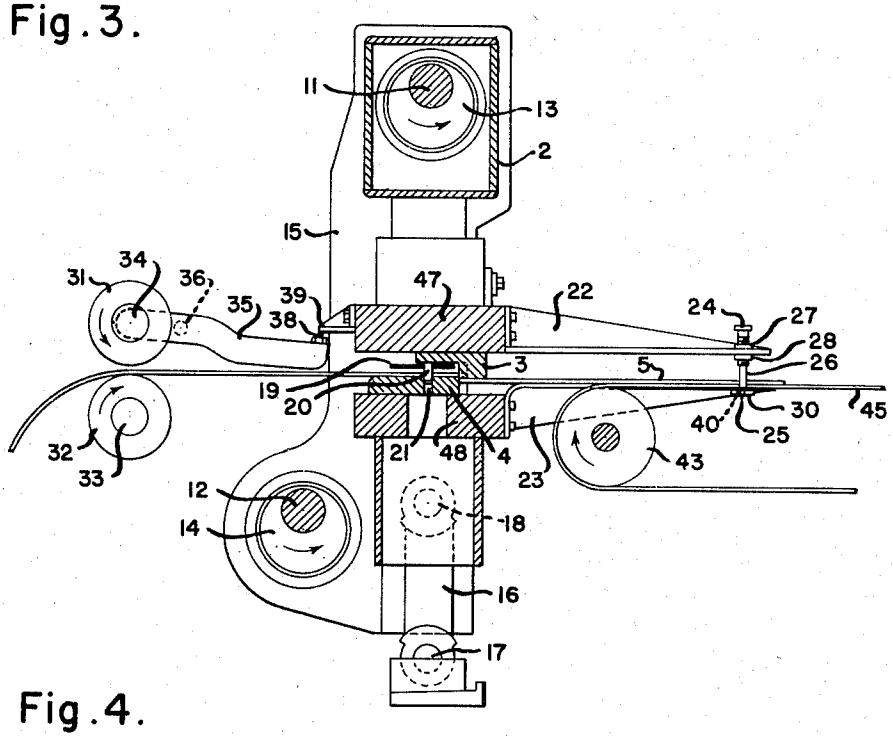
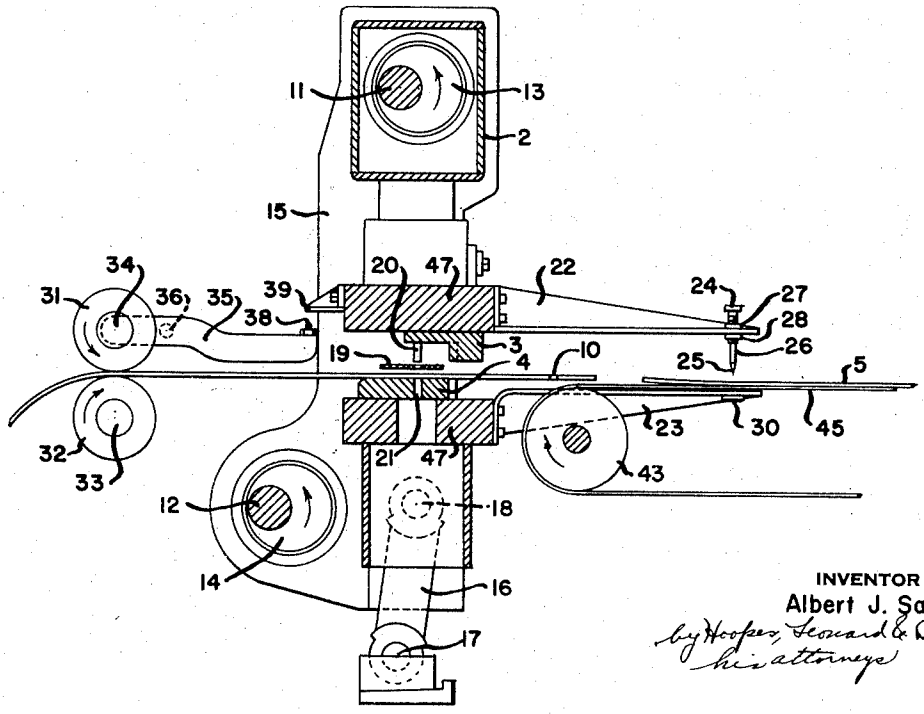


Fig. 4.



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SHEARING SHEETS FROM CONTINUOUSLY ADVANCING STRIP

Filed March 14, 1956 3 Sheets-Sheet 3

Fig. 5.

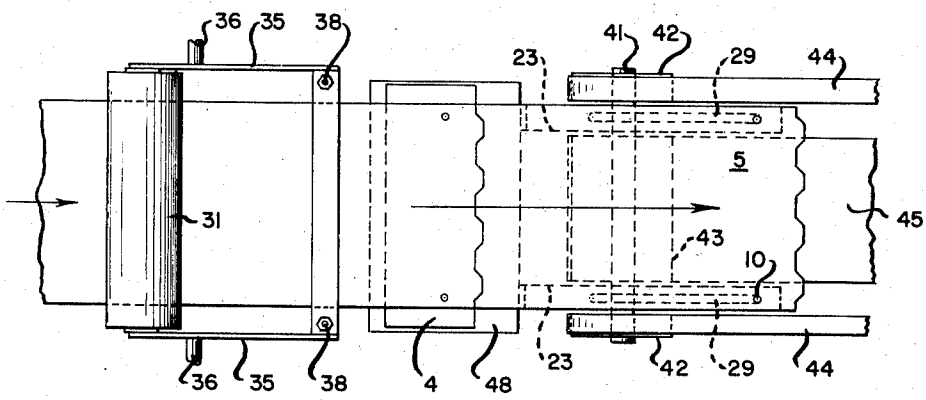
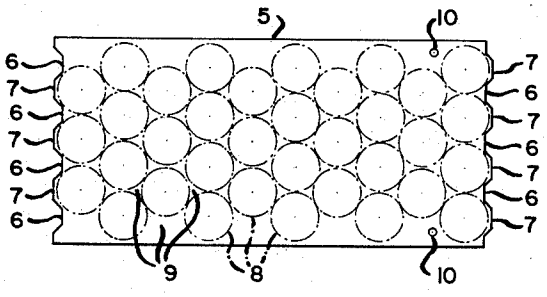


Fig. 6.



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United States Patent Office 2,857,966
Patented Oct. 28, 1958

2,857,966

SHEARING SHEETS FROM CONTINUOUSLY ADVANCING STRIP

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Application March 14, 1956, Serial No. 571,418

16 Claims. (Cl. 164—12)

This invention relates to shearing sheets from continuously advancing strip. It has to do particularly with the production of very accurately sheared sheets. The invention has especial utility in the scroll or contour shearing from continuously advancing strip of sheets for blanking can ends or other generally rounded blanks. A related method and apparatus are disclosed and claimed in my copending application Serial No. 617,180, filed October 19, 1956.

In blanking can ends or other generally rounded blanks it is customary to utilize what are known in the art as scroll or contour sheared sheets. These are sheets having short projections or tabs at their ends which are spaced apart, the tabs providing for the most efficient use of the sheet in forming of the blanks. Scroll or contour sheared sheets are well known to those skilled in the art. Such a sheet is disclosed, for example, in Patent No. 2,335,292.

The tonnage of tin plate utilized for the blanking of can ends alone is very great and the can manufacturers have been endeavoring for many years to form scroll sheared sheets from continuously advancing strip, e. g., by the use of flying shears or other cyclically acting shears which advance with the strip while shearing it. However the efforts have not been successful due to lack of requisite shearing accuracy. The sheets must be sheared to dimension within .004" laterally and .007" longitudinally. The low tolerances are due to the requirement that the scrap loss be reduced to a minimum. All of the sheet except the blanks becomes scrap. The spaces between blanks and the spaces from the marginal blanks to the sheet edges are reduced to a minimum. The scroll sheared sheets are blanked in a press and must be of extreme accuracy to be properly received and acted on by the press. A sheet which is not very accurately sheared must be rejected.

Although attempts to produce scroll sheared sheets from continuously moving strip have been made for many years, such attempts have, as indicated above, been unsuccessful because the required shearing accuracy could not be obtained. As a result the can manufacturers are even today reluctantly utilizing sheets sheared by much slower but hitherto more accurate methods.

I have discovered how to produce scroll sheared sheets for blanking can ends or other generally rounded blanks from continuously advancing strip with the requisite accuracy. I cyclically act on the continuously advancing strip by scroll shears which advance with the strip while shearing it. Simultaneously with each shearing action of the scroll shears I form in the strip on the feed side of the transverse line of shearing at least one register hole located in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap. Also simultaneously with each shearing action of the scroll shears I cause register means connected and moving with the scroll shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the scroll shears whereby to accurately position the leading end of the strip for each shearing action. By "the feed side of the transverse line of shearing" I mean the side of the transverse line of shearing in the direction from which the strip is fed so that the register hole or holes will be formed in each cycle in the leading end of the strip which in the succeeding cycle becomes the leading end of a scroll sheared sheet. The positioning of the leading end of the strip by the register means insures very accurate positioning of the leading end of the strip both longitudinally and laterally resulting in scroll sheared sheets which are accurate within the required tolerances and which could not be produced by prior continuous methods. By forming the register hole or holes in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap I not only produce scroll sheared sheets of the required accuracy at unprecedented economy but avoid the utilization of any additional material to effect the accurate registry for shearing whereby my new and useful results are accomplished.

I find it desirable to form two register holes, one adjacent each side edge of the strip, and to utilize register pins connected and moving with the scroll shears to enter the register holes to accurately position the leading end of the strip for shearing. Preferably the register pins have tapered noses to facilitate their entry into the register holes and shanks beyond the tapered noses which guidingly but not bindingly engage within the register holes to accomplish the registering function.

I preferably positively advance or feed the strip and approximately as the register means are entering the register hole or holes simultaneously with each shearing action of the scroll shears interrupt positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing. I preferably convey away the scroll cut sheets upon conveying means laterally offset from the longitudinal zone or zones of movement of the register means so that the register means upon passing through the hole or holes in the strip do not strike the conveying means.

I have devised not only a novel method but also novel mechanism for scroll shearing from continuously advancing strip sheets for blanking can ends or other generally rounded blanks. My improved mechanism preferably comprises cyclically operable scroll shears which advance with the strip while shearing it, means connected and moving with the scroll shears operable simultaneously with each shearing action of the scroll shears to form in the strip on the feed side of the transverse line of shearing at least one register hole located in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap and register means also connected and moving with the scroll shears operable simultaneously with each shearing action of the scroll shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the scroll shears whereby to accurately position the leading end of the strip for each shearing action.

In my scroll sheearing mechanism the means connected and moving with the scroll shears preferably form in the strip two register holes respectively located adjacent the respective side edges of the strip, both register holes being located in the portion of the material intermediate the portions to be blanked out. Register pins are employed for cooperation with the register holes as above described. While in many cases one register hole would sufficiently serve the purpose, I find it desirable to employ two register holes as the employment of two register holes appears to somewhat increase the accuracy of shearing.

More than two register holes could be employed if desired but I believe that the employment of more than two register holes is unnecessary, at least in the great majority of instances.

My mechanism preferably includes strip feeding means for positively advancing the strip and means rendering the feeding means inoperative approximately as the register means are entering the register hole or holes simultaneously with each shearing action of the scroll shears so as to interrupt the positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing. I preferably employ conveying means for conveying away the scroll cut sheets, the conveying means being laterally offset from the longitudinal zone or zones of movement of the register means so that the register means upon passing through the hole or holes in the strip do not strike the conveying means. In a preferred form the conveying means comprise a plurality of generally side by side conveyors adapted cooperatively to support and convey away the scroll cut sheets but having therebetween a space or spaces receiving the register means so that the register means upon passing through the hole or holes in the strip do not strike the conveying means.

I preferably employ pinch rolls for positively advancing the strip together with means separating the pinch rolls approximately as the register means are entering the register hole or holes simultaneously with each shearing action of the scroll shears so as to interrupt the positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing. Desirably means are provided mounting one of the pinch rolls for movement generally toward and away from the other pinch roll, and lever means may be provided connected with the first mentioned means and having a portion in the path of movement of the scroll shears adapted to be operated by the scroll shears to move the first mentioned pinch roll away from the second mentioned pinch roll to render the pinch rolls inoperative.

An extension is preferably provided which projects from the scroll shears in the direction of advance of the material, and the register means are preferably carried by and adjustably positionable along the extension to conform to scroll cut sheets of different lengths. I prefer to employ opposed extensions carried by the respective opposed elements of the scroll shears projecting in the direction of advance of the material for carrying the register means, the register means comprising means adapted to pass through the register hole or holes formed in the strip simultaneously with the preceding shearing action of the scroll shears and socket means receiving the last mentioned means after passing through the register hole or holes whereby to accurately position the leading end of the strip for each shearing action. A variable speed drive for the pinch rolls may be provided to enable controlled variation of the length of strip fed forward at each cycle.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof and a present preferred method of practicing the same proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same in which—

Figures 1, 2, 3 and 4 are diagrams of mechanism for scroll shearing from continuously advancing strip sheets for blanking can ends or other generally rounded blanks, the mechanism being shown in Figure 1 with the opposed elements of the scroll shears most widely separated, in Figure 2 with the opposed elements moving relatively toward each other, in Figure 3 with the opposed elements in operating position closest together and in Figure 4 with the opposed elements moving relatively away from each other;

Figure 5 is a diagram in plan taken above the feed rolls but below the upper shearing member and stripper; and

Figure 6 is a face view of a scroll sheared sheet showing in dotted lines the portions to be blanked out and also showing two register holes formed in the sheet, the register holes being located in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap.

Referring now more particularly to the drawings, there is shown more or less diagrammatically a flying shear of the type disclosed in copending application Serial No. 474,234, filed December 9, 1954. The flying shear is designated generally by reference numeral **2**. Its details are not shown because the flying shear per se is not claimed in the present application and its structure is now well known to those skilled in the art. Moreover flying shears of other constructions than that of said copending application may be employed. The shear, whatever its specific construction, should comprise cyclically operable scroll shears which advance with the strip while shearing.

In the drawings the scroll shears comprise an upper shearing member **3** carried by an upper platen **47** and a lower shearing member **4** carried by a lower platen **48**. The shearing members have their shearing edges formed for scroll shearing, i. e., for producing a transverse cut in material advanced through the shears which transverse cut is not straight but has staggered transversely extending portions joined by portions having a longitudinally extending component. The form of the cooperating upper and lower scroll shearing members **3** and **4** is made clear from Figures 5 and 6; in the latter figure a scroll sheared sheet formed by my process and by the use of my apparatus is designated by reference numeral **5**. The ends of the sheet sheared by the scroll shearing members **3** and **4** are designated by reference numeral **6**. Each end of the sheet has endwise projecting tabs **7** as shown to enable the most efficient use of the material in the blanking out of can ends or other generally rounded blanks. The portions of the sheet to be blanked out are the portions indicated in Figure 6 by dotted circles and are designated by reference numeral **8**. The portion of the material of the sheet intermediate the portions **8** and between the portions **8** and the sheet edges is designated **9**. The portion **9** will ultimately become scrap. Register holes **10** are provided in the portion **9** of the material of the sheet. The register holes are of prime importance and their formation and use will be described in detail.

The particular form of flying shear illustrated in the diagrams has upper and lower shafts **11** and **12** respectively, the upper shaft **11** having thereon eccentrics **13** and the lower shaft **12** having thereon eccentrics **14**. The shafts are geared together to rotate in the same direction at the same speed and are driven by a suitable motor (not shown). The eccentrics **13** and **14** are synchronized as shown. An element **15** of the flying shear is carried by the eccentrics **13** and **14** and hence during operation of the mechanism partakes of circular motion. The upper shearing member **3** is carried by the element **15**. The lower shearing member **4** is supported by links **16** mounted upon a stationary pivot **17** and having means carrying the member **4** pivotally connected with their upper ends at **18** slidable up and down in guides in the element **15** as that element partakes of its circular motion. Actually the lower shearing member **4** partakes of only very slight up and down movement determined by the difference in elevation of the upper ends of the links **16** in their vertical position shown in Figures 1 and 3 and in their slightly tilted position shown in Figures 2 and 4. However the upper and lower shearing members **3** and **4** operate cyclically to shear the strip and advance with the strip while shearing it. A stripper **19** is provided for preventing the material from moving

upwardly with the upper shearing member 3 after a shearing action. Since the elevation of the lower shearing member 4 changes but slightly that shearing member approximately determines the path of the strip as it advances through the mechanism.

Connected with the upper shearing member 3 and projecting downwardly therefrom are two die members 20, one adjacent each side of the shearing member, adapted to form in the portion 9 of the material which is to become scrap the register holes 10 referred to above. Cooperating recesses or female die portions 21 are formed in the lower shearing member 4. Thus upon each shearing cycle of the scroll shear 2 the die members 20 punch the register holes 10 in the strip on the feed side of the transverse line of shearing.

Connected with the upper platen 47 is an extension 22 projecting in the direction of advance of the material and connected with the lower platen 48 are two generally parallel extensions 23 projecting generally parallel to and beneath the projection 22. Carried by the projection 22 and adjustably positionable therealong in slots 29 respectively disposed directly above the respective extensions 23 are two transversely spaced register pins 24. Each of the register pins 24 has a tapered nose 25 to facilitate its entry into the corresponding register hole 10 and a shank 26 of such size as to guidingly but not bindingly enter the register hole. A nut 27 is adjustably threaded onto each of the register pins 24 to serve as a stop and to enable determination of the desired length of register pin to project downwardly. Each nut 27 rests upon the upper surface of the extension 22. Also threaded onto each of the register pins 24 is a fastening nut 28 disposed beneath the projection 22. When each register pin 24 is disposed at the desired location along the corresponding slot 29 it is fastened in place by tightening the nut 28 against the under surface of the bracket 22, the nut 27 having previously been adjusted to provide for a desired length of the register pin to project downwardly from the bracket. Lock nuts may be used in conjunction with the nuts 27 and 28. Resiliently mounted strippers may be used on the register pins 24 if desired.

Each of the extensions 23 has an elongated slot directly below one of the slots 29 of the extension 22. A bushing 30 is adapted to be adjustably positioned along each such slot to directly underlie the corresponding register pin 24 thereabove. Each bushing 30 may be suitably connected with its extension 23 to be adjustably positioned therealong, as, for example, by having a flange lying atop the extension and a nut threaded about the bushing therebelow holding the bushing in desired adjusted position. Each bushing 30 has therein a socket 40 cooperating with the register pin to insure accurate positioning of the forward end of the strip upon each shearing cycle. The socket 40 is of approximately the same diameter as the corresponding register hole 10 so when the register pins 24 have passed through the register holes 10 in the strip and into the sockets 40 the forward end of the strip is accurately positioned both longitudinally and transversely.

The strip may be advanced through the mechanism by any suitable means, such, for example, as pinch rolls 31 and 32. The pinch rolls are adapted to turn in the respective directions indicated by the arrows in the drawings. Both rolls may be driven or only one may be driven while the other simply presses the work against the driven roll and turns through its contact with the moving work. I desirably drive the lower pinch roll 32 through a variable speed drive so that the speed of feed of the strip may be varied in relation to the cycle of the flying shear whereby the length of the scroll sheared sheets being formed may be variably controlled. The variable speed drive for the pinch rolls may derive its power from any suitable source. The drive may, for example, and in a preferred form of the mechanism does, derive its power from the shaft 12. The shafts carrying the upper and lower punch rolls may be provided with intermeshing gears so that the upper roll will always be driven by the lower roll even though the upper roll is slightly raised as will now be described.

The lower pinch roll 32 is mounted upon a shaft 33 journaled to rotate about a stationary axis and driven by the variable speed drive above mentioned. The upper pinch roll 31 is mounted upon a shaft 34 carried by opposed arms 35 pivoted to turn about a horizontal shaft 36. Thus the pinch rolls 31 and 32 are mounted at a work feeding station and do not partake of the cyclic movement of the shearing members 3 and 4. The upper pinch roll 31 may be urged downwardly through its own mass by gravity or resilient means such as spring means (not shown) may be provided for urging the upper roll downwardly. The upper roll normally cooperates with the lower roll 32 to drive the strip from left to right viewing the drawings.

The arms 35 are connected with each other by a cross bar 37 which carries adjustable stop screws 38 presenting their ends upwardly as shown. Connected with the upper platen 47 is a bracket 39 whose extremity is disposed above the stop screws 38. As the shearing members move toward each other, which in the particular type of shear shown in the drawings involves substantial downward movement of the upper shearing member and only slight upward movement of the lower shearing member, the bracket 39 engages the stop screws 38, which are in substantially fixed position in the direction of advance of the work, and as the bracket 39 moves downwardly and forwardly the bracket depresses the stop screws 38 and thus turns the arms 35 about the pivot means 36 and thus raises the upper pinch roll 31 a small fraction of an inch to interrupt the positive feed of the strip and permit the register pins to control the position of the leading end of the strip during shearing.

Conveying means are provided for conveying away the scroll sheared sheets. The conveying means may comprise a multiple belt endless conveyor. One of the two shafts of the endless conveyor is shown at 41, the other shaft being outside the limits of the drawings. The shaft 41 carries three pulleys, two being narrow outside pulleys 42, and the third being a wide inside pulley 43. Similar pulleys are carried by the cooperating shaft. Narrow outside belts 44 are carried by the pulleys 42 and a wide inside belt 45 is carried by pulleys 43. The conveyor comprising the belts 44 and 45 operates in the direction indicated by the arrows. The spaces between the belts are provided for the lower extensions 23 with the bushings 30 thereon and the register pins 24 cooperating therewith. Desirably the conveyor operates at a speed in excess of the speed of the strip so that as soon as each scroll sheared sheet reaches the conveyor it will move forward relatively to the forward end of the strip as indicated in Figure 4.

At the beginning of a cycle the shearing members 3 and 4 are farthest apart as shown in Figure 1. In the preceding cycle register holes 10 have been formed in the leading end of the strip. The pinch rolls 31 and 32 are advancing the strip from left to right. The parts are shown in intermediate position in Figure 2 shortly before the register pins 24 enter the previously formed register holes 10. The speed of the pinch rolls is adjusted so that just before each shearing operation of the scroll shears the register pins 24 enter the register holes 10 in the strip. Figure 3 shows the register pins in the register holes and extending into the sockets 40. Simultaneously the die members 20 form new register holes and the strip is sheared. Just before the shearing operation but after the noses of the register pins have entered the register holes the bracket 39 raises the upper pinch roll 31 as shown in Figure 3 so that at the instant of shearing and of forming the new register holes the

strip is positioned by the register pins **24** passing through the previously formed register holes **10** and into the sockets **40** as shown in Figure 3. Figure 4 shows the shearing members moving away from each other, the register pins **24** having been lifted out of the register holes **10** in which they positioned the forward end of the strip for shearing. The scroll sheared sheet **5** is advanced rapidly by the conveyor so that a space **46** is opened up between the trailing edge of the sheet and the leading edge of the strip as the parts move to the starting position for the succeeding cycle.

I thus make practicable for the first time the scroll shearing of sheets from continuously advancing strip due to the fact that through the register means the leading end of the strip is accurately positioned for shearing so that the sheets have the required longitudinal and transverse tolerances which have been obtainable heretofore only by relatively slow conventional shearing methods.

While I have shown and described a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. A method of shearing sheets from continuously advancing strip comprising cyclically acting on the continuously advancing strip by flying shears which advance with the strip while shearing it, simultaneously with each shearing action of the flying shears forming in the strip on the feed side of the transverse line of shearing at least one register hole, and just before each shearing action of the flying shears causing register means connected and moving with the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action.

2. A method of shearing sheets from continuously advancing strip comprising cyclically acting on the continuously advancing strip by flying shears which advance with the strip while shearing it, simultaneously with each shearing action of the flying shears forming in the strip on the feed side of the transverse line of shearing and adjacent each side edge of the strip a register hole, and just before each shearing action of the flying shears causing register pins connected and moving with the flying shears to enter the register holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action.

3. A method of shearing sheets from continuously advancing strip comprising positively advancing the strip, cyclically acting on the continuously advancing strip by flying shears which advance with the strip while shearing it, simultaneously with each shearing action of the flying shears forming in the strip on the feed side of the transverse line of shearing at least one register hole, just before each shearing action of the flying shears causing register means connected and moving with the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and also just before each shearing action of the flying shears but after the register means have entered the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears interrupting the positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing.

4. A method of shearing sheets from continuously advancing strip comprising cyclically acting on the continuously advancing strip by flying shears which advance with the strip while shearing it, simultaneously with each shearing action of the flying shears forming in the strip on the feed side of the transverse line of shearing at least one register hole, just before each shearing action of the flying shears causing register means connected and moving with the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and conveying away the sheets upon conveying means laterally offset from the longitudinal zone or zones of movement of the register means so that the register means upon passing through the hole or holes in the strip do not strike the conveying means.

5. A method of scroll shearing sheets having spaced apart tabs at their ends for blanking can ends or other generally rounded blanks from continuously advancing strip comprising cyclically acting on the continuously advancing strip by flying scroll shears which advance with the strip while shearing it, simultaneously with each shearing action of the flying scroll shears forming in the strip on the feed side of the transverse line of shearing at least one register hole located in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap, and just before each shearing action of the flying scroll shears causing register means connected and moving with the flying scroll shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying scroll shears whereby to accurately position the leading end of the strip for each shearing action.

6. Mechanism for shearing sheets from continuously advancing strip comprising cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing at least one register hole and register means also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action.

7. Mechanism for shearing sheets from continuously advancing strip comprising cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing and adjacent each side edge of the strip a register hole and register pins also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action.

8. Mechanism for shearing sheets from continuously advancing strip comprising strip feeding means for positively advancing the strip, cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feeding side of the transverse line of shearing at least one register hole, register means also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and means rendering the feeding means inoperative just before each shearing action of the flying shears but after the register means have entered the register hole or holes

formed in the strip simultaneously with the preceding shearing action of the flying shears so as to interrupt the positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing.

9. Mechanism for shearing sheets from continuously advancing strip comprising cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneoulsy with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing at least one register hole, register means also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and conveying means for conveying away the sheets, the conveying means being laterally offset from the longitudinal zone or zones of movement of the register means so that the register means upon passing through the hole or holes in the strip do not strike the conveying means.

10. Mechanism for shearing sheets from continuously advancing strip comprising pinch rolls for positively advancing the strip, cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feeding side of the transverse line of shearing at least one register hole, register means also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and means separating the pinch rolls just before each shearing action of the flying shears but after the register means have entered the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears so as to interrupt the positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing.

11. Mechanism for shearing sheets from continuously advancing strip comprising pinch rolls for positively advancing the strip, means mounting one of the pinch rolls for movement generally toward and away from the other pinch roll, cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feeding side of the transverse line of shearing at least one register hole, register means also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and lever means connected with the first mentioned means and having a portion in the path of movement of the flying shears adapted to be operated by the flying shears to move the first mentioned pinch roll away from the second mentioned pinch roll just before each shearing action of the flying shears but after the register means have entered the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears so as to interrupt the positive feed of the strip to permit the register means to control the position of the leading end of the strip during shearing.

12. Mechanism for shearing sheets from continuously advancing strip comprising cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing at least one register hole located in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap, an extension projecting from the flying shears in the direction of advance of the material and register means carried by and adjustably positionable along the extension to conform to sheets of different lengths adapted to enter the register hole or holes which have been formd in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action.

13. Mechanism for shearing sheets from continuously advancing strip comprising cyclically operable flying shears having opposed elements which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneoulsy with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing at least one register hole, opposed extensions carried by the respective opposed elements projecting in the direction of advance of the material and register means carried by the extensions, the register means comprising means adapted to pass through the register hole or holes which have been formed in the strip simultaneously with the preceding shearing action of the flying shears and socket means receiving the last mentioned means after passing through the register hole or holes whereby to accurately position the leading end of the strip for each shearing action.

14. Mechanism for shearing sheets from continuously advancing strip comprising cyclically operable flying shears which advance with the strip while shearing it, means connected and moving with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing at least one register hole, register means also connected and moving with the flying shears operable just before each shearing action of the flying shears to enter the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action and conveying means for conveying away the sheets, the conveying means comprising a plurality of generally side by side conveyors adapted cooperatively to support and convey away the sheets but having therebetween a space or spaces receiving the register means so that the register means upon passing through the hole or holes in the strip do not strike the conveying means.

15. Mechanism for shearing sheets from continuously advancing strip comprising strip feeding means for positively advancing the strip, cyclically operable flying shears which advance with the strip while shearing it, means connected and movable with the flying shears operable simultaneously with each shearing action of the flying shears to form in the strip on the feed side of the transverse line of shearing and adjacent each side edge of the strip a register hole and extension projecting from the flying shears in the direction of advance of the material, register pins carried by and adjustably positionable along the extension to conform to sheets of different lengths adapted to enter the register holes which have been formed in the strip simultaneously with the preceding shearing action of the flying shears whereby to accurately position the leading end of the strip for each shearing action, means rendering the feeding means inoperative just before each shearing action of the flying shears but after the register pins have entered the register holes which have been formed in the strip simultaneously with the preceding shearing action of the flying shears so as to interrupt the positive feed of the strip to permit the register pins to control the position of the leading end of the strip during shearing and conveying means

for conveying away the sheets, the conveying means being laterally offset from the longitudinal zones of movement of the register pins so that the register pins upon passing through the holes in the strip do not strike the conveying means.

16. Mechanism for scroll shearing sheets having spaced apart tabs at their ends for blanking can ends or other generally rounded blanks from continuously advancing strip comprising cyclically operable flying scroll shears which advance with the strip while shearing it, means connected and moving with the flying scroll shears operable simultaneously with each shearing action of the flying scroll shears to form in the strip on the feed side of the transverse line of shearing at least one register hole located in the portion of the material intermediate the portions to be blanked out and which first mentioned portion of the material will therefore ultimately become scrap and register means also connected and moving with the flying scroll shears operable just before each shearing action of the flying scroll shears to enter

the register hole or holes formed in the strip simultaneously with the preceding shearing action of the flying scroll shears whereby to accurately position the leading end of the strip for each shearing action.

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