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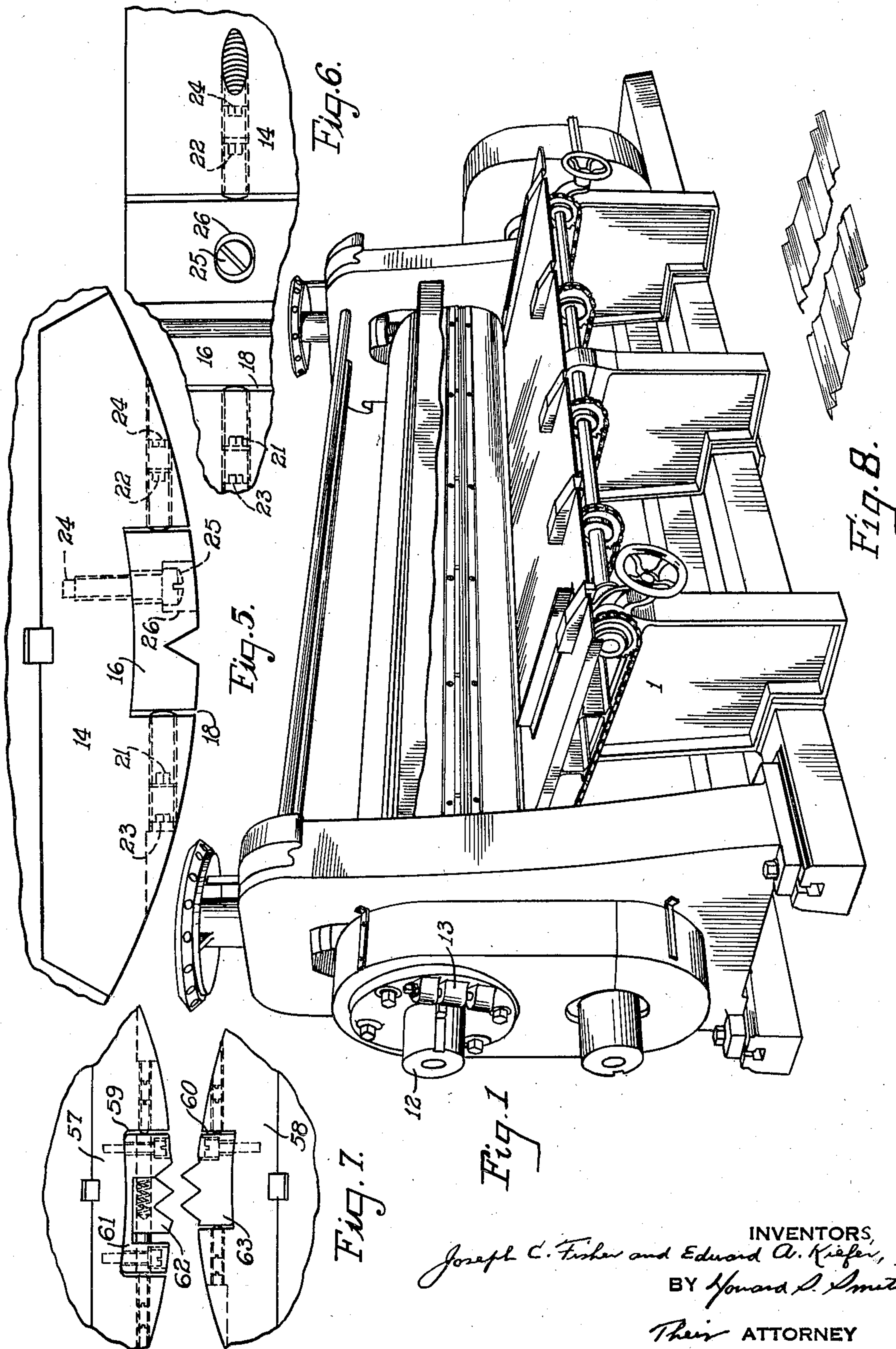
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2,022,082

DIE FOR TWO-ROLL CORRUGATING MACHINES

Filed March 8, 1935

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

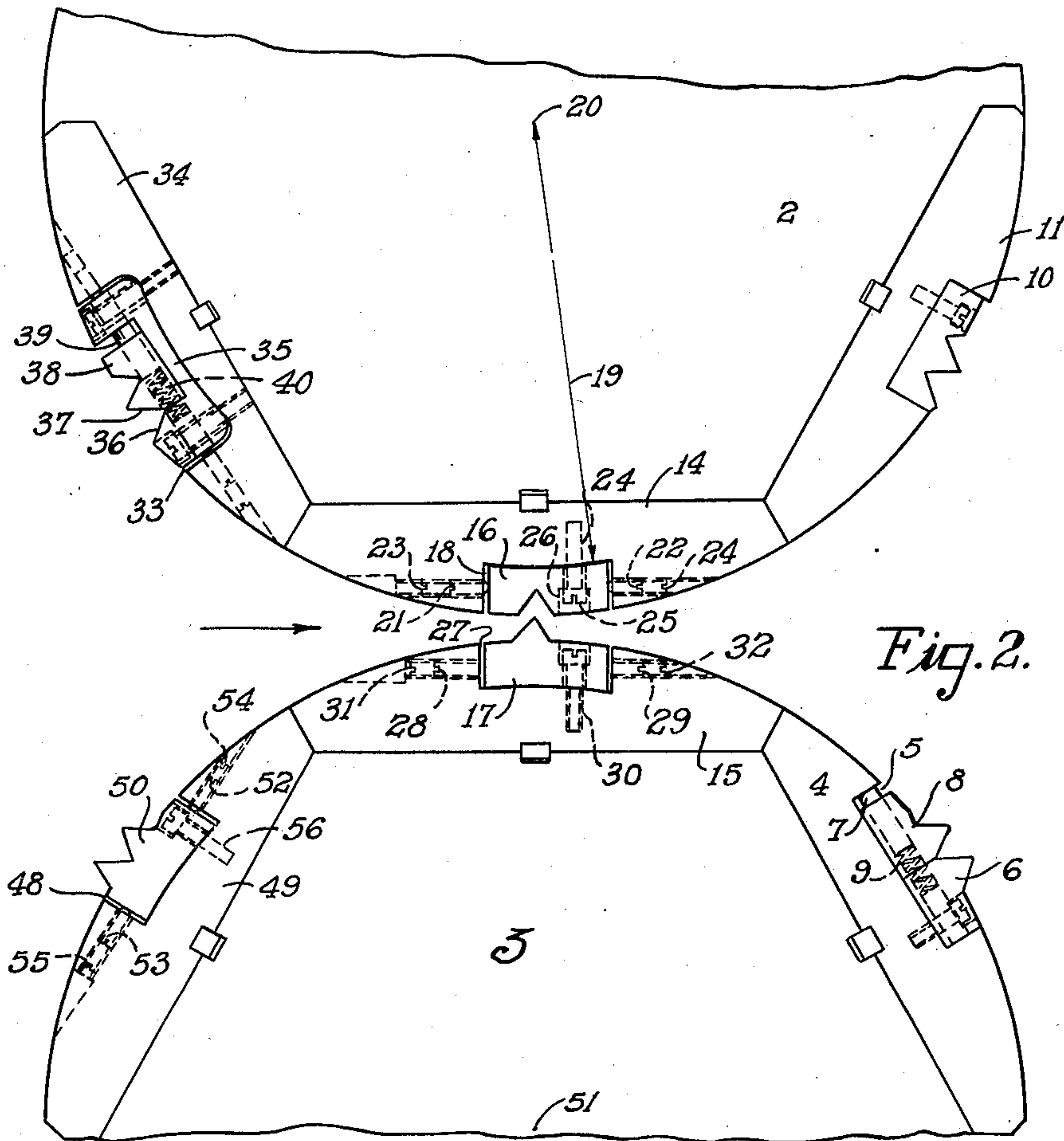


Fig. 2.

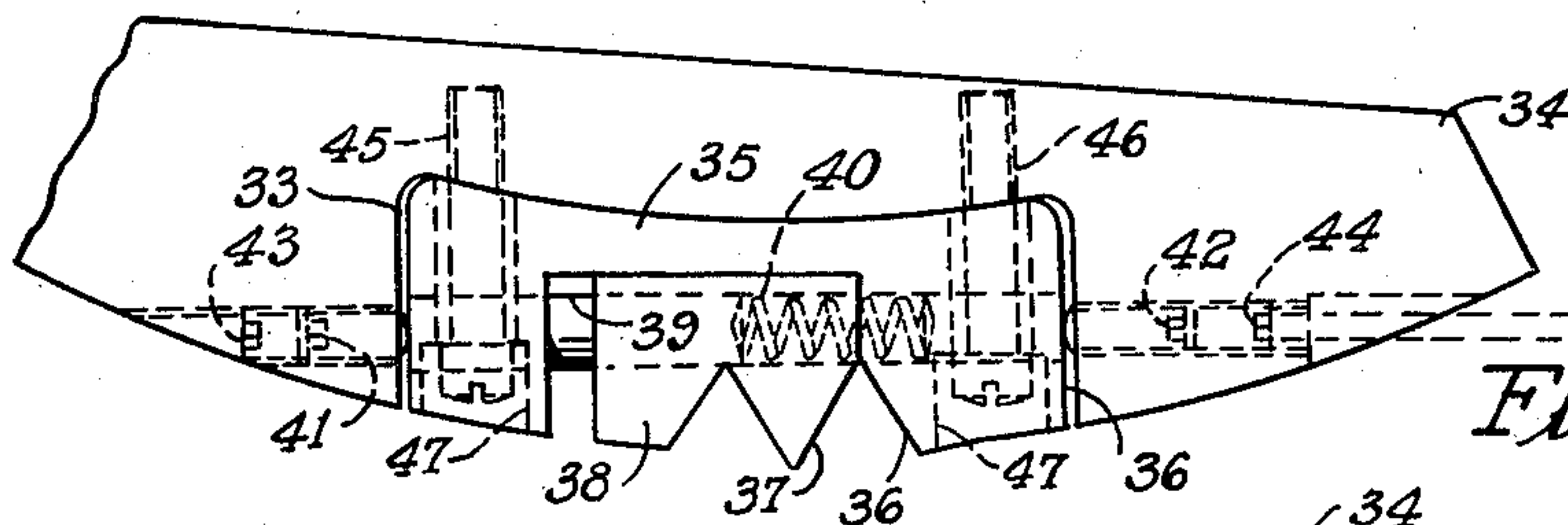


Fig. 3.

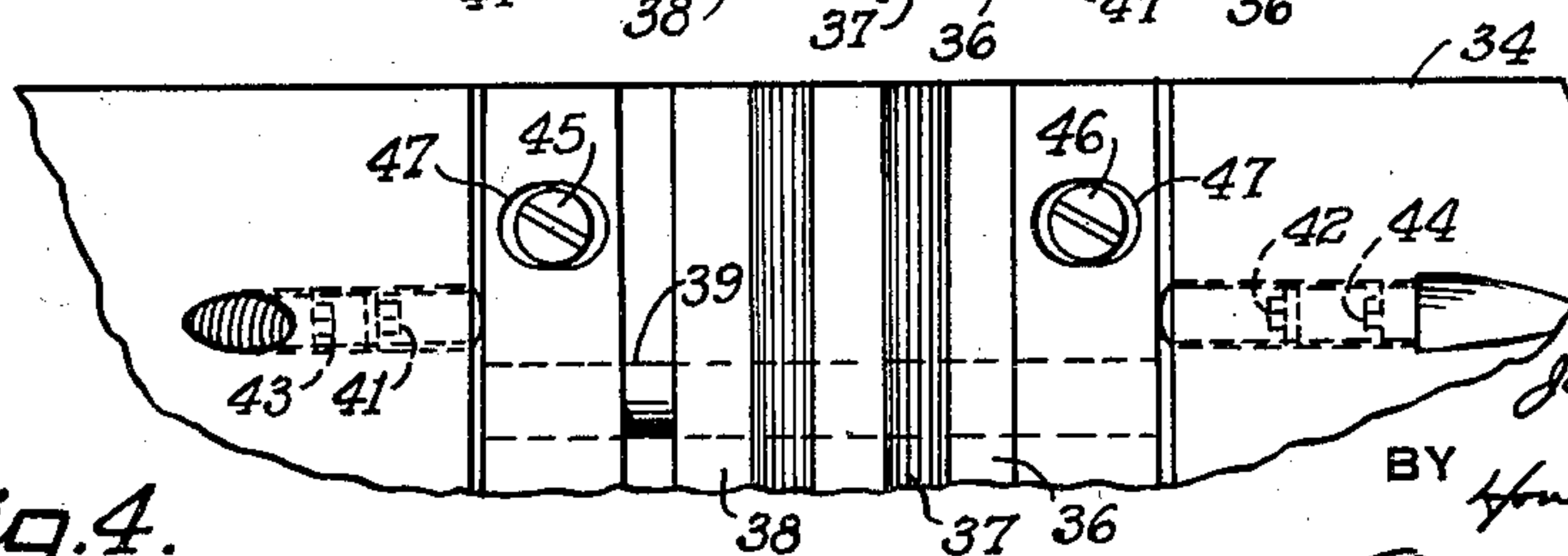


Fig. 4.

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## UNITED STATES PATENT OFFICE

2,022,082

## DIE FOR TWO-ROLL CORRUGATING MACHINES

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Application March 8, 1935, Serial No. 10,036

6 Claims. (Cl. 153-77)

This invention relates to new and useful improvements in dies for two-roll corrugating machines.

It is the primary object of the invention to provide adjustable dies for use on two-roll corrugating machines, and more particularly adjustable crimping dies for making V-crimp roofing more accurate in pitch, with more concise and clear shaped V's, and with more attractive and uniform radii at the tops and bottoms of the V's.

Variations in the temper of the material resulting from the different methods and processes employed by various sheet makers, cause one manufacturer's sheets to be harder and possess more springiness than the sheets made by another manufacturer. Hence it is impossible for a die manufacturer to make for all customers, standard sets of V crimp roofing dies that will place the V's in exactly correct locations on the sheets unless these sheets are made by the same methods and processes and have the same physical properties.

In order to obtain the exactly correct spacing of all the V's in the sheet regardless of the variations in the temper of the material, it is necessary that the second and third V-inserts be arcuately adjustable a small amount. It is therefore one principal object of our invention to provide for V-crimp roofing dies that are required to operate upon sheets of different degrees of hardness, floating and bolted inserts that are adapted to an easy and quick arcuate adjustment in the field to give the correct location of the V's in the sheets.

Another object of our invention is to provide V-crimp roofing dies that are interchangeable from one roll to the other.

It is another object of our invention to provide a roll in which a single, second or middle V-crimp die may be easily replaced by a floating double V-die to form with the other roll a 6 V-crimp roofing die after a double V has been substituted for the single middle V in that roll.

Other important and incidental objects will be brought out in the following specification and particularly set forth in the subjoined claims.

In the accompanying drawings illustrating our invention, Figure 1 is a perspective view of a two-roll corrugating machine of a well-known type. Figure 2 is a side view of the co-acting top and bottom rolls in this machine, showing the adjustable steel inserts therein. Figure 3 is a side view of one of the number 3 adjustable, floating

inserts. Figure 4 is a plan view of the same. Figure 5 is a side view of one of the middle, single V, adjustable dies. Figure 6 is a plan view of the same. Figure 7 is a side view showing the double V inserts in the middle positions on the top and bottom rolls to form a six V-crimp die. And Figure 8 is a plan view of a piece of 5-V crimp roofing,—a product of our machine.

Referring to the accompanying drawings for a detailed description of our invention, the numeral 1 designates a two-roll corrugating machine of a well-known type. Suitably journaled for co-acting rotation in this machine is a top roll 2 and a bottom roll 3. In the present instance each roll has six sides.

In the first die plate 4 in the bottom roll 3 there is formed an axial peripheral recess 5 that receives a steel piece 6 which is bolted to the die plate. The steel piece 6 on whose outer surface there is formed a single inverted V projection, carries a plurality of spaced pins 7 on which a series of shorter steel pieces 8 are slidably mounted within the recess 5. Each one of these pieces is formed at its outer periphery with an inverted V-projection which is immediately adjacent the similar projection on the fixed piece 6. The pieces 8 float on the pins 7 in relation to the pitch or spacing between them and the bolted piece 6, so that pieces 8 may float the necessary amount to effect the proper bite on the incoming flat sheet (not shown) and move the bite of it toward the bolted steel piece 6. In doing so, it will fold, rather than draw, the metal in forming the first double V in the five crimp sheet, thereby greatly reducing the likelihood of cracking and peeling the spelter on the sheet near and at the bends or crimps.

The floating steel pieces 8 are gently held in a yielding position away from the bolted steel piece 6 by a number of small helical springs 9 whose ends fit in aligned recesses in the floating pieces and the bolted piece.

The floating steel pieces 8 are actuated by their meshing with a steel female double V-piece 10 bolted in a recess adapted to receive it in the first die plate 11 in the top roll 2. The proper relation of the first top and the first bottom steel pieces may be obtained through the conventional method of radially adjusting the top roll neck 12 by conventional adjusting mechanism 13 on the top roll end gear.

As the rolls 2 and 3 revolve, advancing the sheet toward the steel inserts in the second or middle top and bottom die plates 14 and 15 respectively, the floating steel pieces 8 in the



first bottom die plate 4 are automatically reset by the gentle pressure of their respective springs 9.

The second die plates 14 and 15 carry steel V inserts 16 and 17 respectively. These inserts are arcuately adjustable in relation to their respective die plates by the following means, for the purpose of locating the single or middle V in the exact position required on the sheet.

Formed in the second die plate 14 in the top roll 2 is an arcuate recess 18 in which the V insert 16 is arcuately movable a short distance to the right or the left with a radius 19 drawn from it to the center 20 of the roll. This adjustment is effected by hollow head set screws 21 and 22 in drilled and tapped holes on either side of the insert 16 in the die plate 14. (See Figures 2, 5, and 6.) These set screws are held secure against loosening by hollow set screws 23 and 24 locked tightly against them in the outer ends of the tapped holes in said die plate. A radial screw 25 which enters a radial tapped hole in the die plate 24, holds the insert firmly against the bottom of the recess 18. When the screw 25 is loosened, the insert is free to be adjusted in either direction by the hollow head set screws 23 and 24, since a longitudinal slot 26 formed in the insert surrounds the head of the screw 25.

The second V-insert 17 in the recess 27 in the die plate 15 in the bottom roll 3 may be similarly adjusted by hollow head set screws 28 and 29 after a radial screw 30 is loosened. When in their adjusted positions, the set screws 28 and 29 are held against loosening by hollow head set screws 31 and 32 respectively.

Having formed the first double V and the single or middle V in the sheet, the latter is advanced toward the last double V which is formed in the same manner as the first double V. However, before the last double V is formed, the rolls having a bite on the sheet, in advancing it, set up a different condition from that existing in forming the first double V. This is due to the fact that all the metal for forming the last double V must be advanced from the unformed edge of the sheet toward the inserts. It is therefore necessary in order to fold, instead of excessively draw, the metal, to have floating inserts on the third top die plate and a bolted double V-insert in the third bottom die plate.

Mounted for arcuate adjustment in a recess 33 in the third die plate 34 in the top roll 2 is a series of inserts or retainers 35. Each of these inserts comprises an elongated U-shaped steel piece having a forward leg portion with an inclined side 36 which forms a V-recess with the inclined side 37 of a floating steel piece 38. This floating piece is slidably mounted on pins 39 similar to the pins 7, that project forwardly from the rear leg portion of the U-piece 35. (See Figures 2, 3, and 4.) The floating steel pieces 38 are held in a yielding position away from the fixed portion 36 of the insert 35 by a number of small helical springs 40 whose ends fit in aligned recesses in the floating pieces and the fixed portion of the insert.

For the purpose of effecting an arcuate adjustment of the insert 35, about the center 20 of the roll 2, in the recess 33 in the die plate 34, we have provided means similar to those employed in adjusting the middle V inserts 16 and 17. Referring to Figures 3 and 4, the numerals 41 and 42 designate hollow head set screws in drilled and tapped holes in the die plate 34, on either side of the insert 35 for engagement with

it. These set screws are held secure against loosening by hollow head set screws 43 and 44 in the outer ends of the tapped holes in said die plate. Radial screws 45 and 46 pass through slots 47, 47 in the insert 35, into radial holes in the die plate to hold the adjusted insert firmly to the latter.

Within a recess 48 in the third die plate 49 in the bottom roll 3 we have also provided an arcuately adjustable double V steel insert 50. This insert, which does not contain a floating V-member, may be interchanged with the insert 35 in the top roll 2.

For the purpose of arcuately adjusting the insert 50, about the center 51 of the bottom roll 3, we have provided in drilled and tapped holes in the die plate 49, hollow head set screws 52 and 53, similar to the set screws 41 and 42. The set screws 52 and 53 are adapted to be locked in their adjusted position by hollow head set screws 54 and 55 similar to the set screws 43 and 44 respectively.

For the purpose of holding the insert 50 securely against the arcuate bottom of the recess 48 in the die plate 49, we have provided a radial screw 56, similar to the screw 30. The head portion of this screw is received by a slot in the insert 50, while its shank portion enters a tapped hole in the die plate below the insert.

It will thus be seen that the floating inserts, as well as the fixed inserts in the second and third top and bottom die plates, are arcuately adjustable by the means before described in order to make it possible to obtain the exactly correct spacing of all the V's in the sheet, regardless of the variation in the temper of the material.

If it is desired to provide for six V crimp roofing, the die plates 14 and 15 carrying the middle inserts 16 and 17 may be easily taken off and replaced by die plates 57 and 58 formed with arcuate recesses 59 and 60 respectively. (See Figure 7). In the recess 59 in the die plate 57 there is mounted adjustable retainers 61 similar to the retainers 35, which carry floating pieces 62 similar to the floating pieces 38 for the purpose of forming with the bottom adjustable inserts 63 in the recess 60 in the die plate 58, a double V in the sheet that will not crack its spelter.

It is also to be understood that the bottom roll 3 may be converted into the female die roll and the top second into the male die roll by interchanging the dies. The double and single V-inserts are made removable and interchangeable for this purpose.

If it is desired to provide for four crimp V roofing, the middle inserts 16 and 17 may be taken out and replaced by blanks. In Figure 8 we have illustrated a piece of 5-V crimp galvanized roofing 63 which is a product of our machine.

Having described our invention, we claim:

1. In a two-roll corrugating machine, a top roll and a bottom roll to receive between them a sheet to be crimped, a pair of co-acting V inserts in the first positions on said rolls, a pair of co-acting V inserts in the second positions on said rolls, a pair of co-acting V inserts in the third positions on said rolls, and means for arcuately adjusting the second and third V inserts to obtain the correct spacing of all the V's on the sheet irrespective of the variations in the temper of the material thereof.

2. In a two-roll corrugating machine, a top roll and a bottom roll to receive between them a sheet to be crimped, a first, a second and a third die plate in each roll, co-acting V inserts carried



by the first die plates, the second and third die plates being formed with arcuate recesses, co-acting V inserts in the recesses in the second and third die plates in said rolls, and set screws engaging the second and third V inserts to arcu-  
 5 ately adjust them about the centers of the rolls to obtain the correct spacing of all the V's on the sheet irrespective of the variations in the temper of the material thereof.

10 3. In a two-roll corrugating machine, a top roll and a bottom roll to receive between them a sheet to be crimped, a double V insert secured in the first position in the bottom roll, a floating double V insert in the first position in the top  
 15 roll for co-action with the first insert below it, a pair of co-acting V inserts in the second positions on said rolls, a double V insert secured in the third position in the bottom roll, a floating double V insert in the third position on the top  
 20 roll for co-action with the third insert below it, and means for arcuately adjusting the second and third floating and fixed inserts to obtain the correct spacing of all the V's on the sheet ir-  
 25 respective of the variations in the temper of the material thereof.

4. In a two-roll corrugating machine, a top roll and a bottom roll to receive between them a sheet to be crimped, a first, a second and a third die plate in each roll, co-acting V inserts carried  
 30 by the first die plate, the second and third die plates being formed with arcuate recesses, co-acting V inserts in the recesses in the second and third die plates in said rolls, said second and third die plates being formed with oppositely  
 35 disposed tapped holes communicating with said

recesses, and set screws in said holes for engage-  
 ment with the sides of the inserts in said recesses to arcuately adjust them about the centers of the rolls as axes to obtain the correct spacing of all the V's on the sheet irrespective of the temper of  
 5 the material thereof.

5. An adjustable V crimp die insert for a die plate on a roll of a two-roll corrugating machine, comprising an arcuate V insert formed with a  
 10 wide longitudinal slot at one side of the V, a screw in said slot for entrance into a tapped hole in the die plate, and set screws in tapped holes in the die plate for engagement with the  
 15 sides of said insert to arcuately adjust it about the center of the roll.

6. An adjustable V crimp die insert for a die plate on a roll of a two-roll corrugating machine, comprising an arcuate V-shaped insert, the legs of which point outwardly, pins projecting in-  
 20 wardly from the trailing leg of the insert, a piece floatingly mounted on said pins and formed at its outer periphery with a V projection, the trail-  
 25 ing end of said piece and the leading leg of the insert having inclined faces to form with the V projection a double V recess, springs for yield-  
 30 ingly holding the floating piece away from the inclined face of the leading leg of the insert, said insert formed with a longitudinal slot on each side of the double V, a screw in each slot for en-  
 35 trance into a tapped hole in the die plate, and set screws in tapped holes in the die plate for en-  
 gagement with the side of said insert to adjust it about the center of the roll.

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