

April 2, 1935.

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1,996,382

SEAMING MECHANISM

Original Filed Aug. 2, 1933 2 Sheets-Sheet 1

Fig. 1.

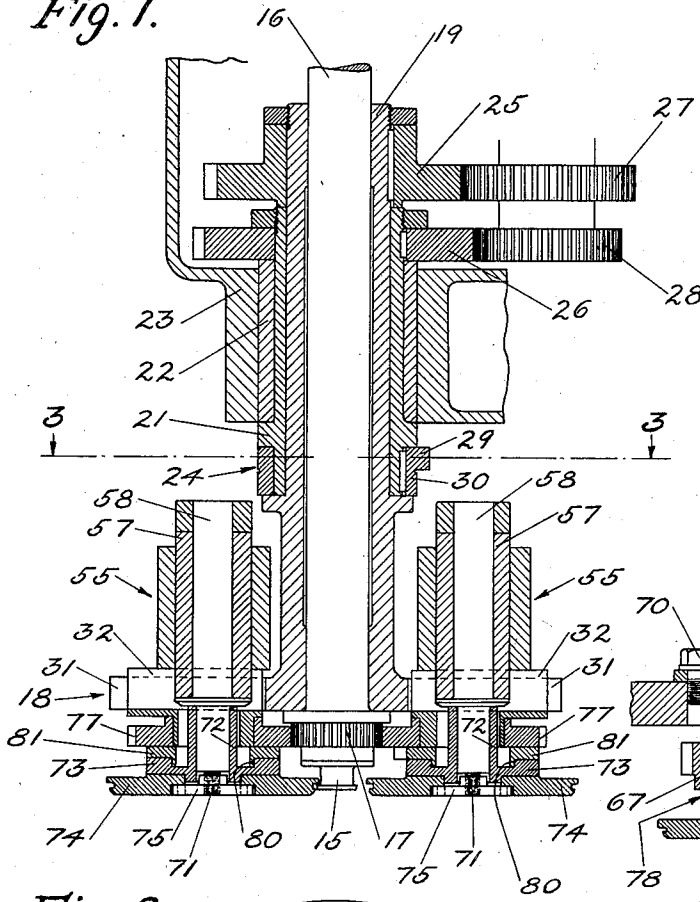


Fig. 6.

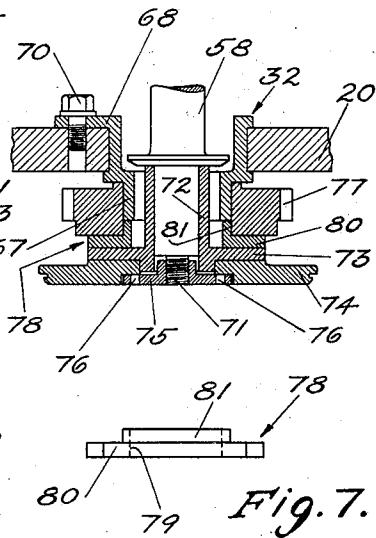


Fig. 2.

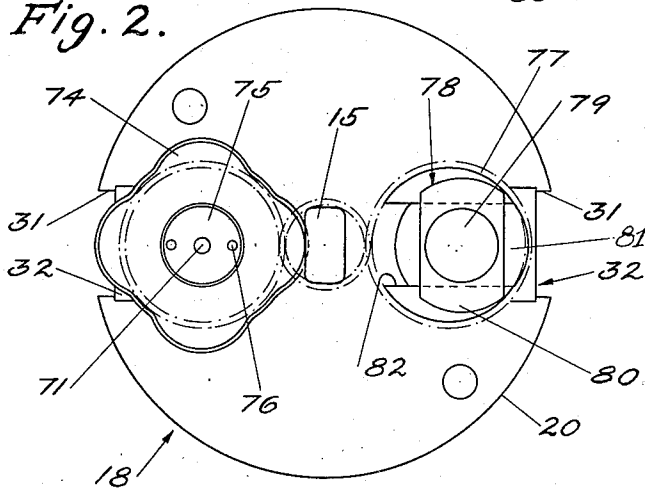


Fig. 7.

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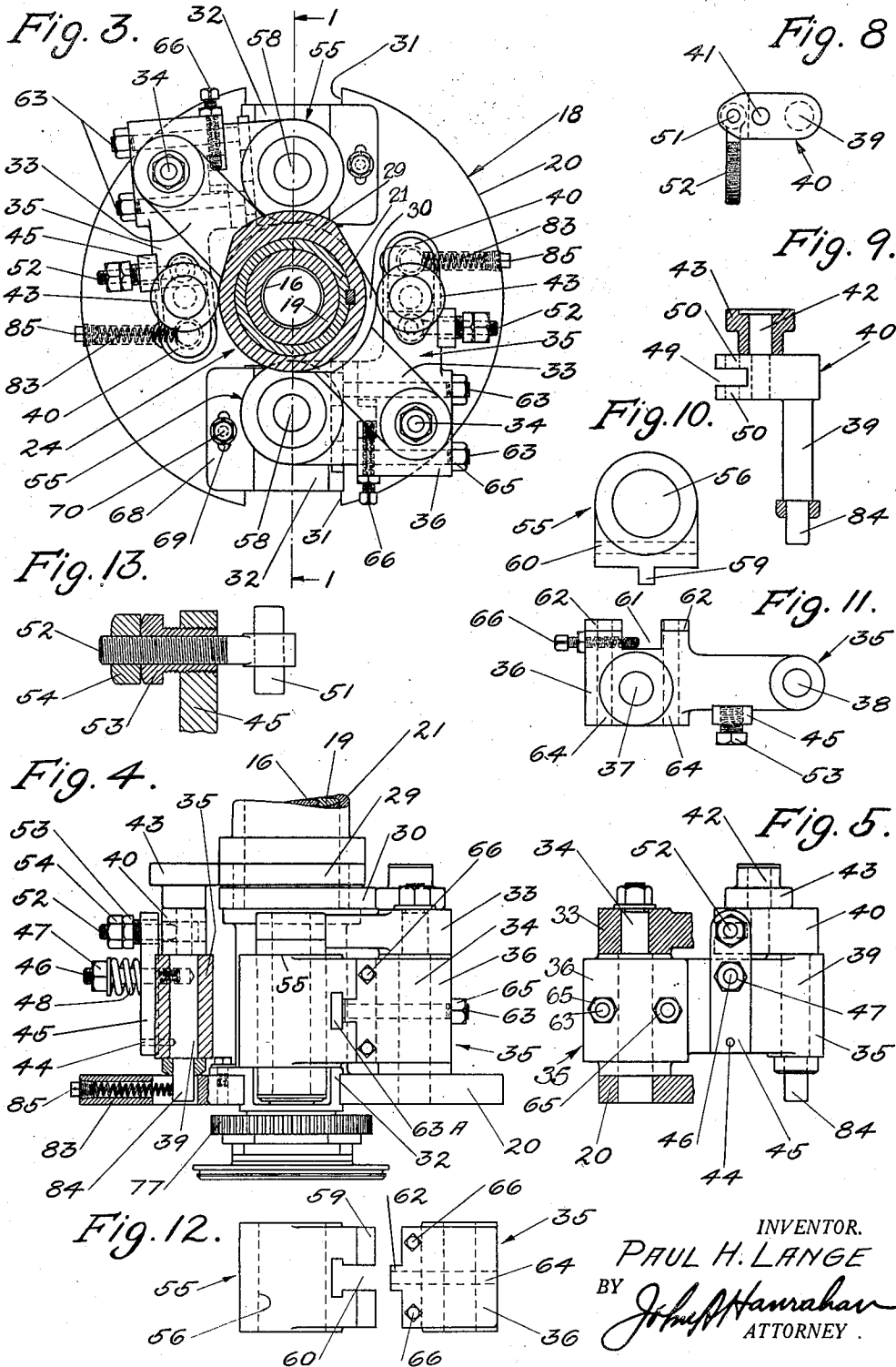
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SEAMING MECHANISM

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SEAMING MECHANISM

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12 Claims. (Cl. 113—24)

This invention relates to new and useful improvements in seaming mechanism and has for an object to provide a seaming mechanism for attaching ends or covers to can bodies of square, oblong or other irregular shape and which seaming mechanism is a simple and well balanced mechanism suitable for high speed production.

With the foregoing and other objects in view, as will latter become more apparent, the invention includes certain features of construction, combination and arrangement of parts as more particularly shown in the accompanying drawings and pointed out in the claims. It is to be understood, however, that the invention is not limited to the specific structure disclosed and that the invention includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view taken substantially along the lane of the line 1—1 of Fig. 3 and showing a seaming mechanism incorporating the features of the present invention;

Fig. 2 is a bottom plan view of the mechanism, one seaming roller being omitted to better illustrate a drive means employed;

Fig. 3 is a horizontal sectional view taken substantially along the plane of the line 3—3 of Fig. 1;

Fig. 4 is a side elevational view taken as looking from the lower side of Fig. 3, parts being broken away to better illustrate details of construction;

Fig. 5 is a detail elevational view taken as when looking from the right in Fig. 4;

Fig. 6 is a detail sectional view on an enlarged scale and showing the structure of the lower end portion of a seaming roller carrying spindle;

Fig. 7 is an edge elevational view illustrating a driving coupling;

Fig. 8 is a plan view of a cam roller carrying auxiliary lever employed;

Fig. 9 is a side elevational view of said lever with a cam roller in place thereon, the cam roller being shown in section;

Fig. 10 is a plan view of a holder for a seaming roller spindle;

Fig. 11 is a similar view of a cam roller lever on which said holder and auxiliary lever are to be adjustably mounted;

Fig. 12 is an end elevational view showing in slightly separated relation the holder of Fig. 10 and the lever of Fig. 11, the view suggesting the manner of assembling of these parts; and

Fig. 13 is a sectional view on an enlarged scale showing a screw adjustment employed.

Referring in detail to the drawings, at 15 is shown a stationary chuck or work holder mounted on a stationary shaft or support 16 and also mounted on said support above the work holder or chuck is a gear 17, keyed or otherwise rigidly secured to the support so as to be stationary therewith. Mounted for turning movement about the support 16 is a seaming head generally designated 18 and including a long sleeve or tubular portion 19 mounted on the support 16 and at its lower end carrying a flange 20. Obviously, any suitable bearing means may be provided for the sleeve 19.

A somewhat shorter sleeve 21 is mounted on the sleeve 19 and this shorter sleeve is for a portion of its length received by a bushing or other bearing means 22 mounted in a suitable support 23. It will be apparent that plate 20 forms part of the seaming head 18 and in fact forms that part on which the operating mechanism is mounted. Therefore, the entire seaming head will rotate with the sleeve 19. A cam means 24 carrying first and second operation cams, as will later be more fully set forth, is carried by the sleeve 21 so as to rotate therewith. To the sleeve 19 there is secured a gear 25 and a gear 26 is secured to the sleeve 21. Meshing with the gears 25 and 26 are gears 27 and 28 respectively driven at a continuous and constant speed. The ratio between the respective gears is such as to give the desired differential as, for example, the seaming head may have eight revolutions while the cam is making seven revolutions so as to give a differential of one. Of course, the revolutions may be 9 and 8, or anything else desired as long as a differential of one is obtained.

On the seaming head 18 are arranged first and second operation seaming mechanisms and as these mechanisms are duplicates of one another, with the exception of the seaming rollers, a description of one will suffice for both. It will be evident that either set of mechanisms may be the first seaming operation mechanism and that the other set of mechanism will necessarily be set to perform the second seaming operation. For the purpose of operating the first and second operation mechanisms the cam means 24 includes upper and lower cams 29 and 30 arranged in predetermined relationship to operate the respective mechanisms at the proper times.

To mount the seaming mechanisms the disc or plate 20 is notched or cut away in its opposite sides as at 31 and in the notches thus formed the disc receives bearing boxes 32 the purpose

and mounting of which will later be more fully set forth. Extending outwardly from opposite sides of the sleeve 19 are arms 33 and mounted by said arms and the plate 20 are pivot pins 34 on which are pivotally mounted cam levers 35. Each lever 35 includes (see Fig. 11), at one end, an enlarged head portion 36 having an opening 37 therethrough and which opening receives a pivot pin 34, whereby the lever is pivotally mounted.

In its opposite end portion lever 35 is provided with an opening 38 extending parallel with the opening 37 and this opening 38 rotatably receives the spindle 39 of an auxiliary lever or arm 40 shown more particularly in Figs. 8 and 9. This auxiliary lever 40 is in the nature of an arm extending radially from one end of the spindle 39. At a point spaced from its spindle 39 the auxiliary lever or arm 40 is provided with an opening 41 receiving the spindle 42 of a cam roller 43, the arrangement obviously being such that the cam roller is eccentric with relation to the spindle 39.

Pivoted to the cam lever 35 at 44 is a bar 45 extending above the lever and having its upper end portion arranged at one side of the arm 40. A bolt or stud 46 is carried by the lever and extends through the intermediate portion of the bar 45, and threaded on the outer end of said bolt or stud is a nut 47 between which and the bar there is arranged a stiff coil spring 48. Obviously, the tendency of this spring is to force the bar 45 in the direction of the lever 35 and the arm 40. The arm is bifurcated at its outer end as at 49 and each portion of said outer end is perforated as at 50 to receive a cross stud 51 carried by an eyebolt 52 extending through the upper portion of the bar 45. Threaded into said portion about the said screw is a tubular screw 53 which latter has both internal and external threads whereby a micrometer adjustment is provided. A lock nut 54 may be threaded on the outer end of 52.

With the described arrangement, it will be apparent that the spring 48 and bar 45 tend to cause turning movement of the spindle 39 in the opening 38 to, at least, carry the arm 40 into alignment with the lever 35. By adjusting the tubular screw 53 the position of the arm 40 with respect to the lever 35 may be very minutely adjusted.

One side of the enlarged portion or head 36 of the lever 35 is formed to provide an adjustable mounting for a seaming tool or roller spindle holder 55. This holder 55 includes a body portion having an opening 56 therethrough for the reception of a bushing 57 in which is mounted the seaming tool spindle 58. To one side of opening 56 the body carries a projecting fin 59 cut by a groove 60 which latter is T-shaped as best shown in Fig. 12. The head portion 36 of the cam lever is provided with a vertical slot 61 of considerable width and intermediate its upper and lower edges, said head carries a rib 62 intersected by said slot.

In assembling the holder 55 on the head of the cam lever, the parts are so arranged that the rib 62 enters the groove 60 and the fin 59 enters the slot 61. T-bolts 63 are provided and have their heads 63A disposed in the inner portion of the T-shaped groove 60 and then extend through openings 64 in the head of the lever 35 and at their outer ends carry nuts 65 adapted to be tightened to draw the holder against the head on the lever. Set screws or bolts 66 are carried

by the head portion of the cam lever and are arranged transverse with respect to the T-bolts 63 and enter the slot 61. The function of the screws 62 is to adjust the holder 55 radially with respect to the chuck or work holder 15 when the T-bolts 63 are loosened. This adjustment will later be again referred to.

It will be understood that the slots 31 in the disc 20 also extend radially with respect to the chuck or work holder. The bearing boxes 32 are mounted for adjustment inwardly and outwardly of the slots 32 and said bearing boxes are therefore radially adjustable with respect to the chuck or work holder. Each bearing box includes a depending tubular portion 67 disposed below the disc 20 and on the upper surface of the disc a flange 68 having an elongated slot 69 therein and through which slot extends a bolt 70 threaded into the plate. It will be apparent that on loosening of the bolt 70 the bearing box 32 may be moved inwardly or outwardly with respect to the chuck or work holder and then secured in the desired position of adjustment on re-tightening of the bolt.

Spindle 53 extends downwardly through the bearing box 32 and its extreme lower end is reduced and screw threaded providing a stud 71. Surrounding the lower end portion of the spindle is a sleeve 72 provided with a flange or plate-like portion 73 against the lower surface of which a seaming tool or roller 74 is clamped or secured as by a nut 75 threaded onto the portion 70 of the spindle. As disclosed nut 75 is provided with spaced openings 76 whereby the nut may be turned by a spanner wrench although it will be understood that this is but a detail which may be altered as convenient.

On the lower tubular portion 67 of the bearing box there is rotatably mounted a gear 77 meshing with the stationary gear 17 arranged above the chuck or work holder 15. The arrangement of the parts is such that gear 77 remains constantly in mesh with the gear 17 irrespective of the position of the tool or seaming roller 74. A universal driving coupling generally designated 78 forms a driving connection between the gear 77 and the spindle and seaming tool. Coupling 78 comprises a member substantially in the shape of a cross having its arms in parallel planes. As here disclosed this coupling is provided with an opening 79 whereby the coupling is loosely disposed about the sleeve 72 and the coupling includes arms 80 and 81 arranged at right angles to one another and arranged one above the other.

The gear 77 is provided with a slot 82 (see Fig. 2) slidably receiving the arm 81 of the coupling member and the plate or flange-like portion 73 of the sleeve 72 is provided with a groove arranged at right angles to the groove 82 of the gear and the arm 80 of the coupling member is arranged in this groove of said plate or flange portion. Figs. 1 and 6 are taken at right angles to one another and a comparison of these figures will make clear the structure. With this particular driving connection it will be apparent that the sleeve 72 will be driven by the gear 77 and that such sleeve will drive the tool 74. The gear 77 will remain in constant engagement or mesh with the gear 17 and owing to the universal driving connection the tool will be rotated irrespective of its position which varies as will now be described.

The generated shape of the seaming tools is well understood and no description of the tools will therefore be given. It is likewise true that

the general operation of machines of this character is well understood. When a cover is to be attached to a can, the cover is positioned on the can and the chuck of the proper configuration enters the cover. Thereafter, as the machine operates one tool gives the cover and the upper end portion of the can an initial curling and when the first tool completes its work the second tool comes into operation and seals the cover to the can.

During operation the tool 74 is moved toward and from the work and is carried about the work with the disc 20 and in addition revolves on its own axis which axis is formed by the spindle 58. As the parts move the cam roller 43 engages the cam means 24 with the result that there is a tendency to force the arm 40 outwardly by turning it on its spindle 39. This is prevented by the spring 48 pressing against the bar 45 and therefore engagement of the cam roller by the cam results in the lever 35 being rocked about its pivot pin 34 in a direction to carry the spindle and tool inwardly toward the work on the work holder or chuck.

Should a greater strain be placed on the part then required for double seaming, as when the tool is passing over a side seam of the can, the tool may move outwardly notwithstanding engagement between the cam and cam roller. This movement will, of course, result in a compressing of the spring 48 due to the upper portion of the bar 45 being forced outwardly. This permits of a turning movement of the arm 40 with its spindle 39 as an axis. Since the arm 40 turns outwardly on the vertical axis it will be apparent that the cam roller will remain in full engagement with the cam so that there will be no excessive wear. The cam roller is kept in engagement with the cam by means of a coil spring 83 arranged in a pocket in the disc 20 and at its inner end bearing against the extreme lower end portion 84 of the spindle 39. This spring 83 at its outer end bears against a screw plug 85 and the tension of the spring may, therefore, be adjusted.

Obviously, the seaming rollers and chuck may be easily removed for replacement to adapt the machine for work on various sizes and shapes of cans. Since the bearing box 32 may be adjusted radially with respect to the work holder it will be apparent that gear changes may be made when tool changes are made and without the use of any additional parts save the chuck or work holder, the rollers and the gears. It is not necessary to replace the cam levers 35 or other parts since by loosening the T-bolts 63 the tool spindle holders 55 may be adjusted inwardly or outwardly and to adjust them inwardly it is but necessary, when the T-bolts are loosened, to tighten the screws 66. If the spindle holders are to be adjusted outwardly this may be accomplished by loosening or backing off the screws 66 while the T-bolts are loose. Of course, when adjustment has been made the bolts must again be tightened up. Very fine adjustments of the arm 40 and the cam roller may be made by the micrometer screw adjustment above referred to.

It will be understood that as the cam engages the cam roller and moves from it, the tool 74 is carried to and from the chuck. The cam engagement with the roller forces the tool toward the chuck and the spring 83 causing the roller to bear constantly against the cam draws the tool away from the chuck. This latter action

will also be assisted by centrifugal force. The first and second cam rollers 43 are shown reversed with respect to one another whereby they will only engage the proper cam 29 or 30 of means 24. Obviously, either roller may be on the first operation seaming mechanism.

Having thus set forth the nature of my invention, what I claim is:

1. In a seaming mechanism, a stationary work holder, a seaming head, means for rotating said seaming head about said work holder, a cam, means to rotate said cam, a pivoted cam lever on said seaming head, a roller on said lever, means normally holding said roller in engagement with said cam whereby said lever may be rocked by said cam, a seaming tool spindle holder, means mounting said seaming tool spindle holder on said lever for movement therewith and for adjustment thereon radially relative to said work holder, a seaming tool spindle in and movable with and supported by said seaming tool spindle holder, a gear on said stationary work holder, a gear on the seaming head and meshing constantly with the gear on the work holder, a seaming tool carried by the spindle and adapted to be carried toward and from the work holder as said lever is rocked by the cam, and a flexible driving connection between the seaming tool and the gear on the seaming head whereby said gears remain in mesh while said tool is carried toward and from the work holder and said seaming tool is constantly driven.

2. In a seaming mechanism, a stationary work holder, a seaming head, means for rotating said seaming head about said work holder, a cam, means to rotate said cam, a pivoted cam lever on said seaming head, a roller on said lever, means normally holding said roller in engagement with said cam whereby said lever may be rocked by said cam, a seaming tool spindle holder, means mounting said seaming tool spindle holder on said lever for movement therewith and for adjustment thereon radially relative to said work holder, a seaming tool spindle in and movable with and supported by said seaming tool spindle holder, a bearing box in said seaming head below said tool holder, means mounting said bearing box for adjustment radially relative to said work holder, said spindle extending through said bearing box, a gear on said work holder, a gear on said bearing box and meshing constantly with the gear on the work holder, a seaming tool carried by the spindle below said bearing box and adapted to be carried toward and from the work holder independent of the bearing box as said lever is rocked by the cam, and a flexible driving connection between the tool and the bearing box carried gear whereby said tool is constantly driven as it is moved toward and from the work.

3. In a seaming mechanism, a stationary work holder, a seaming head, means for rotating said seaming head about said work holder, a cam means to rotate said cam, a pivoted cam lever on said seaming head, a roller on said lever, means normally holding said roller in engagement with said cam whereby said lever may be rocked by said cam, a seaming tool spindle holder, means mounting said seaming tool spindle holder on said lever for movement therewith and for adjustment thereon radially relative to said work holder, a seaming tool spindle in and movable with and supported by said seaming tool spindle holder, a bearing box in said seaming head below said tool holder, means mounting said bearing box for ad-

justment radially relative to said work holder, said spindle extending through said bearing box, a gear on said work holder, a gear on said bearing box and meshing constantly with the gear on the

5 work holder, a seaming tool carried by the spindle below said bearing box and adapted to be carried toward and from the work holder independent of the bearing box as said lever is rocked by the cam, a sleeve on the lower end portion of said spindle, 10 a plate carried by said sleeve and forming a support for said seaming tool, a driving connection between the bearing box mounted gear and said plate, said driving connection comprising a slot in the gear, a slot in the plate at right angles to the slot in the gear, and a cross shaped member 15 on the sleeve and having its respective arms slidably received in the slots of the gear and plate respectively.

4. In a seaming mechanism, a stationary work 20 holder, a seaming head, means for rotating said seaming head about said work holder, a cam, means to rotate said cam, a pivoted cam lever on said seaming head, a roller on said lever, means normally holding said roller in engagement with 25 said cam whereby said lever may be rocked by said cam, a seaming tool spindle holder, means mounting said seaming tool spindle holder on said lever for movement therewith and for adjustment thereon radially relative to said work holder, a 30 seaming tool spindle in and movable with and supported by said seaming tool spindle holder, a gear on said stationary work holder, a gear on the seaming head and meshing constantly with the gear on the work holder, a seaming tool carried 35 by the spindle and adapted to be carried toward and from the work holder as said lever is rocked by the cam, a sleeve on the lower end portion of said spindle, a plate carried by said sleeve and forming a support for said seaming tool, a 40 driving connection between the seaming head mounted gear and said plate, said driving connection comprising a slot in the gear, a slot in the plate at right angles to the slot in the gear, and a cross shaped member on the sleeve and having 45 its respective arms slidably received in the slots of the gear and plate respectively.

5. In a seaming mechanism, a pivotally mounted cam lever, a cam roller on one end portion of 50 said lever, said lever having its other end portion notched to provide a vertically extending slot, said end portion of the lever having a horizontally arranged rib, a seaming tool holder having a groove receiving said rib, a fin on said holder and entering said slot, means securing said holder 55 against the end portion of the lever with said rib in said groove and said fin in said slot, and means carried by said lever and engaging said fin and supporting it in the desired position of adjustment in said slot.

6. In a seaming mechanism, a cam and a seaming 60 head having a relative revolving motion one with respect to the other, a lever pivotally supported on the seaming head for movement in the plane of the cam, a seaming tool carried by said 65 lever, a cam roller to engage the cam, a support on said lever, said support including a spindle rotatably mounted by said lever and extending parallel with the face of the cam, an arm on said spindle and eccentric with respect thereto, spring 70 means normally tending to rotate said support on its spindle to carry said arm in the direction of said cam, and means mounting said cam roller on said arm to one side of said spindle and for movement with the arm toward and from the cam 75 in the plane of the latter whereby to admit of an

extra outward movement of the seaming tool notwithstanding engagement of and without changing the full face contact between the cam and cam roller.

7. In a seaming mechanism, a cam and a seaming 5 head having a relative revolving motion one with respect to the other, a lever pivotally supported on the seaming head, a seaming tool carried by said lever, a cam roller to engage the cam, a support on said lever, said support including a 10 spindle rotatably mounted by said lever and extending parallel with the face of the cam, an arm on said spindle and eccentric with respect thereto, a bar pivotally mounted on said lever, a micrometer screw connection between said bar and 15 the arm of said support whereby said support may be adjusted relative to said bar, spring means normally tending to move said bar in the direction of said lever to rotate said support and carry the arm thereof in the direction of the cam, and means 20 mounting the cam roller on said arm of the support whereby to admit of an extra outward movement of the seaming tool notwithstanding engagement of the cam and cam roller and without changing the full face contact between the cam 25 and cam roller.

8. In a seaming mechanism, a cam and a seaming 30 head having a relative revolving motion one with respect to the other, a lever pivotally supported on the seaming head, a seaming tool carried by said lever, a cam roller to engage the cam, a support on said lever, said support including a spindle rotatably mounted by said lever and extending parallel with the face of the cam, an 35 arm on said spindle and eccentric with respect thereto, a bar pivotally mounted on said lever, an adjustable connection between said bar and the arm of said support whereby said support may be adjusted relative to said bar, spring means normally tending to move said bar in the direction 40 of said lever to rotate said support and carry the arm thereof in the direction of the cam, and means mounting the cam holder on said arm of the support whereby to admit of an extra outward movement of the seaming tool notwithstanding 45 engagement of the cam and cam roller and without changing the full face contact between the cam and cam roller.

9. In a seaming mechanism, a stationary work 50 holder, a seaming head, means for rotating said seaming head about said work holder, a cam, means to rotate said cam, a pivoted cam lever, a roller on said lever, means normally holding said roller in engagement with said cam whereby said 55 lever may be rocked by said cam, a seaming tool spindle holder, means mounting said seaming tool spindle holder on said lever for movement therewith and for adjustment thereon radially relative to said work holder, a seaming tool spindle 60 in and movable with and supported by said seaming tool spindle holder, a bearing box in said seaming head below said tool holder, means mounting said bearing box for adjustment radially relative to said work holder, said spindle extending 65 through said bearing box, a gear on said work holder, a gear on said bearing box and meshing constantly with the gear on the work holder, a seaming tool carried by the spindle below said bearing box and adapted to be carried toward and 70 from the work holder independent of the bearing box as said lever is rocked by the cam, a flexible driving connection between the tool and the bearing box carried gear whereby said tool is constantly driven as it is moved toward and from the work, 75

a support on said lever, said support including a spindle rotatably mounted by said lever and extending parallel with the face of the cam, an arm on said spindle and eccentric with respect thereto, a bar pivotally mounted on said lever, an adjustable connection between said bar and the arm of said support whereby said support may be adjusted relative to said bar, spring means normally tending to move said bar in the direction of said lever to rotate said support and carry the arm thereof in the direction of the cam, and means mounting the cam roller on said arm of the support whereby to admit of an extra outward movement of the seaming tool notwithstanding engagement of the cam and cam roller and without changing the full face contact between the cam and cam roller.

10. In a seaming mechanism, a stationary work holder, a seaming head, means for rotating said seaming head about said work holder, a cam, means to rotate said cam, a pivoted cam lever, a roller on said lever, means normally holding said roller in engagement with said cam whereby said lever may be rocked by said cam, a seaming tool spindle holder, means mounting said seaming tool spindle holder on said lever for movement therewith and for adjustment thereon radially relative to said work holder, a seaming tool spindle in and movable with and supported by said seaming tool spindle holder, a bearing box in said seaming head below said tool holder, means mounting said bearing box for adjustment radially relative to said work holder, said spindle extending through said bearing box, a gear on said work holder, a gear on said bearing box and meshing constantly with the gear on the work holder, a seaming tool carried by the spindle below said bearing box and adapted to be carried toward and from the work holder independent of the bearing box as said lever is rocked by the cam, a flexible driving connection between the tool and the bearing box carried gear whereby said tool is con-

stantly driven as it is moved toward and from the work, a spring pressed rotatable support on said lever, and said support carrying the cam roller to thereby admit of an extra outward movement of the seaming tool notwithstanding engagement of the cam and cam roller.

11. In a seaming mechanism, a cam and a seaming head having a relative revolving motion one with respect to the other, a lever pivotally supported on the seaming head, a seaming tool carried by said lever, a cam roller to engage the cam, a support on said lever, said support including a spindle rotatably mounted by said lever and extending parallel with the face of the cam, an arm on said spindle and eccentric with respect thereto, spring means normally tending to rotate said support on its spindle to carry said arm in the direction of said cam, means mounting said cam roller on said arm to one side of said spindle whereby to admit of an extra outward movement of the seaming tool notwithstanding engagement of the cam and cam roller and without changing the full face contact between the cam and cam roller, and spring means engaging the lower end of said spindle and serving to maintain said cam lever in position with said roller in engagement with the cam.

12. In a seaming mechanism, a work holder, a cam lever, a vertical pivot mounting said lever, a cam roller on one end portion of said lever, a seaming tool holder on the other end portion of the lever, one of said lever and holder having a vertically extending slot and the other having a fin of less width than the slot and entering the latter, means mounting said tool holder on the said other end of the lever for movement therewith and for adjustment in a direction crosswise of said slot and radially of the work holder, and means engaging the fin and securing it in the desired position in said slot to secure the tool holder in the desired position of adjustment.

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