

J. KROHN.  
SHEET METAL VESSEL MAKING MACHINE.  
APPLICATION FILED NOV. 28, 1910.

1,020,560.

Patented Mar. 19, 1912.

9 SHEETS—SHEET 1.

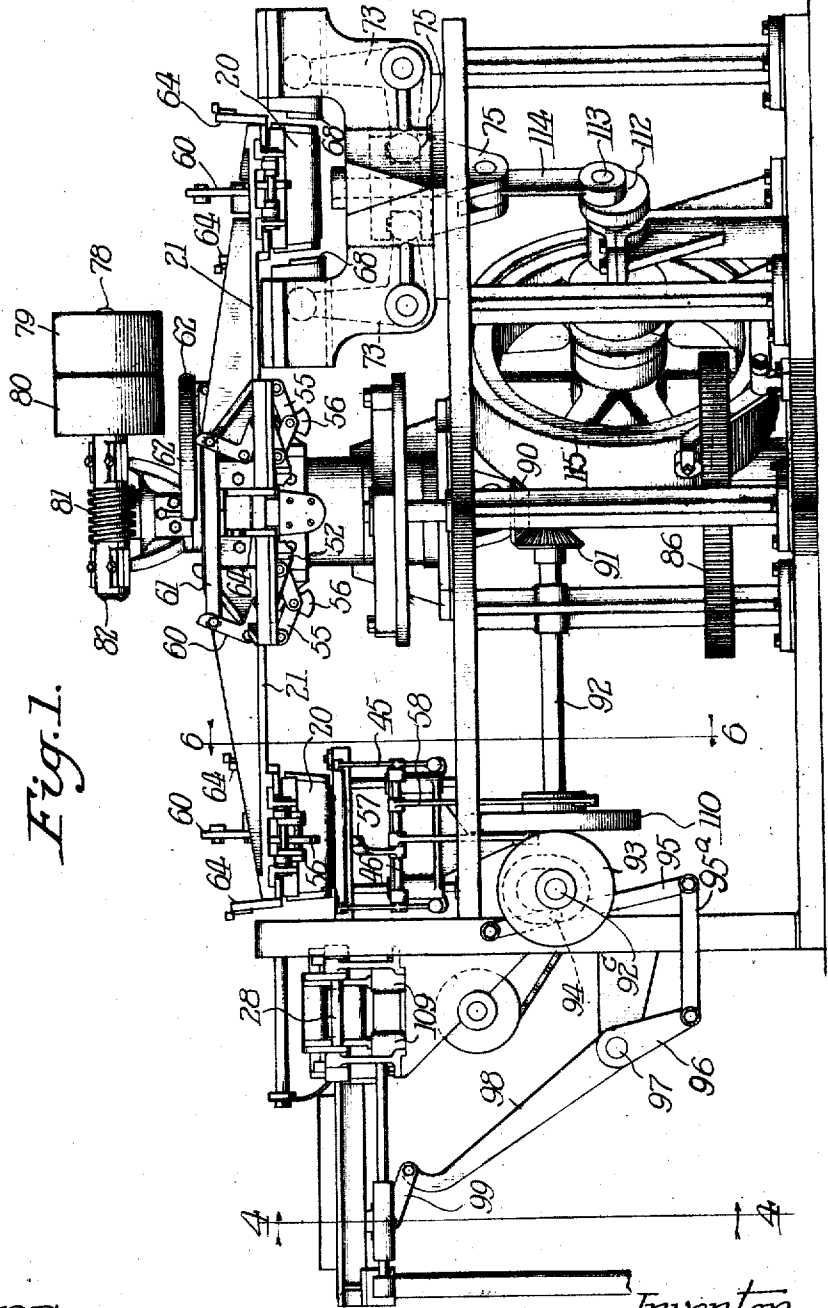


Fig. 1.

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*Paul Abrams.*

Inventor  
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by *Monday, Evans, Peacock and*  
*Clark* his Attys

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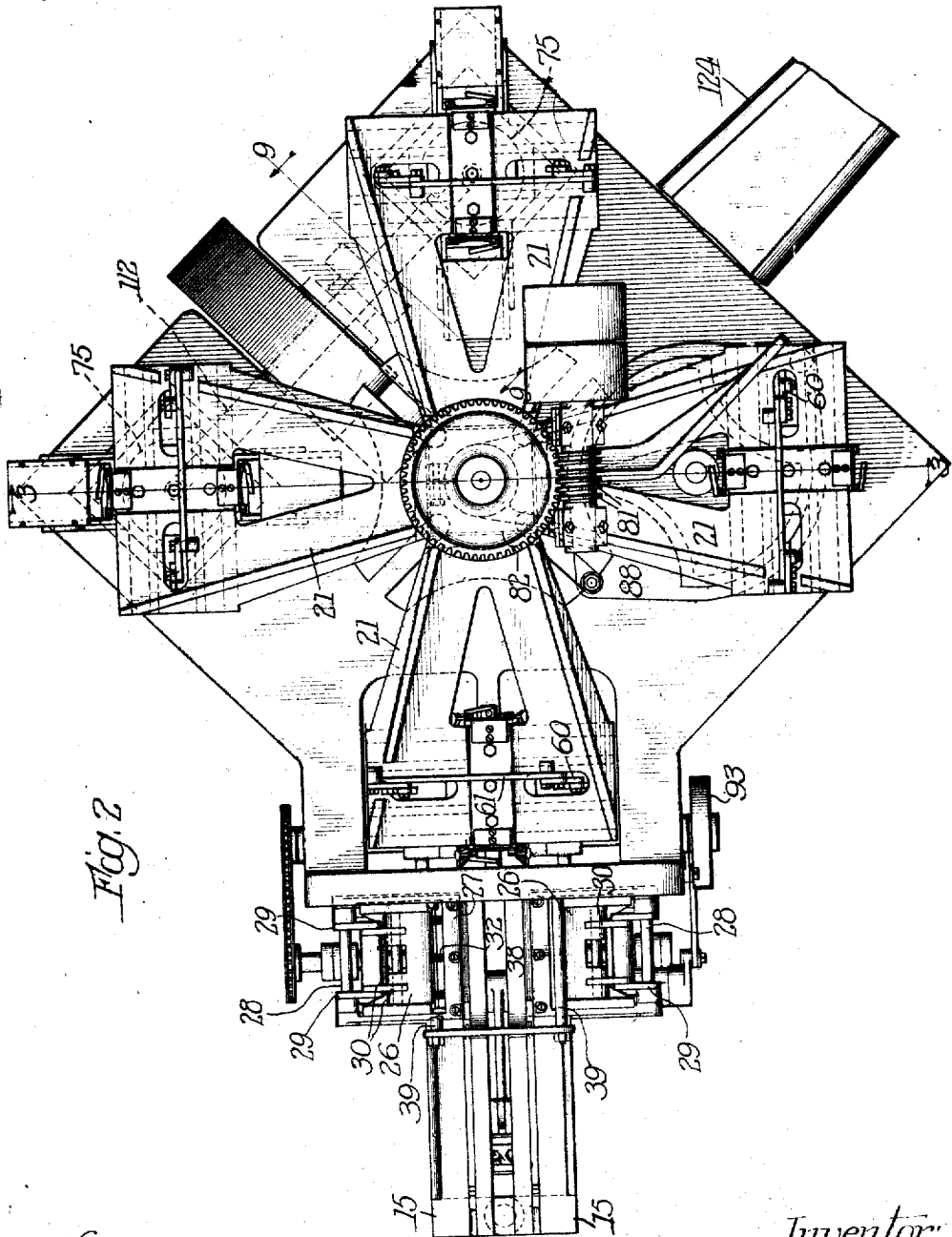


Fig. 2

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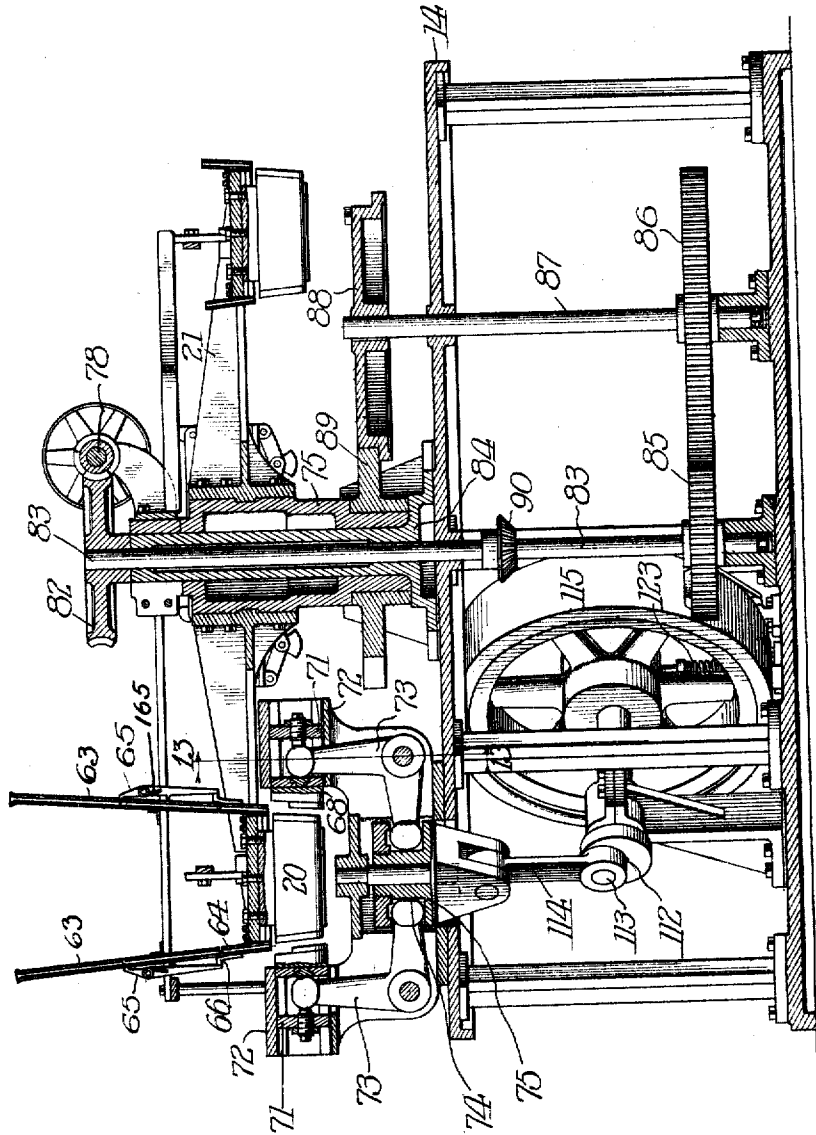
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9 SHEETS—SHEET 3.

Fig. 3



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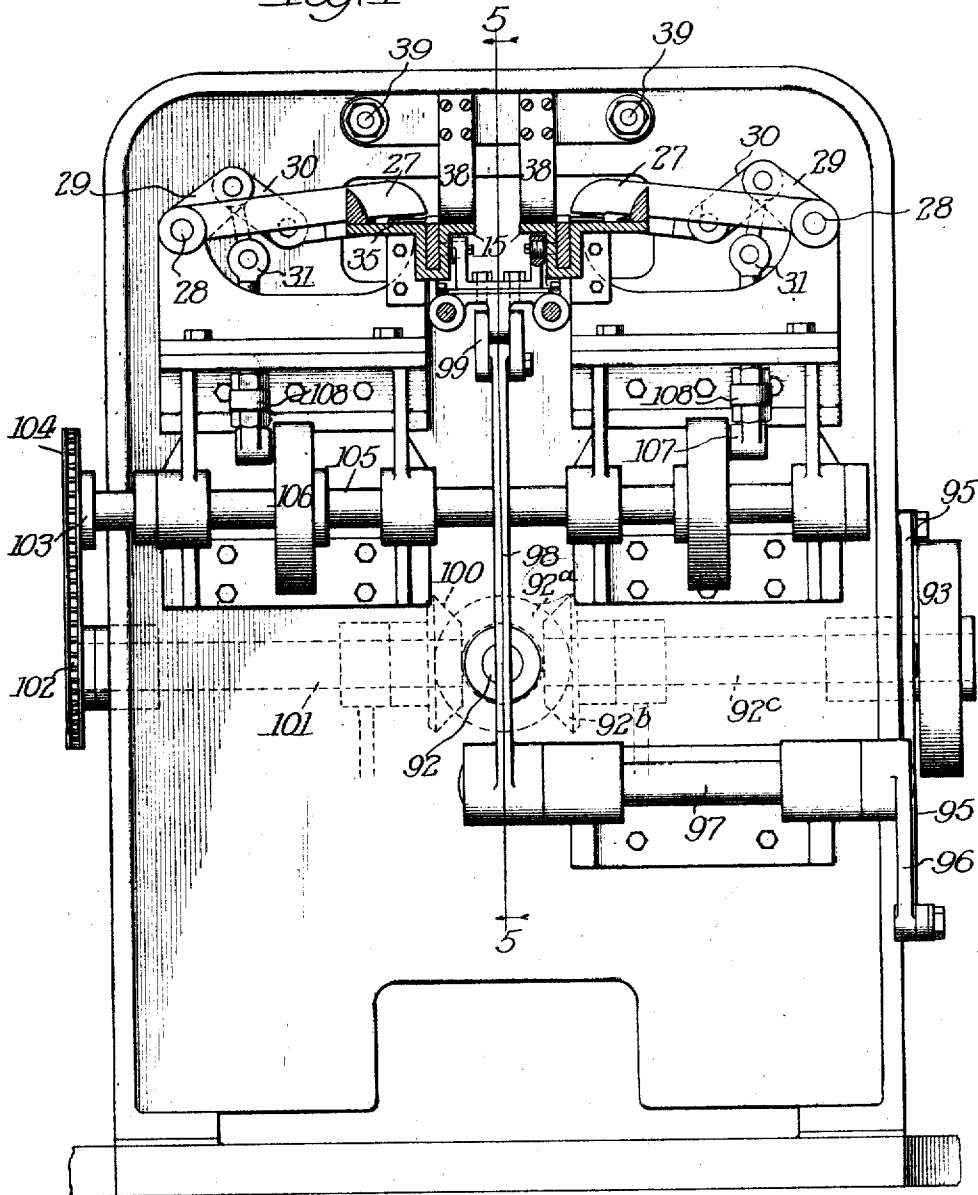
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9 SHEETS—SHEET 4.

Fig. 4



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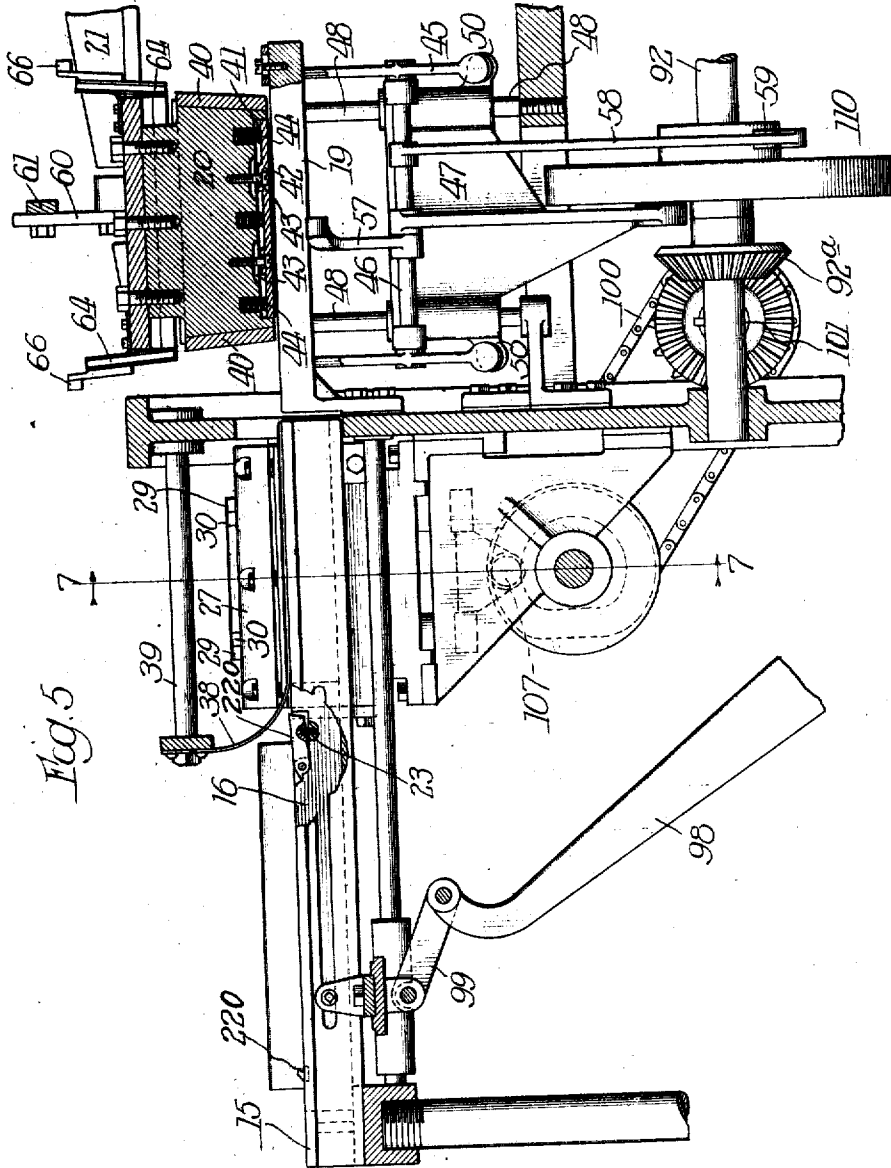
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9 SHEETS—SHEET 5.

**1,020,560.**



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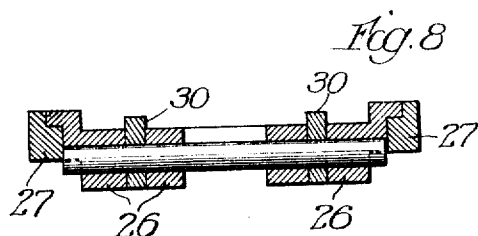
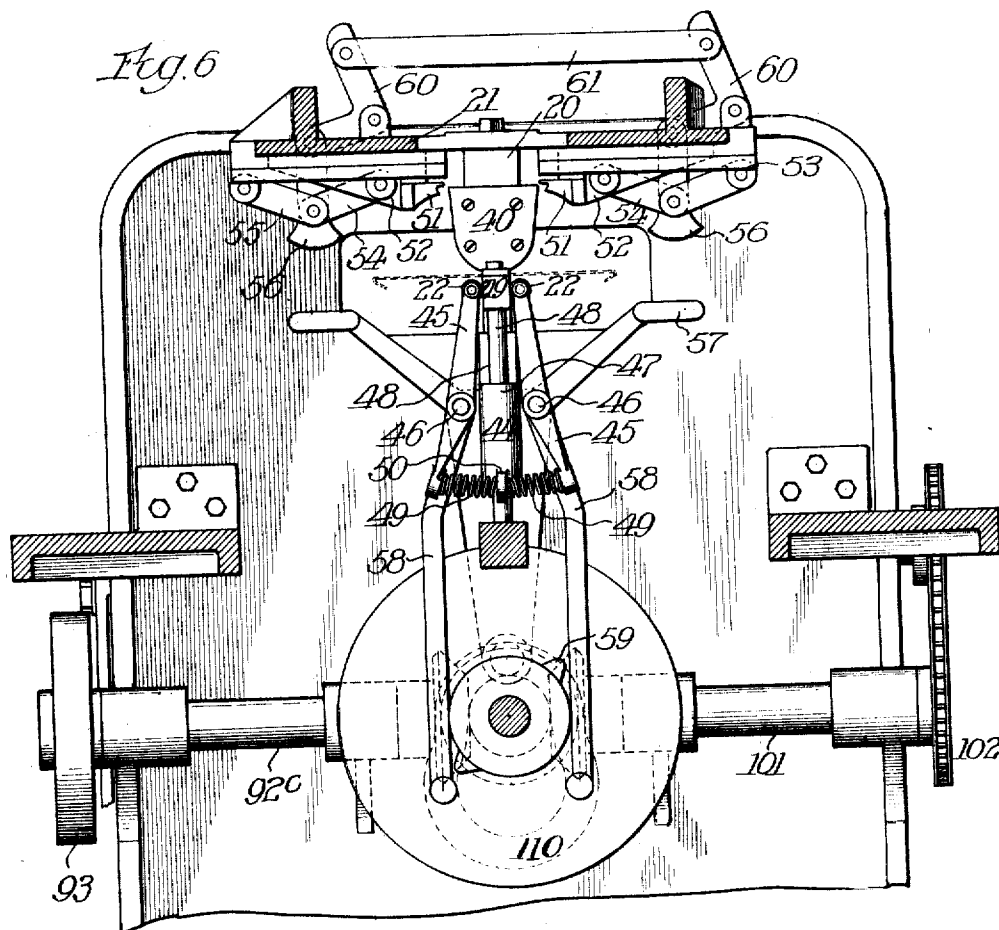
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9 SHEETS—SHEET 6.



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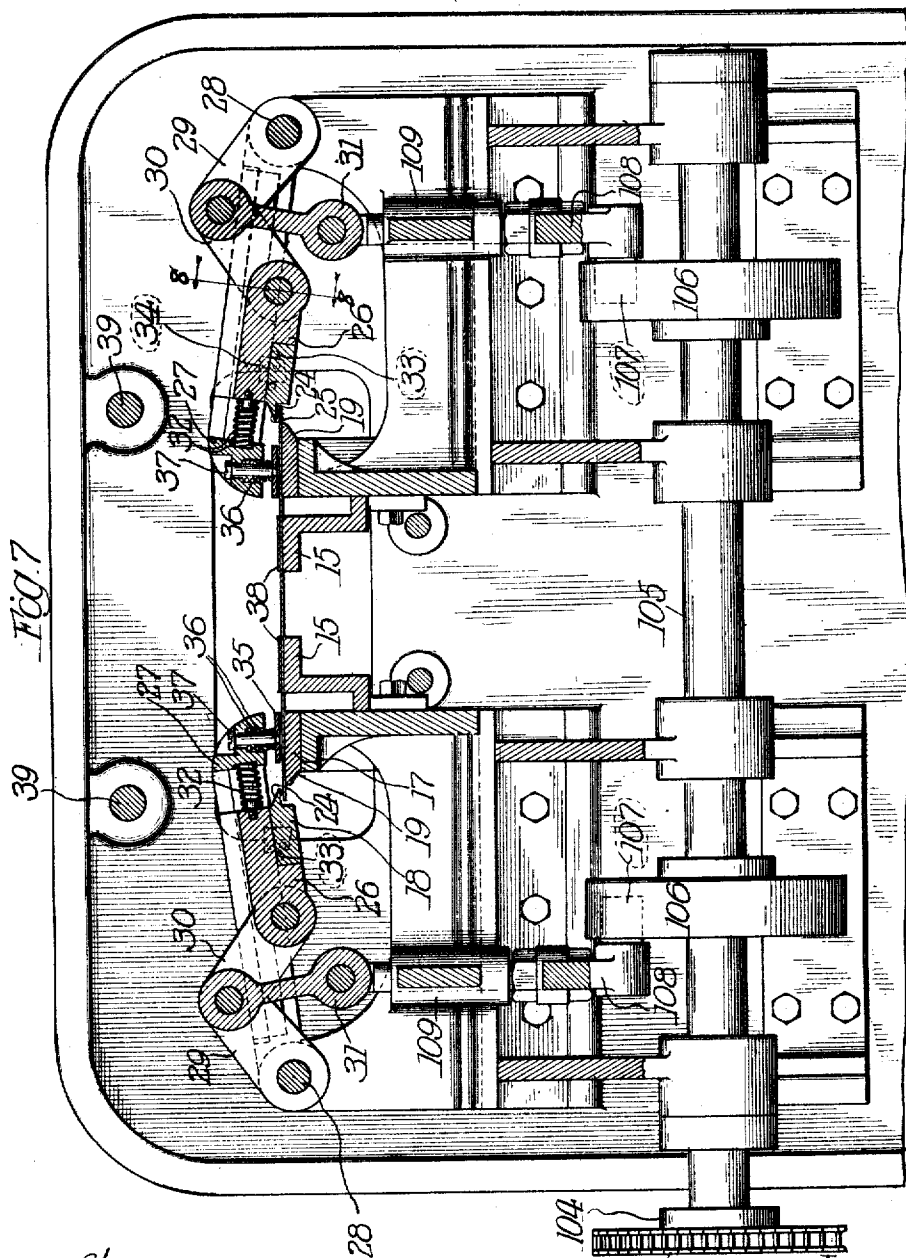
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9 SHEETS—SHEET 7.



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9 SHEETS—SHEET 8.

Fig. 9

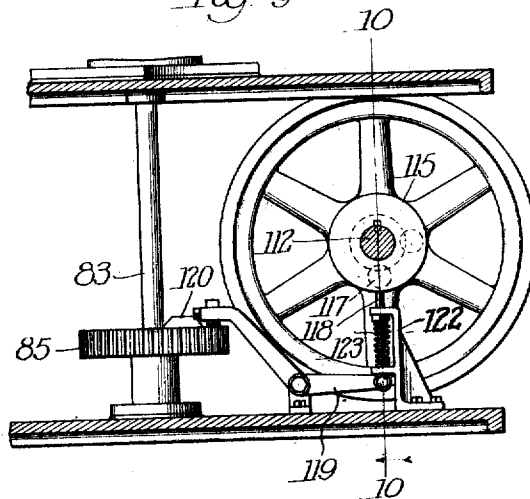


Fig. 10

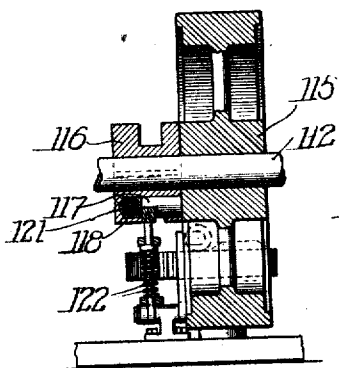


Fig. 11

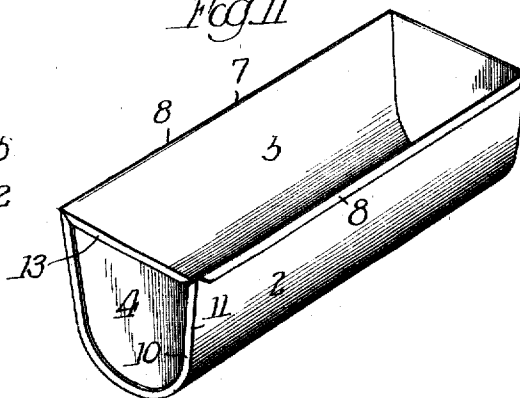
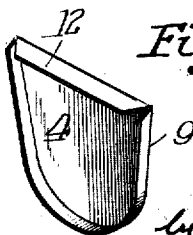


Fig. 12



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9 SHEETS—SHEET 9.

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Fig. 13

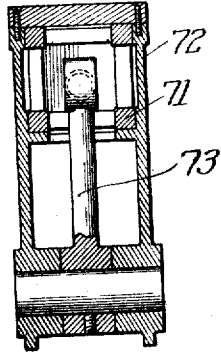


Fig. 14

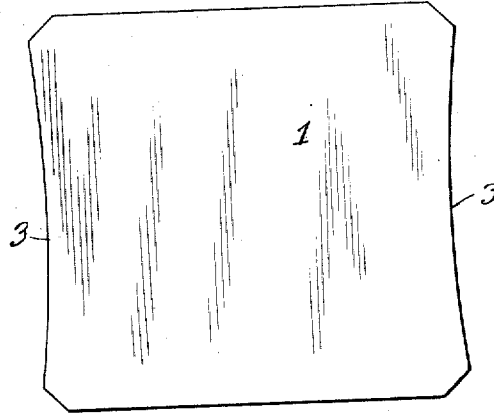


Fig. 15



Fig. 16

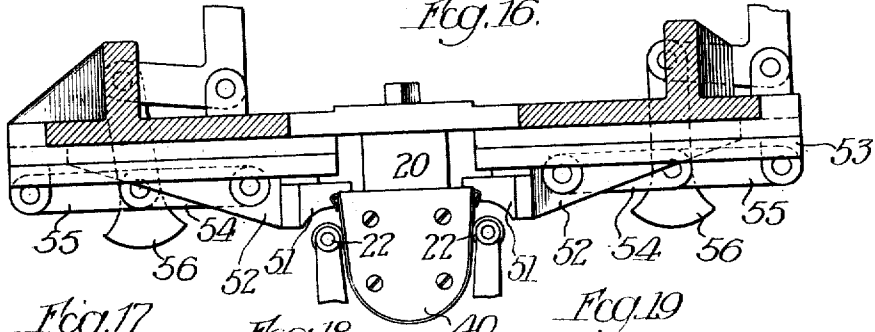


Fig. 17

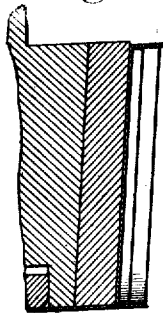


Fig. 18

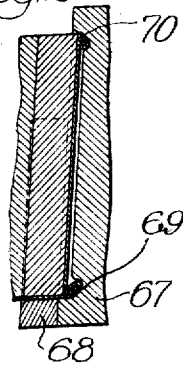


Fig. 19

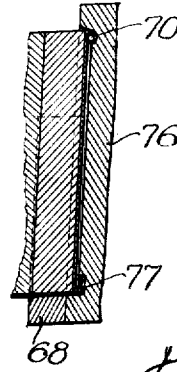


Fig. 20



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# UNITED STATES PATENT OFFICE.

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## SHEET-METAL-VESSEL-MAKING MACHINE.

1,020,560.

Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed November 28, 1910. Serial No. 594,425.

*To all whom it may concern:*

Be it known that I, JOHN KROHN, a citizen of the United States, residing in Irving Park, Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Sheet-Metal-Vessel-Making Machines, of which the following is a specification.

My invention relates to improvements in machines for making sheet metal vessels.

The object of my invention is to provide a sheet metal making machine of a simple, efficient and durable construction, by means of which three-piece sheet metal turpentine collecting cups of a trough or U-shape in cross section, or other vessels, may be rapidly and cheaply manufactured.

My invention and the machine embodying the same comprises in coöperative combination, a feeder for the flat blanks from which the U shaped bodies are to be formed; edge folders for turning edge folds at the side edges of the flat blank; a plurality of body former horns or anvils mounted upon an intermittently rotating carrier or turret, each shorter than the U shaped body to be formed therearound so that the ends of the body will project outward beyond the horn at each end to permit the sheet metal heads or ends to be received therein; and body formers, preferably rollers, for bending the flat blank about the horn or anvil into U or other desired shape.

It further comprises, in connection with these parts, a plurality of pairs of clamping dies mounted on the carrier, one pair for each horn or anvil for clamping the body blank to the horn and simultaneously closing or finishing the previously formed edge folds at the side edges of the blank to produce a smooth mouth for the upper side edges of the finished body and to stiffen and strengthen the same, and cause the raw cut edge to be turned downward against the wall of the vessel so that it will be protected from exposure or rust, these clamping dies holding the blank in position on the horn during the subsequent operations.

It further comprises, in connection with these parts, chutes for feeding the heads or ends into the projecting end portions of the U shaped body, the body former turret being preferably provided with a pair of short chutes, one pair for each body former

horn, which are brought in turn under the stationary chutes on the frame of the machine as the carrier rotates.

It further comprises movable seam forming dies adapted for coöperation with each of the body former horns or anvils on the carrier as the carrier rotates for interfolding the seam flange of the head or end with the projecting end or seam flange of the U shaped body at each end of said body and for turning the flange at the upper horizontal edge of each head or end into a roll or false wire; and also movable seam closing dies which operate to firmly compress the flanges or folds of the seam at each end of the body.

My invention further consists in the novel construction of parts and devices and in the novel combinations of parts and devices herein shown and described and more particularly specified in the claims.

In the accompanying drawing forming a part of this specification, Figure 1 is a side elevation of a three piece turpentine cup forming machine embodying my invention. Fig. 2 is a plan view, the stationary chutes for the heads or ends being omitted, to better show the other parts. Fig. 3 is a vertical cross section on line 3—3 of Fig. 2. Fig. 4 is a vertical section on line 4—4 of Fig. 1. Fig. 5 is a detail vertical section on line 5—5 of Fig. 4. Fig. 6 is a detail, vertical section on line 6—6 of Fig. 1. Fig. 7 is an enlarged, detail vertical section on line 7—7 of Fig. 5. Fig. 8 is a detail section on line 8—8 of Fig. 7. Fig. 9 is a detail, vertical section on line 9—9 of Fig. 2. Fig. 10 is a detail section on line 10—10 of Fig. 9. Fig. 11 is a perspective view, showing the finished sheet metal turpentine cup as produced by the machine. Fig. 12 is a detail, perspective view of the head or end of the cup before it is applied to the body and seamed thereto. Fig. 13 is a detail section on line 13—13 of Fig. 3. Fig. 14 is a detail plan view of the sheet metal blank from which the body of the vessel is formed. Fig. 15 is an edge view of the same after the hooks or edge folds have been formed at the side edges of the blank. Fig. 16 is an illustrative view, partly in section, similar to Fig. 6, showing the parts in a different position with the clamping dies clamping the U shaped body to the horn or anvil. Fig.

17 is a detail, vertical section of the horn or anvil showing the head or end fed into the projecting end of the U shaped body. Fig. 18 illustrates the next operation, the same showing in section, a portion of the body former horn and of the seam forming die. Fig. 19 illustrates the next step or operation, showing a portion of the body former horn and of one of the seam closing dies. Fig. 20 is an enlarged, detail, vertical section, showing the seam formed by the dies in the sheet metal turpentine cup or vessel.

In the drawing, I have illustrated my invention as embodied in a machine for forming the particular vessel shown in Fig. 11, but it will be understood by those skilled in the art, that my invention may be used for making other vessels or articles.

In the drawing, 1 represents the flat blank from which the body portion 2 of the vessel is to be formed, the same having straight side edges and curved end edges 3 as the heads or ends 4 of the completed vessel 5 are to be set somewhat flaring.

The first operation to be performed upon the blank is to turn the straight side edges at an angle to form the edge folds 6 thereon, and which at a subsequent operation are turned or pressed flat against the upright walls 7 to provide the vessel 5 with a smooth mouth 8 at its upper side edges. The ends 4 are of U shape corresponding to the cross sectional form of the body, and are provided each with a right angle seam-flange 9, which is to be interfolded with the projecting end or flange 10 of the body to form the lock or double seam 11 which unites the body to the head or end, the end fitting inside the U shaped body. Each of the heads 4 is provided at its upper horizontal edge with a right angle flange 12, preferably wider than the seam flange 9, and which is to be curled or formed into a false wire 13 at the upper or mouth end of the finished vessel.

14 is the frame of the machine, 15 a feed table or guide along which the flat body blanks 1 are moved by the blank feeder 16, first to the edge folders 17, 18, and then to the stationary clamp bar or support 219, below one of the U shaped body former horns or anvils 20 on the intermittently rotating carrier or turret 21, and body formers 22 which bend or form the flat blank upward into U shape around the body former horn.

The blank feeder 16 preferably consists of a pair of reciprocating bars furnished with two sets of feed pawls 220, one set advancing the body blank 1 to the edge folders and the other set advancing the edge folded blank to the body former horn and body formers. Each of the forward pawls 220 is furnished with a spring 23.

The edge folders for forming the hook or edge fold 6 at each straight side edge of the blank preferably comprise a stationary

folder or member 17 having a forming or shaping edge 19, and a movable edge folder 18 having a projecting lip or blade 24 with an inclined upper face 25, the movable edge folder having a downward and inward movement about or in respect to the stationary edge folder.

To impart to each of the movable edge folders 18 its required downward and inward movements, it is mounted on or secured to a slide or holder 26 which reciprocates upon and is carried by a lever or vibrating arm 27, pivoted to the frame by a pin 28, and with which the holder or slide 26 is connected by toggle links or arms 29, 30, so that the operating link 31 which is connected to the toggles 29, 30, may serve to both operate or vibrate the lever 27 and reciprocate the slide or holder 26 thereon, and thereby, impart to the movable edge folder 18, first a downward movement to turn a right angle fold on the blank and then an inward movement to turn such right angle fold inward into the shape shown in Fig. 15.

Springs 32 are interposed between the inner end of the slide or holder 26 and the adjacent portion of the lever 27, which is preferably of a yoke or rectangular form. The springs 32 hold the slides or holders 26 in their outward position, as shown in Fig. 7 until after the lever 27 has been sufficiently depressed to carry the edge of the folder lip 24 below the shaping edge 19 of the stationary edge folder 17, and then the further downward movement of the operating link 31, acting upon the toggles 29, 30, causes the edge folder slide or holder 26 to move inward and thus complete the formation of the hook or edge fold 6 on the side edge of the blank. Although the springs 32 are ordinarily sufficient to keep the slide 26 in its outward position until the movable edge folder is carried sufficiently below the stationary edge folder, I prefer to provide the movable edge folder or its slide with a guard or safety pin or device 33, which by engagement with a stationary block or escapement 34 on the frame of the machine serves to positively prevent the edge folder slide 26 from being moved inward by the toggle arms 29, 30 until after the movable edge folder 18 is properly depressed below the stationary edge folder 17.

To hold the body blank 1 flat and properly clamped against the stationary edge folders 17, 17, during the edge folding operation, the edge folder operating levers 27 are each furnished with a clamp 35, backed up by springs 36, surrounding the guide pins 37 of the clamps or blank holders 35. And to further aid in holding the body blank 1 in a straight flat form during the edge folding operation, I preferably provide flat spring clamps or guides 38 above the stationary feed table or guide 15. The spring clamps

or guides 38 are secured to rods or arms 39 attached to the stationary frame of the machine.

Each of the body former horns or anvils 20 on the turret or carrier 21 conforms in cross section to the U shape of the vessel 5 to be produced, and is somewhat shorter in length than the body portion 2 of the vessel, so that the end portions 10 of the U shaped body 2 will project (sufficiently to receive the heads or ends 4) beyond the end faces 40 of the horn, which are preferably of hardened steel for coöperation with the seam forming and seam closing dies. The horns or anvils 20, which are preferably four in number, are preferably removably secured to the turret or carrier 21, which is preferably in the shape of a four-armed spider rotating about a vertical axis. Each of the horns 20 is also provided at its bottom portion with a recess 41 to receive a movable spring-backed clamp or member 42 which serves to clamp the blank at its middle portion against the stationary clamp or blank support 19 on the frame of the machine when the edge folded blank is first fed or advanced under the horn or anvil 20 by the feeder 16. This clamp bar or member 42 also serves the further function of ejecting the finished vessel 5 from the horn 20 at a subsequent or final stage of the operation. The movable clamp bar 42 is supported by guide pins or screws 43, the heads of which fit in countersunk recesses in the clamp bar. The springs 44 which are interposed between the clamp bar 42 and the horn 20 are preferably three in number.

The body formers 22 are preferably in the form of rollers and are mounted on the body former levers 45 which are fulcrumed on the rock shafts 46 on the vertically movable slide 47, which reciprocates on suitable guides or upright rods 48 on the stationary frame of the machine. Springs 49 interposed between the lower ends of the levers 45 and lugs 50 on the slide 47 serve to press the body former rollers 22 together or toward each other and cause them to hug the body former horn 20 as they bend and carry the blank upward and around the horn 20.

The clamping dies 51, one pair for each body former horn, and which serve to clamp and hold the shaped body 2 on and against the horn after it has been formed thereon by the body formers 22, and which further serve to close the hooks or edge folds 6 against the upright walls of the U shaped body, and thus complete the false wiring at the straight side edges of the body, are preferably secured to slides or holders 52, which reciprocate in suitable guides 53 on the arms of the carrier 21. These clamping and edge fold closing or wiring dies 51 are preferably operated by toggle links 54, 55, one pivoted to the slide 52 and the other to its guide 53,

and which are furnished with an operating link or member 56 which is engaged by an arm 57 on the rock shaft 46 when the slide or cross head 47 makes its up stroke to cause the body formers 22 to bend or form the blank around the horn 20. The rockshafts 46 are furnished with further arms 58, which are engaged by a supplemental cam 59 to impart to the link 56 a slight further movement after the upward movement of the slide 47 is completed, this slight further movement of the link 56 carrying the toggle arms 54, 55 past the center and thus locking the clamping dies 51 in their closed position, and thereby retaining the U shaped body 2 on the horn during the subsequent operations of the seam forming and seam closing dies, into registry with which the body is brought by the step by step rotary movement of the turret or carrier 21.

After the vessel 5 has been completed by seaming the heads or ends 4 to the body 2, the operating links or members 56 of the pairs of toggles 54, 55 are moved to unlock the toggle and retract the clamp dies 51 by means of bent levers 60, connected together by a link 61, and one of which is engaged by a stationary cam or member 62 on the stationary frame of the machine as the carrier rotates.

The heads or ends 4 with the flanges 9 and 12 already formed thereon feed down the stationary head feed chutes 63 on the frame of the machine into the short supplemental chutes 64 on the carrier, one at each end of each of the horns 20, and through these supplemental chutes into the projecting ends 10 of the U shaped vessel body 2. Each of the feed chutes 63 is provided with an escapement, trigger, or head feeder 65, adapted to engage the wider flange 12 of the two lowermost heads 4 and thus support the heads 4 in the chute 63 until this head feeder or escapement is operated or released. The escapement or feeder 65 is preferably in the form of a lever and is preferably operated by a cam or projection 66 on the short chutes 64 on the carrier. The levers 65 are returned to their normal position by springs 165.

The seam forming dies 67, one for each end of the U shaped body 2, are each preferably furnished with a bevel lip or mouth 68 to insure the entrance of the projecting end or flange 10 of the U shaped body 2 within the seam forming groove 69 of the die 67 as the die advances. Each of the seam forming dies 67 is also provided at its upper edge with a straight, horizontal curling or wiring die-groove 70 which operates to curl the projecting wide flange 12 at the upper edge of the head 4 into a roll or false wire 13, as will be readily understood from Fig. 18 of the drawing. The seam forming dies 67 are preferably secured to horizon-

tally reciprocating slides or holders 71 which move back and forth in suitable guides 72 on the frame of the machine and are preferably operated as required by bent levers 73, the inner arms 74 of which are engaged by an operating block or member 75.

The seam closing dies 76 which operate to compress the interfolded seam flanges of the body 2 and heads 4 into a double or lock seam have each seam closing die grooves 77, suitable for forcibly compressing the seams and making them liquid tight. The seam closing dies 76 are mounted upon slides or holders 71 in all respects similar to those employed for the seam forming dies and are operated by similarly bent levers 73, the inner arms 74 of which engage an operating block or member 75.

Motion may be imparted to the several movable or operating devices of my improved machine by any suitable operating or connecting mechanism. In practice, however, I prefer to impart the required intermittent or step by step movement to the rotary turret or carrier 21 from the main driving shaft 78, having fast and loose pulleys 79, 80, through a worm 81 thereon, which engages a worm gear 82 on the upright shaft 83, which fits within the stationary column 84 of the frame and which has near its lower end a spur gear 85, meshing with a spur gear 86 on the upright shaft 87, which carries at its upper end a member 88 of a Geneva stop movement, the other member 89 of which is on the hollow shaft of the turret or carrier 21.

The blank feeder 16 is preferably reciprocated as required through a bevel gear 90 on the upright shaft 83, which meshes with a bevel gear 91 on the countershaft 92, having a gear 92<sup>a</sup> meshing with bevel gear 92<sup>b</sup> on shaft 92<sup>c</sup> which is furnished with a cam 93, engaging a roller 94 on a lever 95 connected by link 95<sup>a</sup> to a crank arm 96 on a rock shaft 97 having an arm 98 which is connected by a link 99 with the feeder 16.

The edge folder operating links or members 31 are preferably actuated, as required, from the upright shaft 83 through the bevel gears 90, 91, 92<sup>a</sup> which latter meshes with a bevel gear 100 on the countershaft 101, which has a sprocket wheel 102 connected by a chain 103 with a sprocket wheel 104 on the cam shaft 105, which is furnished with cams 106 engaging rollers 107 on the slides 108 which are connected with the operating links or members 31 of the edge folders, and which reciprocate vertically in suitable guides 109 on the frame of the machine.

The body formers 22 which fold the blank upward about the horn 20 and their slide 47 and the parts connected therewith are preferably operated as required by a cam 110 on the cam shaft 92, which engages an anti-friction roller on the slide 47, and which

cam is preferably formed integral with the cam 59.

The seam forming dies 67 and seam closing dies 76, and their operating blocks 75, are preferably actuated at intervals as required by a shaft 112, having crank arms or eccentric wrist pins 113 at each end thereof as will be evident from an inspection of Figs. 1 and 3, which are connected by links 114 with the operating blocks 75, and which shaft is adapted to be clutched at intervals with the continuously belt driven fly wheel 115 by a suitable clutch mechanism 116, 117, 118, 119, 120.

The clutch collar 116 is fast on the shaft 80 112 and it carries a sliding clutch pin 117 backed up by a spring 121. The clutch pin is retracted and released by a movable segment cam 118, the stem of which slides up and down in the bracket 122, and which is retracted to permit the clutch pin to connect the clutch collar with the fly wheel by a lever 119, which is operated by a cam 120 on the gear 85 carried by the upright shaft 83. A spring 123 holds the segment cam 118 in its normal or unclutched position.

In operation, one flat blank is having the edge folds 6 formed thereon at one station, another blank is being formed into U shape around one of the body former horns, the heads are being fed into the U shaped body at another station and operated upon by the seam forming dies, and at another station the final operation is being performed by the seam closing dies, and during the movement of the carrier from the seam closing station to the next station, the clamping dies are unlocked and the completed U shaped vessel discharged from the horn into the discharge chute or device 124.

I claim:—

1. In a sheet metal vessel making machine, the combination with a body blank feeder, of edge folders, an intermittently moving carrier having a plurality of body former horns thereon, body formers for bending the body blank about the horn, a plurality of pairs of body blank clamping and edge fold closing dies, one pair for each horn, feed chutes for heads, a pair of seam forming dies between and into registry with which the horns are successively brought, and a pair of seam closing dies between and into registry with which the horns are brought successively by the carrier, substantially as specified.

2. In a sheet metal vessel making machine, the combination with a body blank feeder, of edge folders, an intermittently moving carrier having a plurality of body former horns thereon, body formers for bending the body blank about the horn, a plurality of pairs of body blank clamping and edge fold closing dies, one pair for each horn, feed chutes for heads, a pair of seam forming

dies between and into registry with which the horns are successively brought, and a pair of seam closing dies between and into registry with which the horns are brought successively by the carrier, said body former horns having each a movable spring actuated body blank clamping and vessel ejecting member, substantially as specified.

3. The combination with a body blank and a head feeding means and an intermittently rotating carrier having a plurality of radially arranged horns, of a pair of seam forming dies between and into registry with which the horns are successively brought by the carrier; substantially as specified.

4. The combination with a body blank and a head feeding means and an intermittently rotating carrier having a plurality of radially arranged horns, of a pair of seam forming dies between and into registry with which the horns are successively brought by the carrier; and a pair of seam closing dies between and into registry with which the horns are brought successively by the carrier, substantially as specified.

5. The combination with a body blank and a head feeding means and an intermittently rotating carrier having a plurality of radially arranged body former horns, of body formers, and a pair of seam forming dies between and into registry with which the horns are brought successively by the carrier, substantially as specified.

6. The combination with a body blank and a head feeding means and an intermittently rotating carrier having a plurality of radially arranged body former horns, of body formers, and a pair of seam forming dies between and into registry with which the horns are brought successively by the carrier, and a pair of seam closing dies between and into registry with which the horns are brought successively by the carrier, substantially as specified.

7. The combination with a body blank and a head feeding means and an intermittently rotating carrier having a plurality of radially arranged body former horns, of body formers, and a pair of seam forming dies between and into registry with which the horns are brought successively by the carrier, said horns having each a movable ejector for ejecting the finished vessel from the horn, substantially as specified.

8. The combination with a body blank and a head feeding means and an intermittently rotating carrier having a plurality of radially arranged body former horns, of body formers, and a pair of seam forming dies between and into registry with which the horns are brought successively by the carrier, and a pair of seam closing dies between and into registry with which the horns are brought successively by the car-

rier, said horns having each a movable ejector for ejecting the finished vessel from the horn, substantially as specified.

9. The combination with a body blank and a head feeding means and a carrier having body former horns and clamping dies for clamping the formed bodies on the horns, of seam forming dies between which the horns are brought successively by the carrier, substantially as specified.

10. The combination with a body blank and a head feeding means and a carrier having body former horns and clamping dies for clamping the formed bodies on the horns, of seam forming dies between which the horns are brought successively by the carrier, and seam closing dies between which the horns are brought successively by the carrier, substantially as specified.

11. The combination with a body blank and a head feeding means and a carrier having body former horns and clamping dies for clamping the formed bodies on the horns, of seam forming dies between which the horns are brought successively by the carrier, and body formers for bending the flat blanks about the horns, substantially as specified.

12. The combination with a body blank and a head feeding means and a carrier having body former horns and clamping dies for clamping the formed bodies on the horns, of seam forming dies between which the horns are brought successively by the carrier, and seam closing dies between which the horns are brought successively by the carrier, and body formers for bending the flat blanks about the horns successively, substantially as specified.

13. The combination with a carrier having body former horns thereon, a feed table and a feeder, of stationary edge folders, movable edge folders, slides carrying the movable edge folders, and levers carrying said slides, substantially as specified.

14. The combination with a carrier having body former horns thereon, a feed table and feeder, of stationary edge folders, movable edge folders, slides carrying the movable edge folders, and levers carrying said slides, operating links for said levers, and toggle arms connected to each of said operating links and interposed between the slide and lever, substantially as specified.

15. The combination with a rotating carrier having body former horns thereon, a stationary edge folder and a movable edge folder, of a slide carrying said movable folder, a lever carrying said slide, toggle arms between the lever and slide, and an operating device connected to the toggle arms, substantially as specified.

16. The combination with a rotating carrier having body former horns thereon, a stationary edge folder and a movable edge

folder, of a slide carrying said movable folder, a lever carrying said slide, toggle arms between the lever and slide, and an operating device connected to the toggle arms, and a spring for holding the slide in its retracted position during the first portion of the movement of said lever, substantially as specified.

17. The combination with a rotating carrier having body former horns thereon, a stationary edge folder and a movable edge folder, of a slide carrying said movable folder, a lever carrying said slide, toggle arms between the lever and slide, and an operating device connected to the toggle arms, and a spring for holding the slide in its retracted position during the first portion of the movement of said lever, and an escapement device and interengaging pin on the slide for preventing movement of said slide on said lever during a portion of the movement of the lever, substantially as specified.

18. The combination with a rotating carrier having body former horns thereon, a stationary edge folder and a movable edge folder, of a slide carrying said movable folder, a lever carrying said slide, toggle arms between the lever and slide, and an operating device connected to the toggle arms, a pin on said slide and a stationary escapement device engaging said pin to prevent movement of the slide on said lever during the first part of the movement of the lever, substantially as specified.

19. The combination with a blank feeder and edge folders, of a carrier having body former horns, body formers, means for feeding heads into the formed can bodies on the horns and means for seaming the heads onto the bodies at each end thereof while on the horns, substantially as specified.

20. The combination with a body blank and a head feeding means and a body former horn, of body formers for bending the blank about the horn, and seaming devices cooperating with the horn for seaming heads to the vessel body while on the horn, substantially as specified.

21. The combination with a body blank and a head feeding means and a horn adapted to fit snugly within a vessel body, of seaming devices for seaming heads to the opposite ends of the vessel body while on said horn, substantially as specified.

22. The combination with a body blank and a head feeding means and a horn adapted to fit within a vessel body, of seam forming dies, one at each end of said horn and cooperating therewith to seam heads on the opposite ends of the vessel body while on the horn, substantially as specified.

23. The combination with a body blank and a head feeding means and a horn adapted to fit within a vessel body, of seam forming dies, one at each end of said horn and co-

operating therewith to seam heads on the opposite ends of the vessel body, and seam closing dies, one at each end of said horn and cooperating therewith, substantially as specified.

24. The combination with a body blank and a head feeding means and a horn adapted to fit within a vessel body, of seam forming dies, one at each end of said horn and cooperating therewith to seam heads on the opposite ends of the vessel body, said horn having an ejector for ejecting the body from the horn after the heads are seamed thereto, substantially as specified.

25. The combination with a horn adapted to fit within a vessel body, of seam forming dies, one at each end of said horn and cooperating therewith to seam heads on the opposite ends of the vessel body, and means for feeding heads into the vessel body at each end of said horn while the body is on the horn, substantially as specified.

26. The combination with a body blank feeder and head chutes, of a body former horn having one portion of its surface rounded, body formers for bending the blank about the horn, said horn being less in length than the body blank and body to be formed thereon, and a pair of reciprocating seam forming dies, substantially as specified.

27. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating successively with each horn and between which each horn is brought by the carrier, substantially as specified.

28. The combination with an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating with each horn and between which each horn is brought by the carrier, and feed chutes for the heads, substantially as specified.

29. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating successively with each horn and between which each horn is brought by the carrier, and clamping dies on the carrier, one pair for each horn, substantially as specified.

30. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating succes-

sively with each horn and between which each horn is brought by the carrier, clamping dies on the carrier, one pair for each horn, and toggle arms for operating said clamping dies, substantially as specified.

31. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating successively with each horn and between which each horn is brought by the carrier, clamping dies on the carrier, one pair for each horn, means for operating said body formers, and toggle arms actuated by said body former operating means for operating said clamping dies after the body formers have formed the blank about the horn, substantially as specified.

32. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating successively with each horn and between which each horn is brought by the carrier, clamping dies on the carrier, one pair for each horn, means for operating said body formers, and toggle arms actuated by said body former operating means for operating said clamping dies after the body formers have formed the blank about the horn, and means for retracting said clamping dies after the heads have been seamed to the body, substantially as specified.

33. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating successively with each horn and between which each horn is brought by the carrier, clamping dies on the carrier, one pair for each horn, means for operating said body formers, and toggle arms actuated by said body former operating means for operating said clamping dies after the body formers have formed the blank about the horn, and a supplemental cam and connections for moving said toggle arms past the center into locked position after movement of the body former operating means ceases, substantially as specified.

34. The combination with a body blank and a head feeding means and an intermittently moving carrier, of a plurality of horns on the carrier, body formers cooperating successively with each horn on the carrier, and seam forming dies cooperating successively with each horn and between which each horn is brought by the carrier, clamping dies on the carrier, one pair for each

horn, means for operating said body formers, and toggle arms actuated by said body former operating means for operating said clamping dies after the body formers have formed the blank about the horn, and a supplemental cam and connections for moving said toggle arms past the center into locked position after movement of the body former operating means ceases, an unlocking lever for said toggle arms and a stationary device into engagement with which said unlocking lever is brought by the carrier as it rotates, substantially as specified.

35. The combination with a body former horn, of body formers for bending a flat blank about the horn, means for feeding heads into the projecting end portions of the formed body at each end of the horn, and means for seaming said heads to the body while on the horn, substantially as specified.

36. The combination with a body former horn having one portion of its surface rounded, of body formers, means for feeding heads into the body at each end of the horn and seaming dies at each end of the horn cooperating with the horn to seam the heads to the body while on the horn, substantially as specified.

37. The combination with a body former horn having one portion of its surface rounded, of body formers, means for feeding heads into the body at each end of the horn and seaming dies at each end of the horn cooperating with the horn to seam the heads to the body while on the horn, said seaming dies having each a curling die groove for curling a flange at the upper edge of the heads, substantially as specified.

38. The combination with an intermittently moving carrier having a plurality of body former horns thereon, of body formers, a feeder for the body blanks, means for feeding heads into the bodies at each end of the horns, and means for seaming the heads to the bodies while on the horns, substantially as specified.

39. The combination with an intermittently moving carrier having a plurality of body former horns thereon, of edge folders, a body blank feeder, body formers, clamping dies, one pair for each horn for clamping the bodies on the horns and closing the edge folds, means for feeding heads into the bodies at each end of the horns, and seam forming dies between which and into registry with which the horns are successively brought by the carrier, substantially as specified.

40. The combination with an intermittently moving carrier having a plurality of body former horns thereon, of edge folders, a body blank feeder, body formers, clamping dies, one pair for each horn for clamping the bodies on the horns, and closing the



edge folds, means for feeding heads into the bodies at each end of the horns, and seam forming dies between which and into registry with which the horns are successively brought by the carrier, said seam forming dies having each a head flange curling die groove, substantially as specified.

41. The combination with an intermittently moving carrier having a plurality of body former horns thereon, of edge folders, a body blank feeder, body formers, clamping dies, one pair for each horn for clamping the bodies on the horns and closing the edge folds, means for feeding heads into the

bodies at each end of the horns, and seam forming dies between which and into registry with which the horns are successively brought by the carrier, said seam forming dies having each a head flange curling die groove, and a pair of seam closing dies between which the horns are brought successively by the carrier, substantially as specified.

JOHN KROHN.

Witnesses:

EDMUND ADCOCK,  
PEARL ABRAMS.