

[54] **MACHINE FOR MAKING SPOUTS AND FIXING SAME IN CONTAINERS**

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[56] **References Cited**

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[57] **ABSTRACT**

This machine for punching, cutting and shaping pouring spouts from a metal band for miscellaneous packings comprises essentially a single shaft, connected through a bevel gear to the driving motor of the packing machine, for performing the various operations, including punching a preferably square-shaped hole engageable by a pin for feeding the metal band through the machine, such pin being pivotally mounted and driven with a horizontal reciprocating motion. Punch and die means are operated for cutting portions of the band for permitting the subsequent folding of the side wings of the spout. Other means are provided for punching into the band projecting lugs to be used for securing the spout to the packing.

10 Claims, 13 Drawing Figures

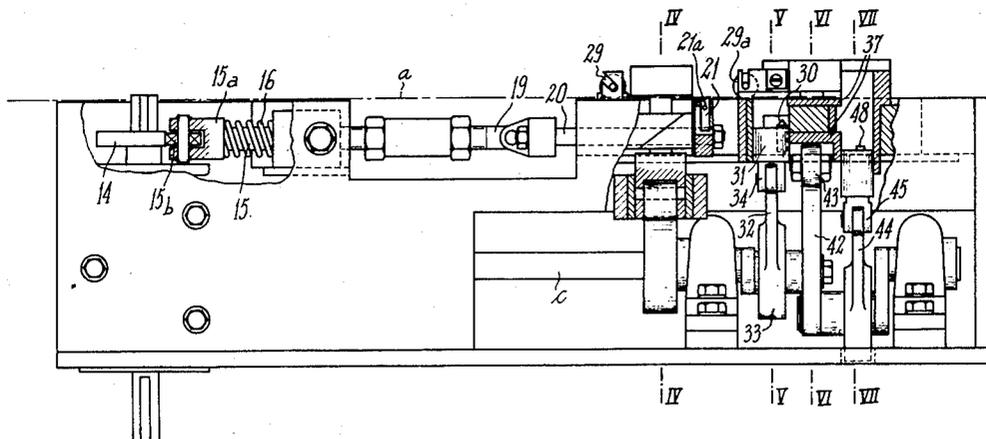


Fig. 1

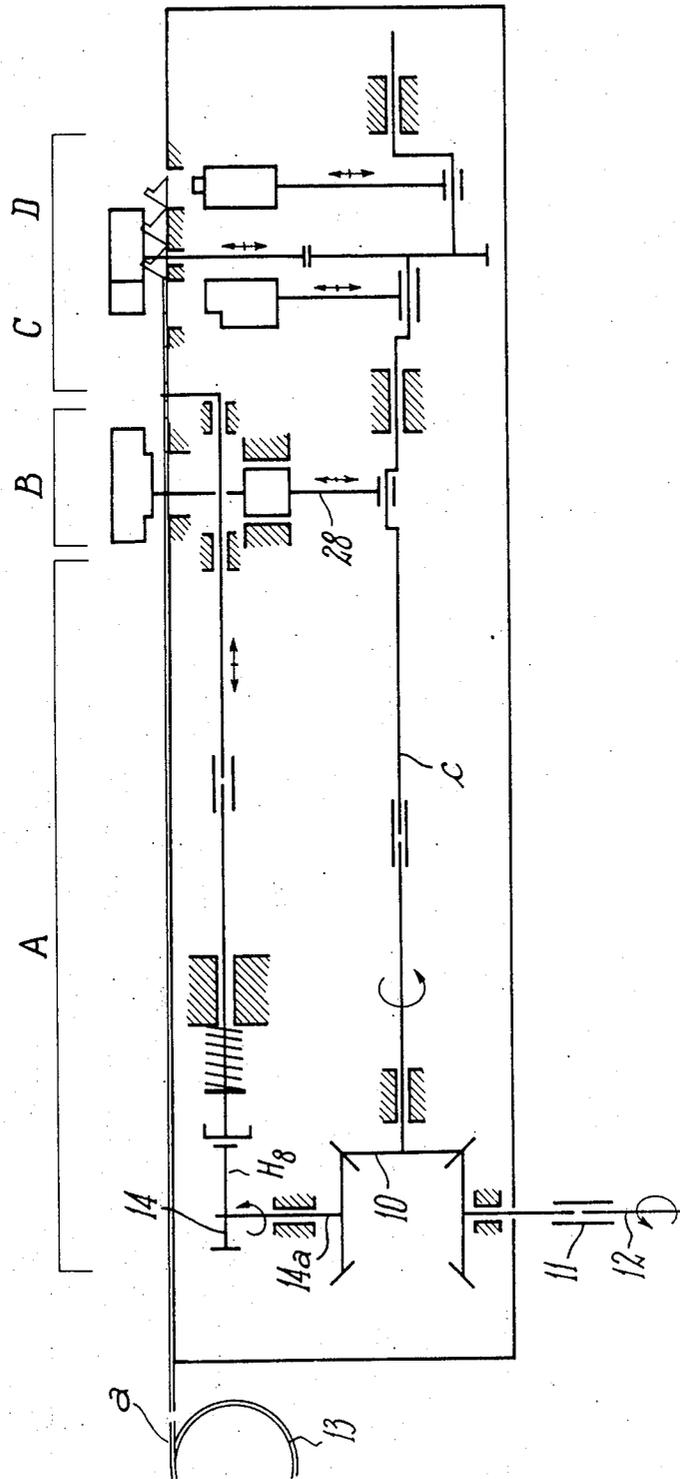
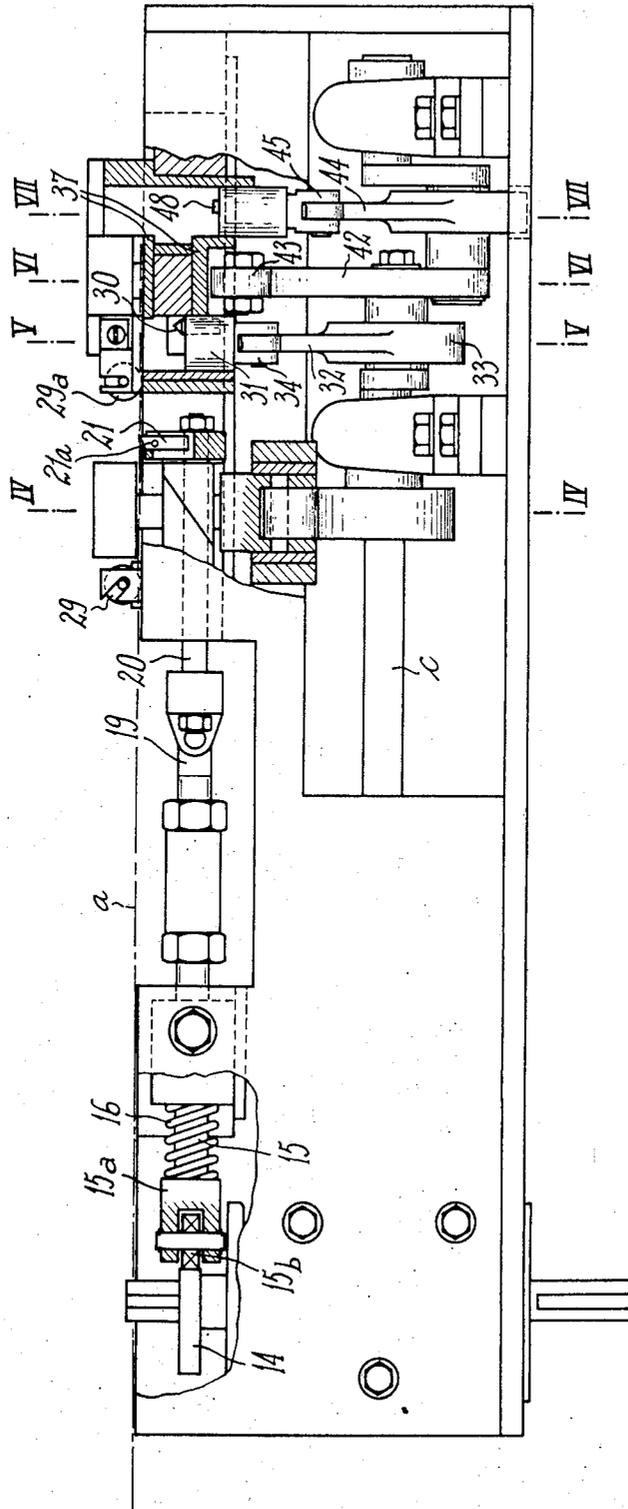


FIG. 2



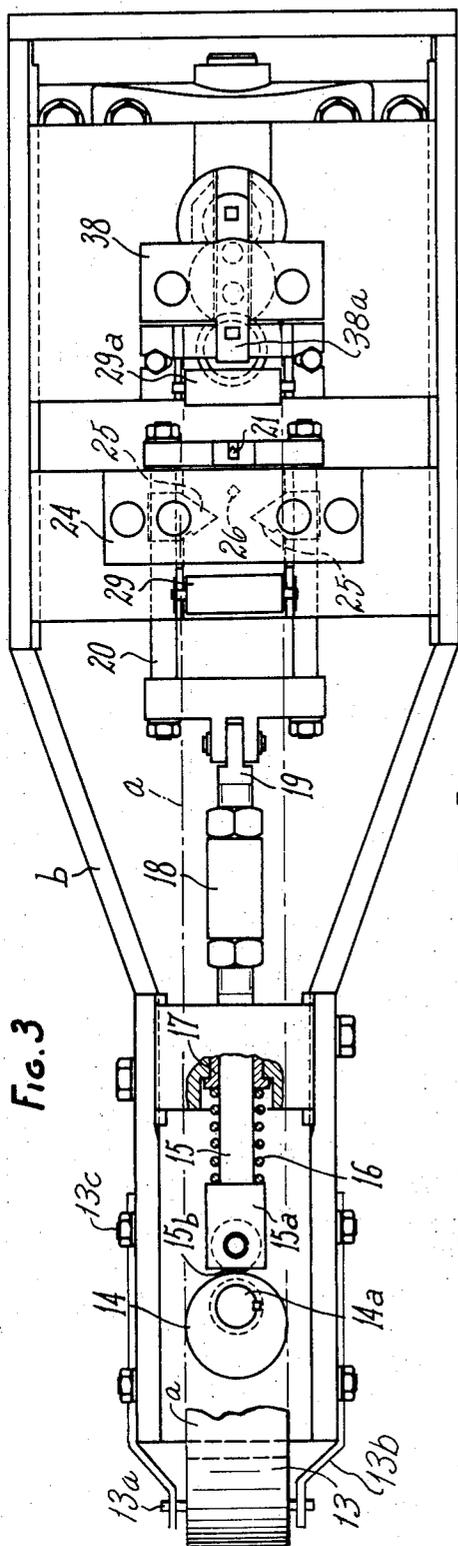


Fig. 3

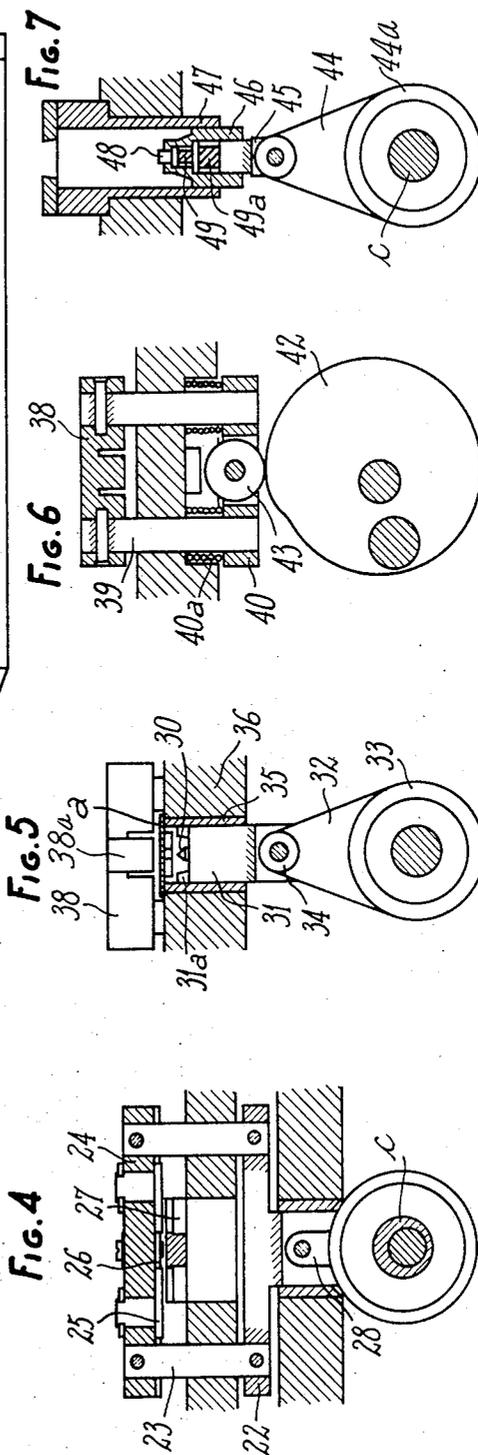


Fig. 4

Fig. 5

Fig. 6

Fig. 7

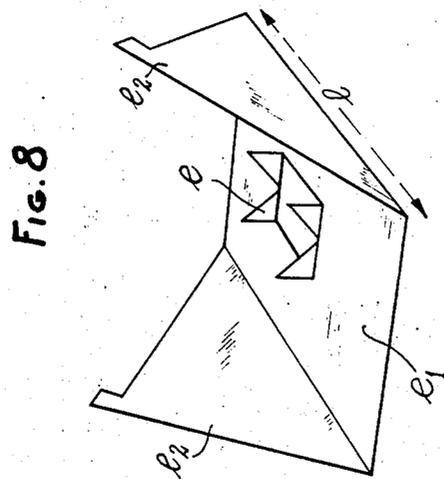
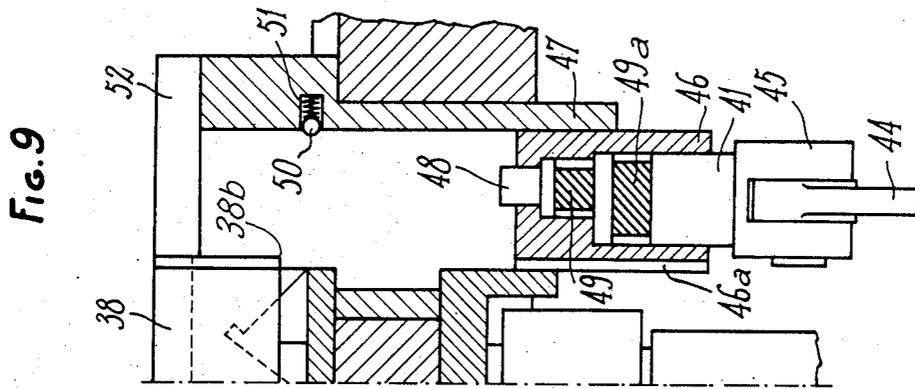
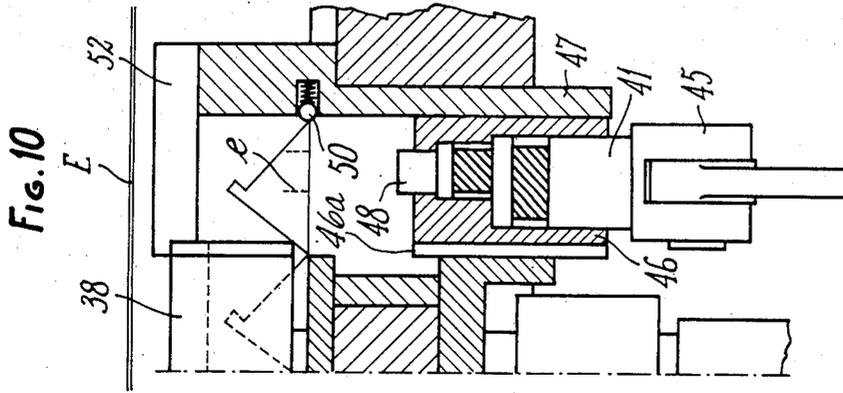


Fig. 13

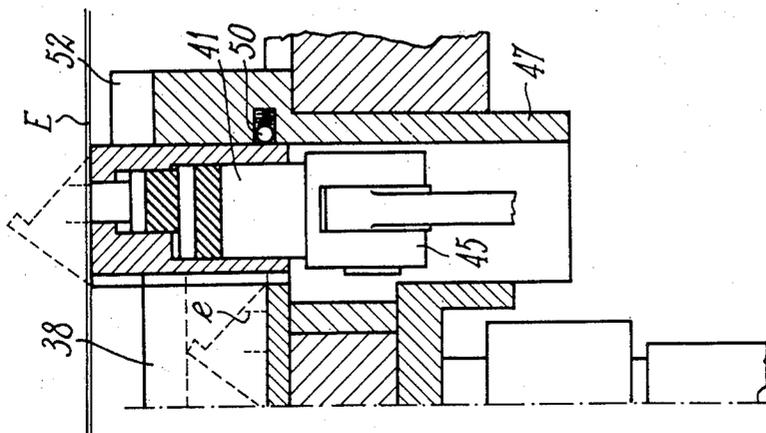


Fig. 12

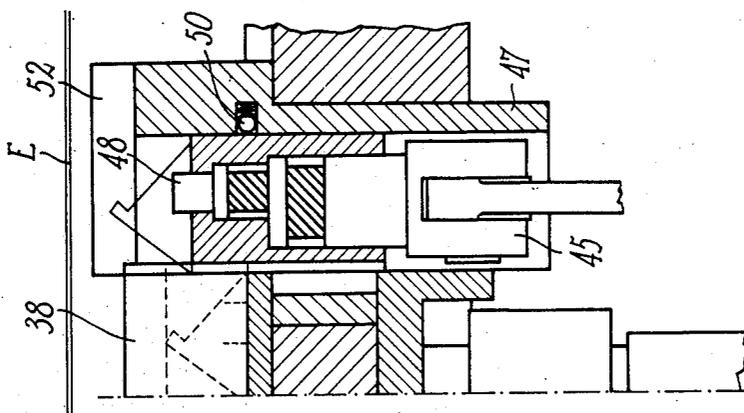
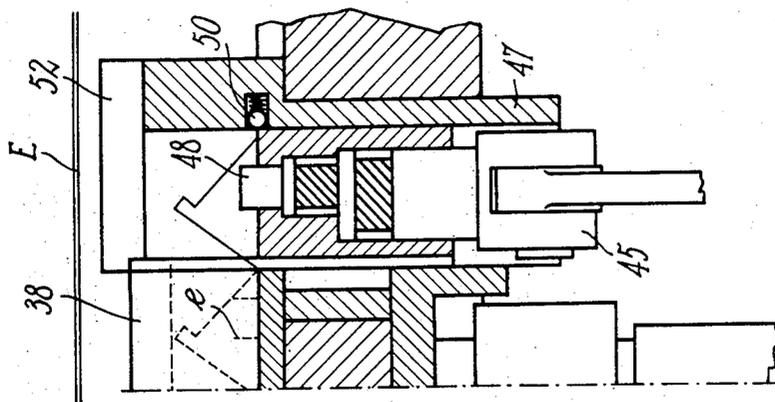


Fig. 11



MACHINE FOR MAKING SPOUTS AND FIXING SAME IN CONTAINERS

FIELD OF THE INVENTION

The present invention relates to an improved machine for making pouring spouts from a metal band for miscellaneous packings and fixing the spouts in for packings.

DESCRIPTION OF THE PRIOR ART

Machines of this type must be capable of forming the spouts from a metal band, i.e., cutting and shaping them to their final configuration, forming the projections or lugs necessary for subsequently attaching the spout to the packing, cutting from the initial band the thus shaped spouts ready for fixing to the packing, and eventually securing each spout to a wall of the packing, at a selected location thereof.

Known machines of this general character are supplied with metal bands previously cut to constitute a continuous series of spout blanks, each blank comprising a cut portion from which, by properly folding the same in the machine, the portion constituting the spout proper and the lateral wings of the spout are obtained.

The band is fed through the machine, for performing the sequence of operations contemplated, by using means co-acting with the cut portions and to which a movement is imparted in such a way that the band can move stepwise through the machine.

A known drawback of this arrangement is that the band feed movements must be adjusted with great accuracy so that the means necessary therefor can operate at exactly the requisite location, i.e.; substantially in the gap left between two successive blanks, through the cut portions formed therein.

Experience teaches that after a certain service time these means come out of adjustment so that they can easily become "phase-shifted" in relation to the traveling blanks. Under these conditions the band feed is not precise and therefore the machine cannot perform with the desired accuracy the various successive operations contemplated. Thus, the machine must be stopped, and the resulting loss of time is also attended by a loss of variable length of band.

SUMMARY OF THE INVENTION

The machine according to the present invention is free of these inconveniences and characterized essentially in that the metal band from which the spouts are cut is fed to the machine in the form of a plain tape and firstly punched to form a preferably square-shaped hole therethrough, a pin or equivalent member pivotally mounted and to which a rectilinear reciprocating motion is applied in a horizontal plane being introduced into such hole in order to feed the band through the machine.

Also according to this invention the punching of the preferably square-shaped hole in the band is attended by the cutting of portions of the band with a view to permit the formation, by folding, of the wings of the spout in accordance with the shape of the thus cut portions.

As the band has been fed into the machine as a consequence of a properly selected kinematic action the aforesaid wings are folded and at the same time four projections are formed on the corresponding spout por-

tion, by using a square-shaped punch having edges aligned diagonally to the edges of and into the previously formed hole.

Finally, the machine is adapted to cut the shaped spout and secure the same to the packing by stapling the projections formed in the spout, and to this end a centering member carried by a vertically reciprocated piston is introduced into the hole and constantly holds the projections in a vertical position during the positioning of the spout in the packing, in order properly to insert the projections into the packing.

The various features and advantages of this invention will appear as the following description proceeds with reference to the accompanying drawings illustrating diagrammatically by way of example a typical embodiment of the invention. Of course other shapes, proportions and arrangements may be contemplated without departing from the spirit and scope of the invention. In the drawings:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic elevational view of the machine showing in the form of assemblies the various mechanisms and the kinematic chain of the machine;

FIG. 2 is an elevational view with parts broken away of the same machine;

FIG. 3 is a plan view from above;

FIGS. 4 to 7 are sections taken along the lines IV—IV to VII—VII, respectively, of FIG. 1;

FIG. 8 is a perspective view of a spout obtained by operating the machine of this invention; and

FIGS. 9 to 13 are fragmentary elevational-sectional views showing the mechanisms for cutting the spouts and inserting them into the packing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the block diagram of FIG. 1 the machine according to this invention comprises:

an assembly A for driving the band and thus feeding the same through the machine;

another assembly B for cutting portions of the band to form the wings of the spout and punching a hole through the band to permit the engagement of the driving pin of assembly A into the hole;

a third assembly C for folding the spout wings and forming the projections (lugs) for fixing the spout to the packing, and

a fourth assembly D for inserting the finished spout, a detached from the band, into the packing.

The movements of the members constituting these various assemblies are controlled from a motor (not shown) of the packing machine through a bevel-gear 10 coupled through a socket 11 to the shaft 12 of the motor.

The band *a*, which is a plain, uncut strip, is unwound from a coil 13, whose shaft 13*a* is supported by two arms 13*b* attached to the frame *b* of the machine by means of bolts 13*c*. The mechanism intended for advancing the band *a* into the machine comprises essentially an eccentric 14 rigid with a shaft 14*a* and adapted to reciprocate in a horizontal plane a rod 15 (FIG. 2) having a strap-shaped end 15*a* provided with a roller 15*b* engaging eccentric 14. A coil compression spring 16 is prestressed between strap-shaped end 15*a* and a sliding socket 17 (FIG. 3) and constantly urges the roller 15*b* of end 15*a* into rolling contact with eccentric

14. Socket 17 is rigid with the frame structure *b* of the machine. The rod 15 is connected through an adjustable ring 18 to a slide 19 to which a stirrup 20 is pivotally connected, the stirrup having an upstanding pin 21 mounted to pivot about a shaft 21*a* (see FIGS. 2 and 3).

The band *a* is placed by the worker on the machine and introduced under the dies which will be discussed below. At the start of the cycle of operation, the worker pulls out the band and places it on the stirrups 20. The feed rate of the band depends on the operational rhythm of the packaging machine to which the machine of the invention is connected by the shaft 12. The movement of the eccentric 14 is a function of the eccentricity imparted to it by its construction and which equals the predetermined length *l* (see FIG. 8) of the pouring spout.

The assembly B for perforating or punching the band *a* and cutting portions of the the latter for forming the wings of the spout comprise (see notably FIG. 4) a flange 22 connected through links 23 to a support 24 carrying on the one hand lateral punches 25 shaped to cut the band *a* and thus form the wings of the spout and on the other hand a central punch 26 for perforating the band to form the square hole engageable by the pin 21 of the band feed mechanism.

Owing to the fact that the pin 21 is pivoted on the shaft 21*a* the pin is introduced into the hole produced in the band. The pin remains engaged in the hole during the advance of the band by the desired amount *l* and is retracted from the hole during the backward movement of the stirrups 20 until the pin encounters the following hole. The punches 25 and 26 co-act with a corresponding die 27. The die 27 possesses the sunk profiles of the punches 25 and 26, so as to cut portions of the band to form the flanges *e*₂ with the punch 25 and the square hole with the punch 26, at the instant when the punches penetrate the die 27, the band *a* resting on the die. The band is driven by the pin 21, the pin advancing by the length of the flange *e*₂ during the ascent of the punches 25 and 26.

The movable assembly comprising the flange 22 and punches 25, 26 is reciprocated in a vertical plane by means of a connecting-rod 28 carried by shaft *c* connected to bevel gear 10 and adapted to drive all the mechanisms of the machine, except the band feed mechanism already described in the foregoing.

With the band thus punched to permit the feeding thereof through the machine and cut, as explained above at the desired locations and with the desired configuration for constituting the wings of the spout, the next step consists in folding these wings and forming the projections or lugs necessary for fixing the spout to the interior of the packing. This function is accomplished by the assembly C to which the band retained by pressure rollers 29, 29*a* is fed.

The projections or lugs *e* of the spout are obtained according to this invention by actuating a punch 30 carried by a piston 31 to which a vertical reciprocating motion is imparted by another connecting-rod 32 carried by a crank-pin 33 of shaft *c*, the connecting-rod to piston connection being achieved through a pivotal coupling 34.

The punch 30 is a square element, cut into a point and having two edges that form cutting elements. The sides of square punch 30 are aligned diagonally to the edges of the square hole punched into the band by the punch 26 and, while penetrating the hole along the di-

agonal, it cuts and bends the pointed lugs *e* with its two cutting element edges.

The piston 31 slidably mounted in a sleeve 35 provided in a support 36 is not completely cylindrical but comprises a flat portion guided during the piston movements by means of plates 37. This arrangement according to a specific feature of the present invention prevents any undesired relative rotative movement of the piston in order to properly introduce punch 30 into the hole already formed in the band. Accordint to another feature characterizing this invention the punch 30 is oriented by construction in a manner to permit its introduction into the hole for shaping the projections or lugs *e* emerging above the body *e*₁ of the spout of which the wings *e*₂ are to be formed during a next step with the assistance of the portions previously cut in the band. This folding operation is carried out, according to this invention, through the combined action of piston 31 and a corresponding die 38 having a cutting edge 38*b* carried through rods 39 by means of a flange or plate 40. The latter is constantly urged by springs 40*a* prestressed between the flange 40 and rods 39 against a cam 42 rigid with shaft *c*, a roller follower 43 carried by flange 40 constantly engaging the contour of cam 42. Thus, a vertical reciprocating motion is imparted to the die 38 for folding the wings. The bending occurs around the projection 38*a*, by the action of guide members 31*a* of the punch 31, when the die 38 is in its lowermost position due to the action of springs 40*a*.

It may be emphasized that according to this invention the arrangement is such, as far as the co-acting surfaces of guide members 31*a* of piston 31 and die 38 are concerned that the spout wings are not exactly perpendicular to the spout body but slightly inclined (V-folding) in order to facilitate the insertion and fixing of the spout into the packing.

The pouring spout is thus completed and ready to be introduced into the packing, after cutting the band, of course, at the proper location. These steps are performed with the assistance of the mechanisms constituting the assembly D.

A connecting-rod 44 (FIG. 7) rigid with a crankpin 44*a* mounted on the driving shaft *c* is adapted to reciprocate a piston 46 having a cutting edge 46*a* in a vertical plane through a pivotal connection 45. This piston 46 is slidably mounted in a sleeve 47 and has a flat face including cutting edge 46*a* which, during the piston movements, engages the rear faces of plates 37. Thus, the piston 46 is prevented from moving otherwise than in a reciprocating motion in a vertical plane. On the other hand, the piston 46 has a centering member such as a pin 48 having a base disposed between a pair of rods 49, 49*a* of resilient material such as rubber or the like.

This assembly operates as follows (see FIGS. 9 to 12 inclusive):

Assuming that the initial position is that illustrated in FIG. 9, which is the original position in which the die 38 is at its top dead centre position and piston 46 at its bottom dead centre position. The band is fed through the machine and a completed spout is brought to the cutting and fixing position (FIG. 10). Thus, die 38 is lowered and piston 41 is raised. At a certain moment during the relative movements of these two members (FIG. 11), while die 38 is in its bottom dead centre position, the piston 41 attains the cutting level to sever the

finished spout from the band and permit the movement of the spout towards the packing E to which it is to be fixed. The band is stopped and the spout is held, at the end thereof freed by the preceding cutting operation, by means of retractable holding means such as a ball 50 5 urged by a spring 51 to its operative position, the spring being housed in a blind hole of the sleeve 47 and the ball projecting slightly from the inner surface of the sleeve.

The completed pouring spout is situated in the position illustrated in FIG. 10. The die 38 is lowered by the springs 40a. The spout is held at its face end by the ball 50, which prevents bending of the spout when the guide 48 is introduced between the pointed lugs. Thus the cutting edges 38b and 46a operates as shears and separate the spout from the band. The piston 46 completes its ascent until the spout is introduced into the package. 10

Simultaneously with this cutting operation the centering pin 48 (FIG. 11) is introduced into the hole previously formed in the band, so as to ensure an accurate centering of the spout in relation to the position to be obtained during its introduction into the wall of packing E. As the piston continues its upwards movement (see FIG. 12) the spout guided by centering pin 48 is self-centered by guide faces 52 engaged during its upward movement. These guide faces bend the spout wings from a substantially inclined position (FIG. 8) to a substantially perpendicular position during the insertion thereof into the packing E, as shown in FIG. 13, 20 this position corresponding to the top dead centre position of piston 46. Stapling is carried out through known means comprising an arm (not shown) and the stapling effort is absorbed by the resilient pads 49, 49a. 25

The arrangement contemplated according to this invention permits on the one hand an accurate centering of the spout before its insertion into the packing, and on the other hand a convenient performance of the stapling operation, since the pointed lugs *e* can be bent definitely only when properly positioned in the packing material. 30 40

Of course, this invention should not be construed as being strictly limited by the specific embodiment described and illustrated herein, since various modifications and variations may be made thereto without departing from the spirit and scope of the invention as set forth in the appended claims. 45

I claim:

1. A device, adapted to be coupled to a package making machine, for forming pouring spouts from a plain uncut metal band and for individually attaching each of the formed spouts to a package made by said machine, each of said formed spouts including a flat body portion, lateral wings bent upwardly with respect to said body portion, and projections extending upwardly from an opening in said body portion, said device comprising: 50

a frame having a substantially horizontal support surface;

supply means operatively associated with said frame for storing said metal band and for permitting the supply thereof to said device over said support surface;

means operatively associated with said frame for perforating said band at predetermined intervals along the length thereof to form regularly spaced holes therein; 55 60

means for feeding said band into said device and including pivotally supported driving means for successively engaging said spaced holes, and means connected to said driving means for imparting thereto an alternating rectilinear horizontal motion;

cutting means operatively associated with said perforating means and reciprocally movable in a vertical plane for cutting away portions of the sides of said band for forming wing portions;

bending means operatively associated with said frame and reciprocally movable in a vertical plane for bending upwardly said wing portions for forming said wings;

shaping means operatively coupled to and movable with said bending means for successive introduction into each of said holes for forming said projections;

severing means operatively associated with said frame and reciprocally movable in a vertical plane for separating each of said formed spouts from said band; and

means operatively coupled to and movable with said severing means for individually advancing the separated spouts upwardly and attaching each said spout to a package. 65

2. A device as claimed in claim 1, wherein said driving means comprises a vertically extending pin pivotally mounted about a horizontal shaft on a stirrups support; and said imparting means comprises a shaft rotatably connected to a motor of said package making machine, an eccentric rigidly attached to said shaft, a horizontally extending rod operatively associated at one end thereof with said stirrup support and biasing means positioned for urging the opposite end of said rod into engagement with said eccentric.

3. A device as claimed in claim 1, wherein said perforating means and said cutting means comprise a die positioned on said frame; a flange; a support carried thereon a centrally located first punch for forming said hole and laterally positioned second punches for forming said wing portions; said die having recesses therein corresponding to the shapes of said first and second punches; support columns movably extending through said frame and connected to said flange and said support; and means acting on said flange to impart an alternating vertical motion to said flange, said support columns, said support and said punches.

4. A device as claimed in claim 1, wherein said shaping means comprises a piston of non-circular cross-section mounted for vertical movement in said frame; a punch element mounted on the top surface of said piston, said punch element having two edges forming cutting elements aligned diagonally to the edges of said holes formed by said perforating means; and means for acting on said piston for imparting an alternating vertical motion to said piston and said punch element; and wherein said bending means comprises a flange mounted below said frame; a die positioned above said frame and having recess means for cooperation with guide means on said piston for bending said wing portions upwardly to form said wings; columns extending through said frame and connecting said flange and said die; and means for acting on said flange for imparting alternating vertical movement to said flange, said columns and said die. 70 75

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5. A device as claimed in claim 4, wherein said recess means and said guide means are dimensioned to bend said wing portions to a position inclined to vertical.

6. A device as claimed in claim 1, wherein said severing means and said attaching means comprise a piston of non-circular cross-section mounted for vertical movement in said frame; centering means mounted on the top of said piston and dimensioned to fit in said hole; means for acting on said piston for imparting an alternating vertical movement to said piston and said centering means from a position below said support surface to a position above said support surface; die means mounted for coaction with a surface of said piston during upward movement of said piston for cutting said band and thus separating said formed spouts from said band; retractable holding means positioned for temporarily supporting said separated spout while said centering means is introduced into said hole of said separated spout; and guide surfaces positioned on said frame for contact with said wings of said separated spout as said piston moves said separated spout above

said support surface and into said package.

7. A device as claimed in claim 6, wherein said guide surfaces are dimensioned to bend said wings as said piston moves said separated spout above said support surface.

8. A device as claimed in claim 7, wherein said guide surfaces are dimensioned to bend said wings to a position at right angles to said body portion of said separated spout.

9. A device as claimed in claim 6, further comprising elastic means positioned between said centering means and said piston for absorbing shock occurring when said separated spout is inserted into said package.

10. A device as claimed in claim 1, further comprising a single shaft operatively connected to a motor of said machine, said shaft being operatively attached to said perforating means, said cutting means, said bending means, said shaping means, said severing means and said attaching means for imparting alternating vertical movement thereto.

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