June 25, 1963 E. GRIMM 3,094,767

MACHINES FOR OPERATING ON SEPARATE LINES OF STOCK AND COMBINING PARTS MADE FROM THE SEPARATE LINES OF STOCK

Filed Aug. 16, 1961 6 Sheets-Sheet 1

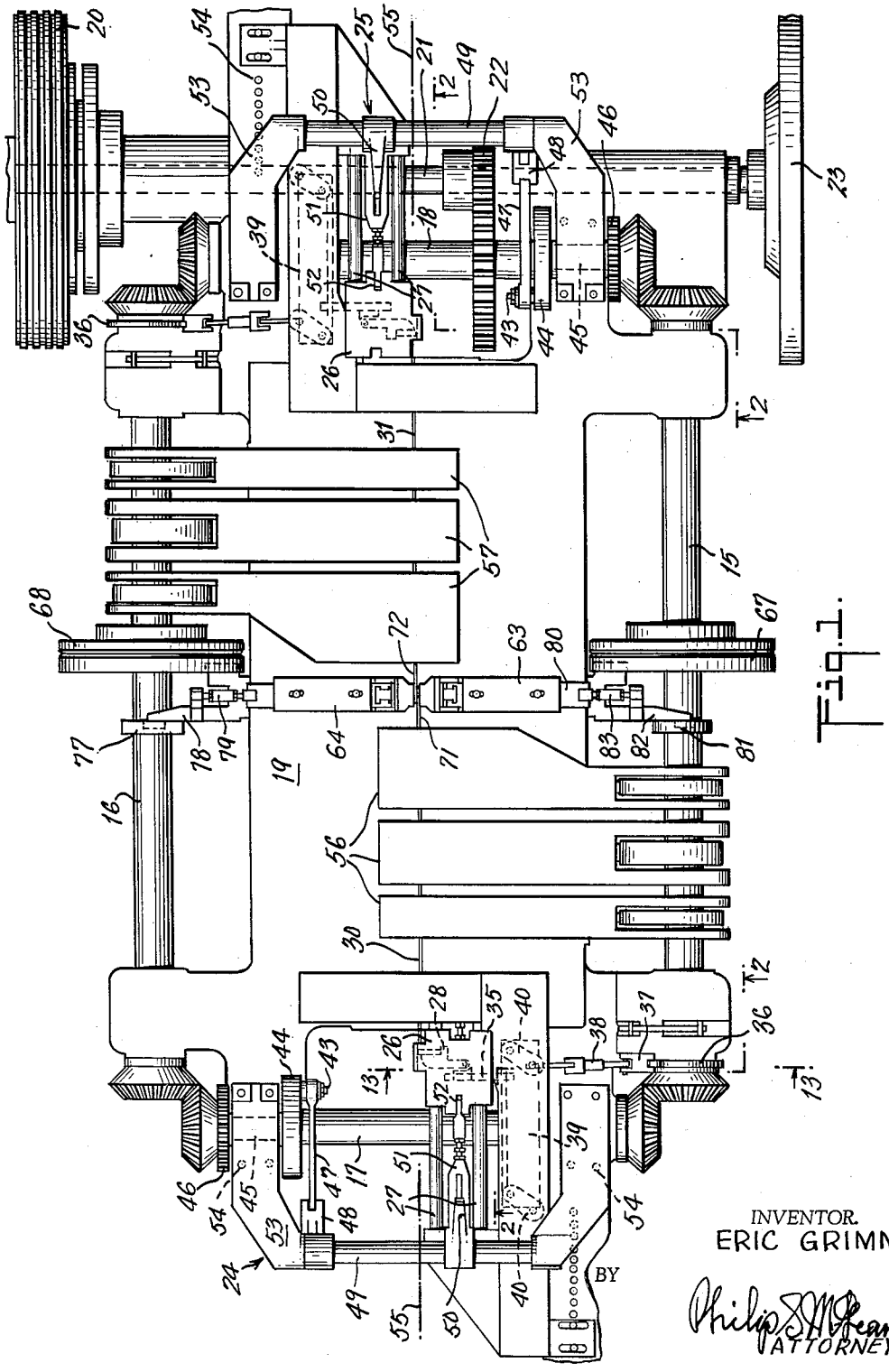


Fig. 1.

INVENTOR.
ERIC GRIMM

BY

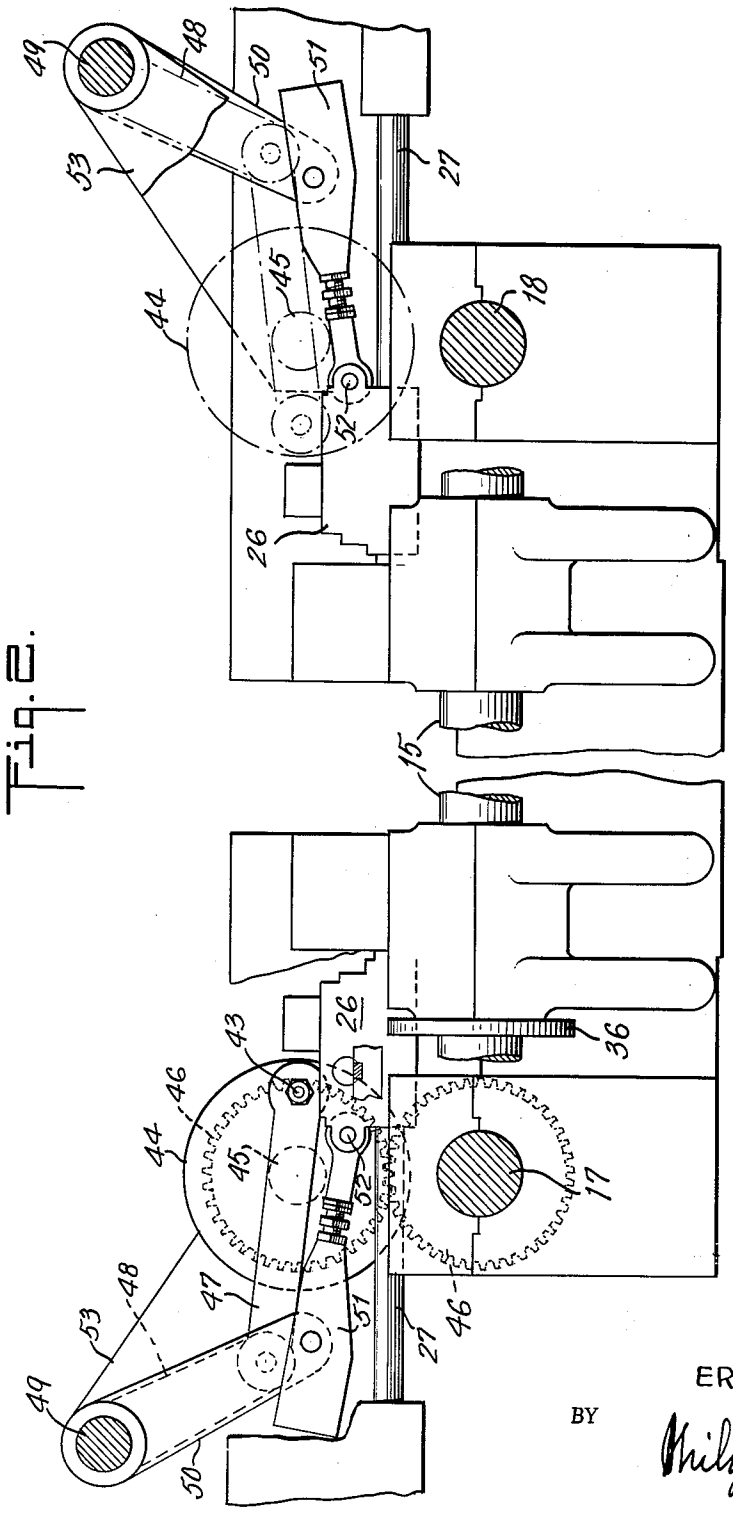
Philip S. McLean
ATTORNEY

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MACHINES FOR OPERATING ON SEPARATE LINES OF STOCK AND COMBINING PARTS MADE FROM THE SEPARATE LINES OF STOCK

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Fig. 2.



INVENTOR.
ERIC GRIMM

BY

ATTORNEY

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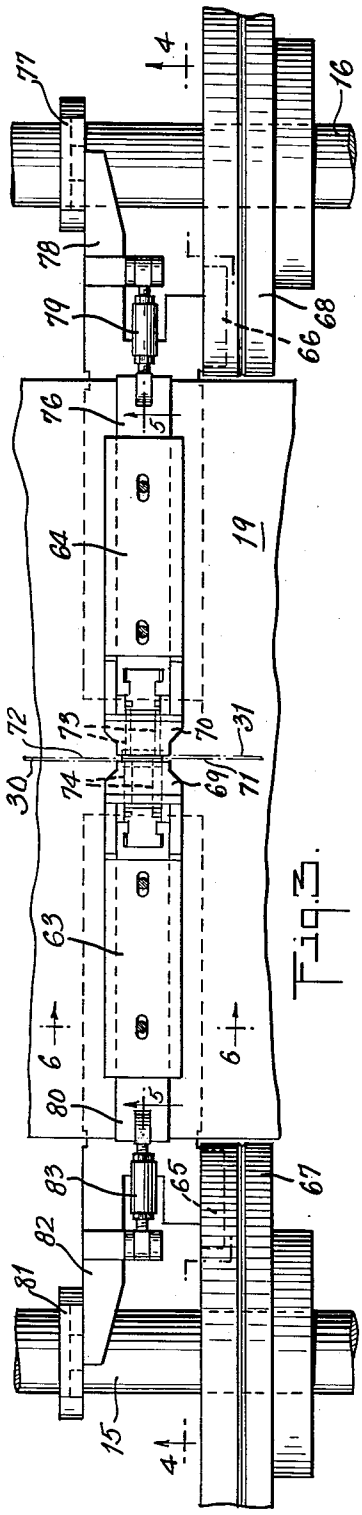


Fig. 3.

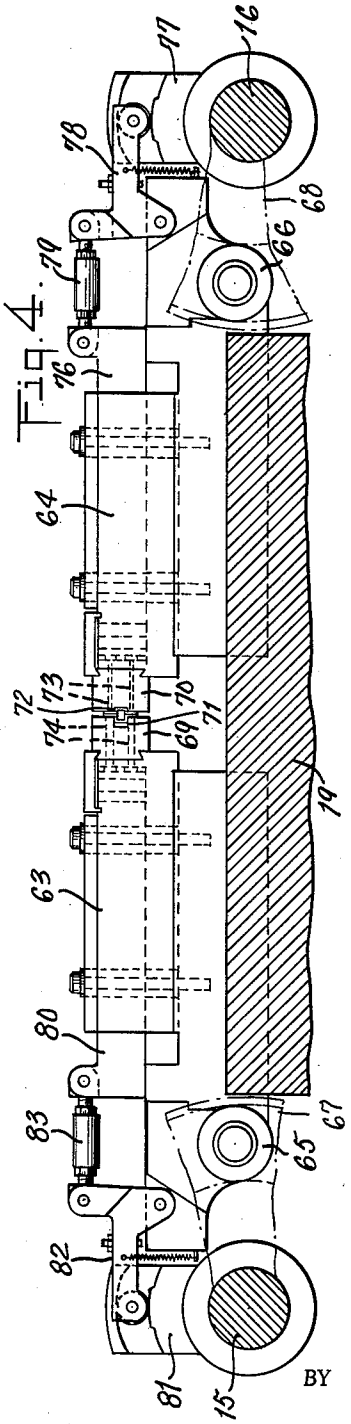


Fig. 4.

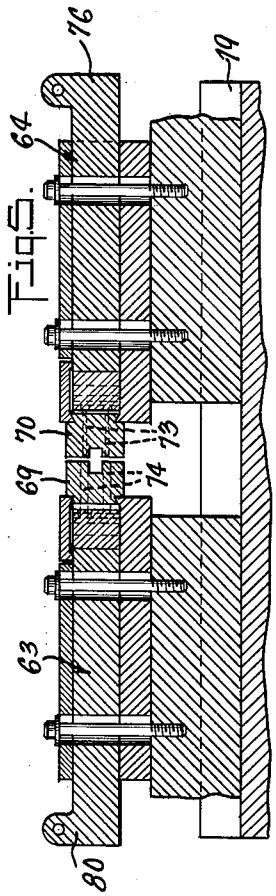


Fig. 5.

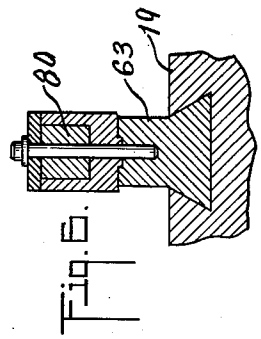


Fig. 6.

INVENTOR.
ERIC GRIMM

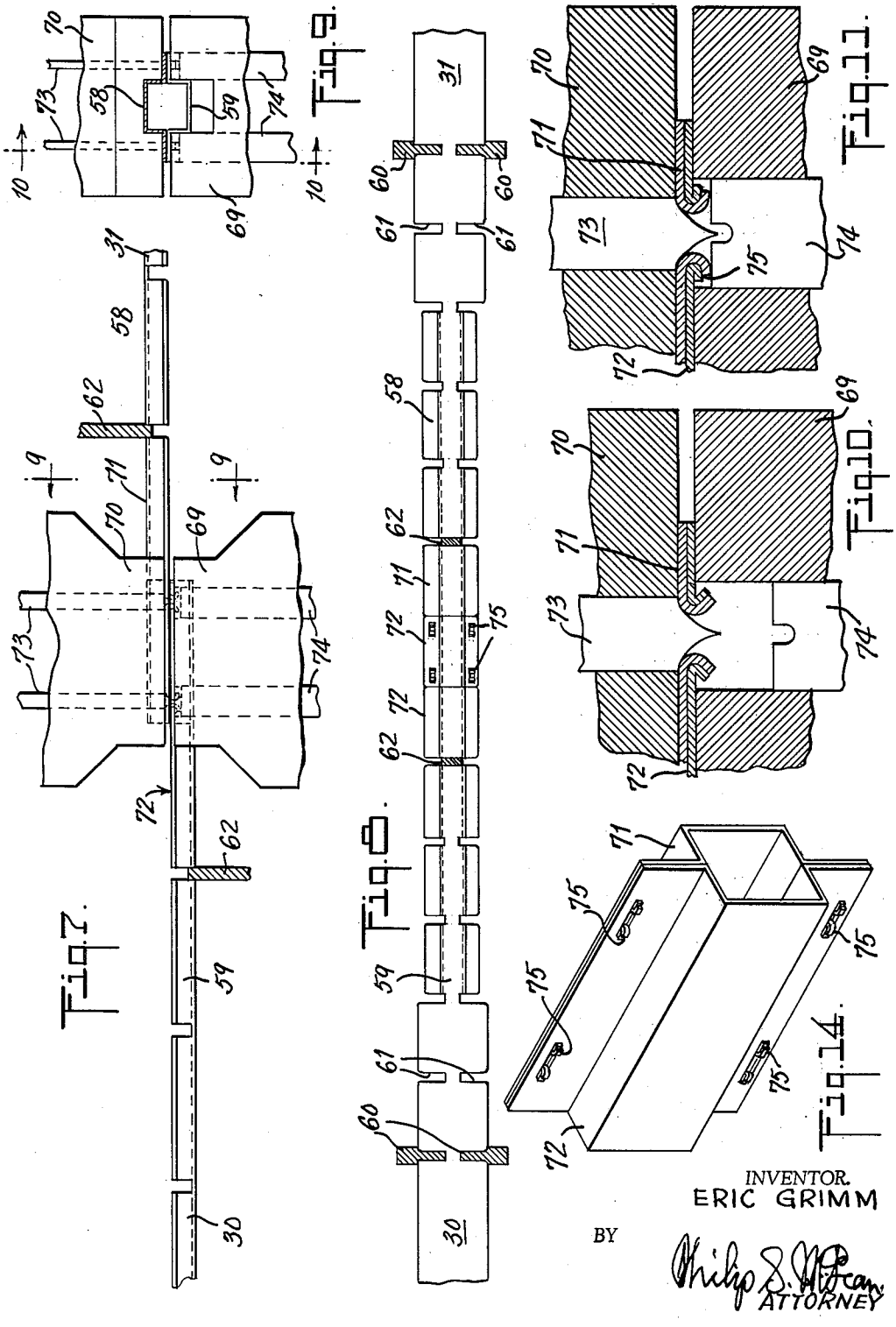
BY

Philip S. H. Beam
ATTORNEY

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MACHINES FOR OPERATING ON SEPARATE LINES OF STOCK AND COMBINING PARTS MADE FROM THE SEPARATE LINES OF STOCK

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INVENTOR.
ERIC GRIMM

BY

Philip S. McCann
ATTORNEY

June 25, 1963 E. GRIMM 3,094,767

MACHINES FOR OPERATING ON SEPARATE LINES OF STOCK AND COMBINING PARTS MADE FROM THE SEPARATE LINES OF STOCK

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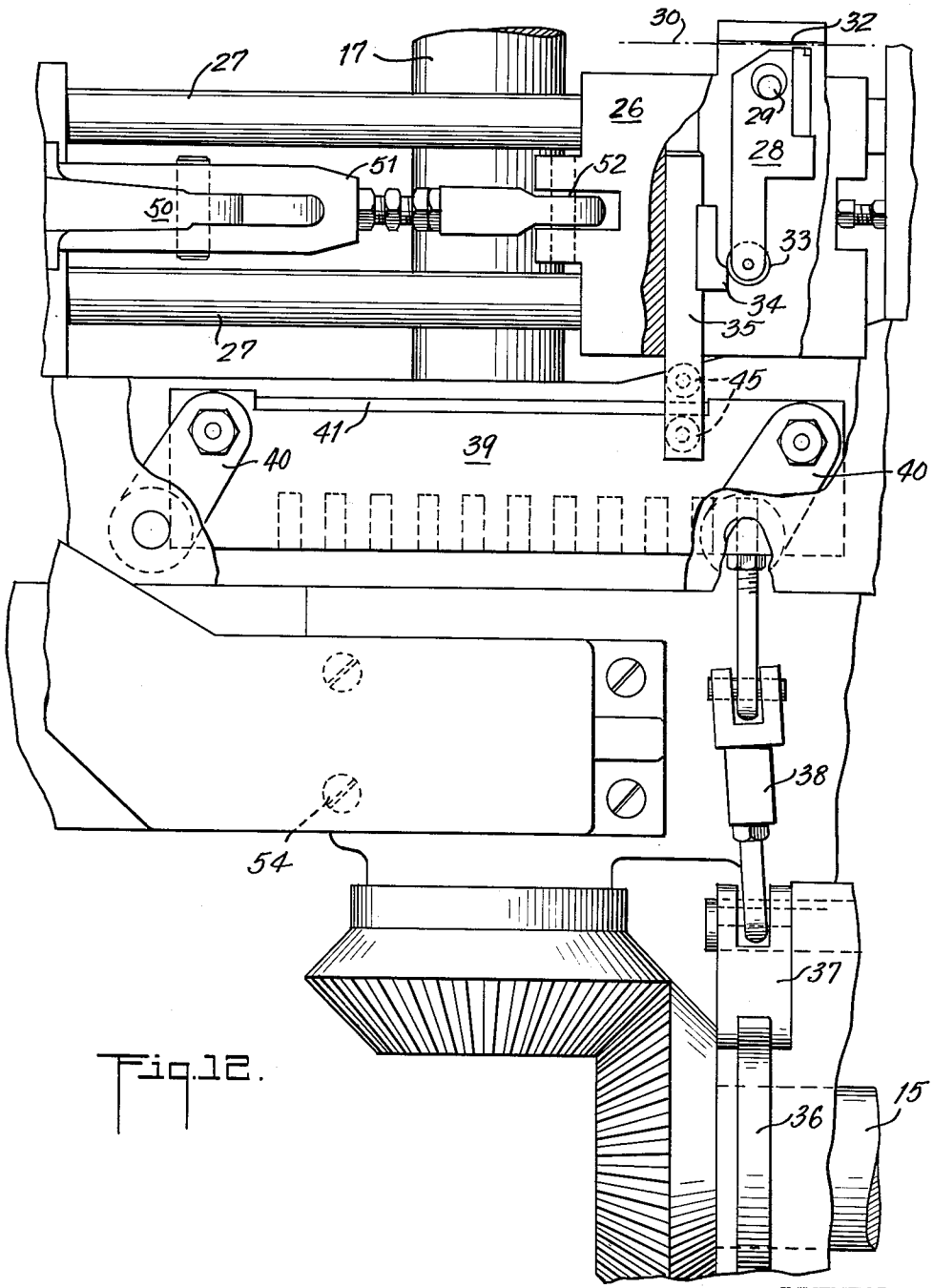


Fig. 12.

INVENTOR.
ERIC GRIMM

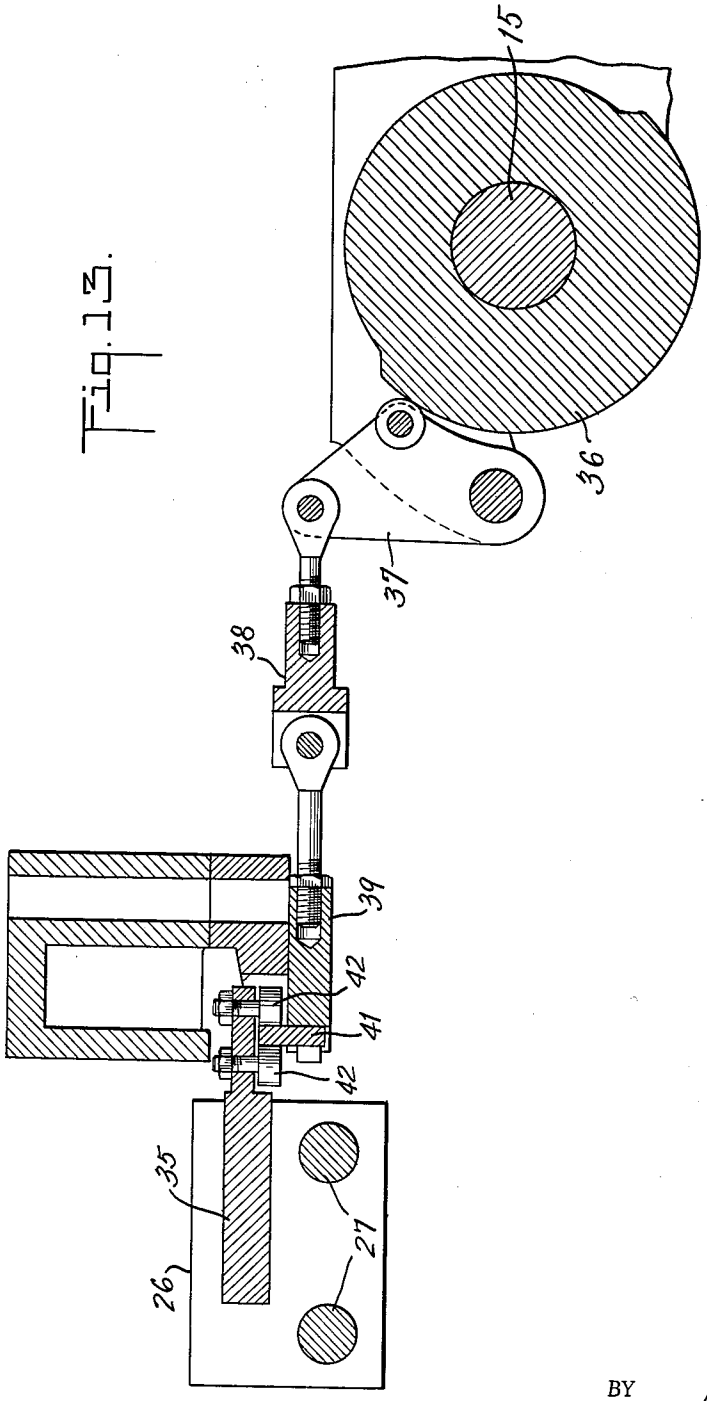
BY Philip S. McLean
ATTORNEY

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Fig. 13.



INVENTOR.
ERIC GRIMM

BY

ATTORNEY

United States Patent Office

3,094,767

Patented June 25, 1963

3,094,767

MACHINES FOR OPERATING ON SEPARATE LINES OF STOCK AND COMBINING PARTS MADE FROM THE SEPARATE LINES OF STOCK

Eric Grimm, East Orange, N.J., assignor, by mesne assignments, to Associated Patentees, Inc., East Orange, N.J., a corporation of New Jersey

Filed Aug. 16, 1961, Ser. No. 131,916
4 Claims. (Cl. 29—33)

The invention herein disclosed relates to the manufacture and assembly of parts made from separate lines of stock, such as two separate lines of strip material.

This patent is a continuation in part of copending patent application Serial No. 837,912, filed September 3, 1959, now abandoned.

Objects of this invention are to provide simple practical mechanism combined in one compact machine, for feeding in stock at opposite ends of the machine, independently forming or otherwise shaping or acting on such stock to create identical or different kinds of parts and then as a continuation of such operations, assemblying such parts in completed units and discharging the finished product of the machine as completed products made up of such manufactured parts.

These objects have been accomplished by a novel combination and arrangement in which the strips of material, formed to desired shape are advanced in opposite directions in laterally offset opposed relation, severed at the ends into the parts which are to be associated and then these formed and severed parts in such opposed relation are brought together and secured so, as by "stitching," staking, riveting, welding or adhering or otherwise fastening the parts together.

The drawings accompanying and forming part of this specification illustrate a practical commercial embodiment of the invention. Structure however may be modified and changed as regards this illustration, all within the true intent and scope of the invention as hereinafter defined and claimed.

FIG. 1 is a general plan view of one of the machines showing stock being fed in at opposite ends, formed into separate parts and the parts assembled into completed units.

FIG. 2 is a broken longitudinal sectional view on substantially the plane of line 2—2 of FIG. 1, showing the individual slide feeds at opposite ends of the machine.

FIG. 3 is a broken, enlarged, part sectional, plan view of the part assembling dies.

FIG. 4 is a cross sectional view on substantially the plane of line 4—4 of FIG. 3.

FIG. 5 is a broken cross sectional view of the assembly slides on substantially the plane of line 5—5 of FIG. 3.

FIG. 6 is a cross sectional detail on line 6—6 of FIG. 3, illustrating the kicker slide operating within the front slide.

FIG. 7 is a broken part sectional plan view illustrating the severing and assembling steps.

FIG. 8 is a broken and part sectional front elevation illustrating stock in course of formation, severing and assemblage.

FIG. 9 is a broken diagrammatic view on the plane of the line 9—9 in FIG. 7 showing the front slide advanced

to hold the two parts together while the stitching punches are operating.

FIG. 10 is a broken sectional detail illustrating the first, piercing step of the stitching punches.

FIG. 11 is a similar view illustrating the second, riveting or upsetting step of the stitching punches.

FIG. 12 is a broken plan view of portions of the left hand end of the machine shown in FIG. 1, illustrating particularly the slide feed mechanism.

FIG. 13 is a broken transverse sectional view on substantially the plane of line 13—13 of FIG. 1, showing the cam and connections therefrom for effecting opening and closing of the gripper.

FIG. 14 is an enlarged perspective view of the parts made up and combined by the machine.

FIG. 1 is a general view of the machine, known as a "Duplex Multi-Slide" embodying front and rear, left and right hand shafts 15, 16, 17, 18 geared together about a rectangular machine tool bed 19 and carrying the cams and eccentrics for operating the dies and tools mounted on the bed.

A motor at the right hand end drives through belt connections 20 a counter shaft 21 connected by gears 22 with the right hand cam shaft 18 and the counter shaft carries a hand wheel 23 for turning over the machine in setting up the tools.

The feed mechanism at the left end of the machine is designated 24 and that at the right hand end is designated 25.

These feed mechanisms are shown as slide feeds consisting each of a feed block 26 mounted to slide on guide rods 27 and carrying a lever 28 pivoted at 29 so as to pinch the stock, 30 at the left and 31 at the right against an abutment wall 32, the gripper lever carrying the roller 33 engaged by a cam 34 on a cross slide 35, with the latter positioned from cams 36 on the front and back power shafts 15, 16.

These cams are shown as actuating rockers 37 connected by links 38 with plates 39 supported by swinging parallel links 40 and carrying at their inner edges rails 41 sliding between spaced rollers 42 on the underside of the cam carrying slides 35.

The parallel links 40 give the rail carrying plates straight in and out movement toward and away from the feed blocks, thus to effect desired opening and closing movements of the stock grippers according to the cam shapes 34 and 36.

Reciprocation of the feed blocks 26 on the guide rods is effected in each instance from a crank pin 43 carried by crank disk 44 on a shaft 45 driven by gearing 46 from the end shafts 17, 18, these crank pins connected by links 47 with arms 48 on rock shafts 49, the latter carrying lever arms 50 connected by adjustable links 51 with pivot pins 52 on the feed blocks.

The rock shafts 49, which reciprocate the feed blocks, are shown journaled in brackets 53 adjustably mounted at 54 on opposite ends of the bed.

While the feed mechanisms at opposite ends of the bed are here shown as duplicates, it will be appreciated that they may be alike or be quite different, depending on the materials fed in at opposite ends of the machine, the extent of feed to be given such materials, the manner in which the products are to be combined or assembled and other such factors.

While illustrated for feeding flat strip stock the structure may be varied for handling other forms of strip, rod, wire and other such stock.

In the plan view, FIG. 1, the longitudinal center line of the machine is indicated at 55, with the "wire line" or feed for the left hand feed mechanism offset to one side and the feed line for the right hand feed mechanism laterally offset to the opposite side of the center line. While these two feed lines are shown offset equal distances to opposite sides of the center line, it will be understood that they may be offset unequal distances, depending upon the character of the work and whether a stripping or forming post is used and other such factors.

Various kinds of shaping, forming, punching, drawing, cutting, drilling, tapping and other such dies, tools and machine elements may be mounted on opposite ends.

These various kinds of machine tools have not been illustrated further than to indicate at 56 one set of tools at the left end of the machine operated from the front cam shaft 15 for forming the stock fed in at the left end and one set of tools at 57 on the right hand end of the bed operated from the rear cam shaft 16 to form stock fed in at the right end of the machine.

In the present illustration these forming tools are indicated as of the type shown in the Koch Patent 2,610,388 of September 16, 1952, with dies to form the two strips to the opposed channel shape shown at 58, 59, FIGS. 7, 8, 9.

These tools, as indicated in FIG. 8, carry or have associated with them dies 60 for notching the edges of the strips at 61 prior to the forming operation and cutters 62 for severing the formed blanks just prior to entry between the dies on the front and back slides 63, 64.

These two slides, as shown in FIGS. 3, 4 and 5, carry cam rolls 65, 66 in engagement with cams 67, 68 on the front and back cam shafts 15, 16.

The dies 69, 70 on the front and back slides are shaped to take the formed and cut blanks 71, 72 and the cams 67, 68 are shaped to approach these dies to grip and hold the blanks together in the opposed face to face relation shown in FIGS. 4, 7 and 9.

While the blanks are thus held together at the assembly point, stitching punches 73 on the rear tool 70 are advanced, as shown in FIG. 10, to pierce and turn back engaged edge portions of the clamped blanks and following this piercing step spanking tools 74 operating in the front slide are advanced to upset and rivet the pierced and overturned portions of the blanks, as indicated at 75 in FIG. 11.

The stitching punches 73 are carried by a rear kicker slide 76 mounted on the back slide 64 and operated from a cam 77 on the rear cam shaft through rocker and link connections 78, 79, FIG. 4.

Similarly the front kicker slide 80 is actuated from cam 81 on the front cam shaft 15 through rocker and link connections 82, 83.

Strip material from separate sources of supply and possibly of the same or different character is thus advanced in opposite directions through notching and forming stages and cut off in blanks positioned in opposing face to face relation and gripped and held in this state while stitching and spanking punches fasten them together by integral portions struck through from one side and headed over at the opposite side of the assembled blanks.

The completed units made up of the assembled independently formed parts may be discharged simply by separation of the front and back slides.

For some parts it may be desirable to use a final forming post or stripper and the parts may be formed and assembled on different levels or on the same level as in the present illustration.

It will be evident also that the two matching parts made at the opposite ends of the machine may differ in conformation and material and size or simply be duplicates as in the present illustration.

Since all operations are automatic the machine may be operated at a high production rate.

The two lines of stock advancing in opposite directions approach in laterally offset overlapping relation thus to locate the shaped complemental parts in the face to face relation required for their proper connection. Guides may be provided so that the blanks cut at the ends of the strips will be properly directed by the continuous ends of such strips into coordinated relation between the holding and assembling dies.

The front and rear kicker cams 81 and 77 are shown as open, segmental cams allowing for independent movement of the stitching and spanking tools on the front and back tool carrying slides.

What is claimed is:

1. A machine for making companion shaped parts from separate lines of strip stock and for assembling and fastening the parts thus made into a unitary article, comprising

an elongated rectangular machine tool bed,

cam shafts geared together positioned at the front, back and opposite ends of said bed,

first and second slide feeds positioned at opposite ends of said bed.

first and second forming tool means positioned inwardly of said slide feed means,

first and second cutoff means positioned inwardly of said first and second forming means,

and assembling means positioned midway between said first and second cutoff means,

said first slide feed operated by the cam shaft at one end of the bed for intermittently advancing a first strip of stock, step by step, into that end of the machine,

said first forming tool means positioned inwardly of said first slide means on the bed in line with the strip stock advanced by said first slide feed for forming the strip material into a predetermined shape,

first cutoff means positioned inwardly of the first forming tool means for cutting off individually formed shapes from the strip material after it passes the forming means,

said first forming tool means and said first cutting means being operated by the cam shaft at the back of said machine,

said second slide feed means operated by the cam shaft at the opposite end of the bed for intermittently advancing a second strip of stock, step by step, into said opposite end of the machine,

said second forming tool means positioned inwardly of said second slide feed means on the bed in line with the strip stock advanced by said first slide feed for forming the strip material into a companion shape to match said first-mentioned formed shape,

second cutoff means positioned inwardly of the second forming tool means for cutting off individually formed shapes from the strip at the inner end of said second-mentioned strip material,

said second forming and second cutting means being operated by the cam shaft at the front of said machine,

assembly means, said assembly means including means for assembling, holding in registered relation and fastening said first-mentioned and companion cut shapes together to form a unitary article while disposed in said assembly means,

said first and second slide feeds cooperating to position said first-mentioned cut shape and said matching cut shape into cooperatively registered relation within said assembly means,

said assembly means being driven from said cam shafts at the front and back of the bed.

2. The invention according to claim 1 in which said assembly means includes opposed companion slides on the bed for holding parts produced by the forming tools together in opposed face to face relation and stitching

tools on said slides operating to punch integral portions of said parts together into interlocked relation.

3. The invention according to claim 1 with said stock feeds offset laterally with respect to a common center line on the bed and operating to advance formed parts produced from the stock into opposed face to face relation.

4. The invention according to claim 1 with said stock feeds offset laterally with respect to a common center line on the bed and operating to advance formed parts produced from the stock into opposed face to face relation and said assembling means including punch mechanism for striking integral portions of one part through the other part opposed to the same.

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