Sept. 30, 1941. E. L. MORROW 2,257,509

LINKING MACHINE

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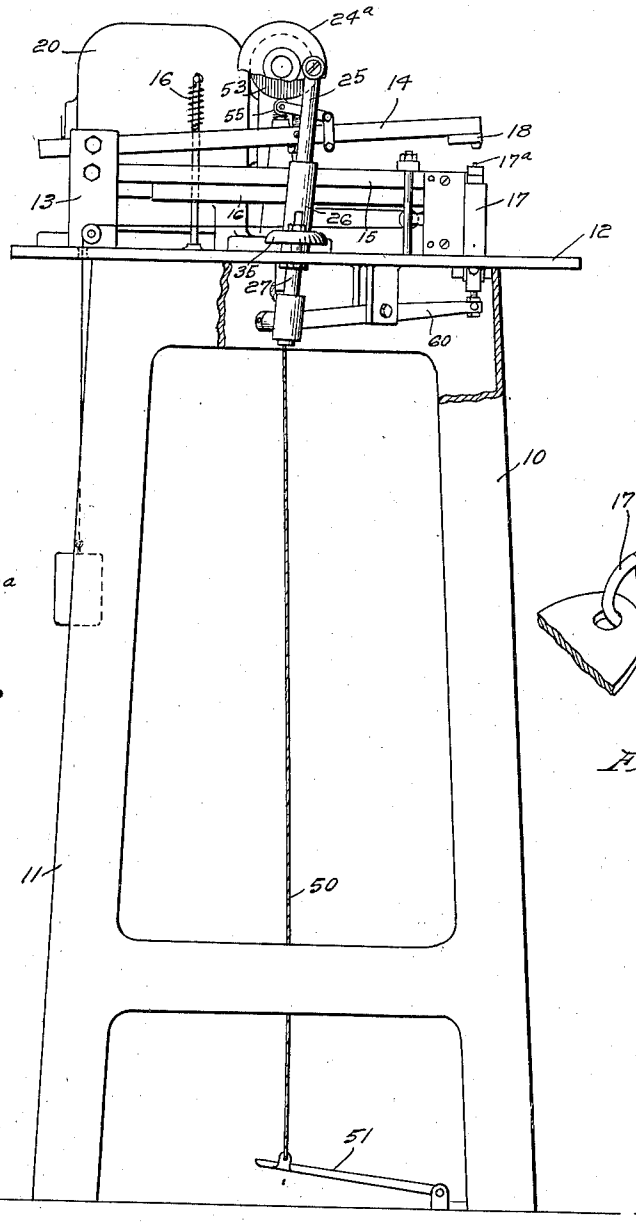


Fig. 1



Fig. 2

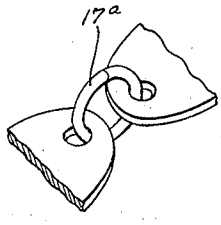


Fig. 3

INVENTOR
Earle L. Morrow
BY
Nathaniel Finch
ATTORNEY

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LINKING MACHINE

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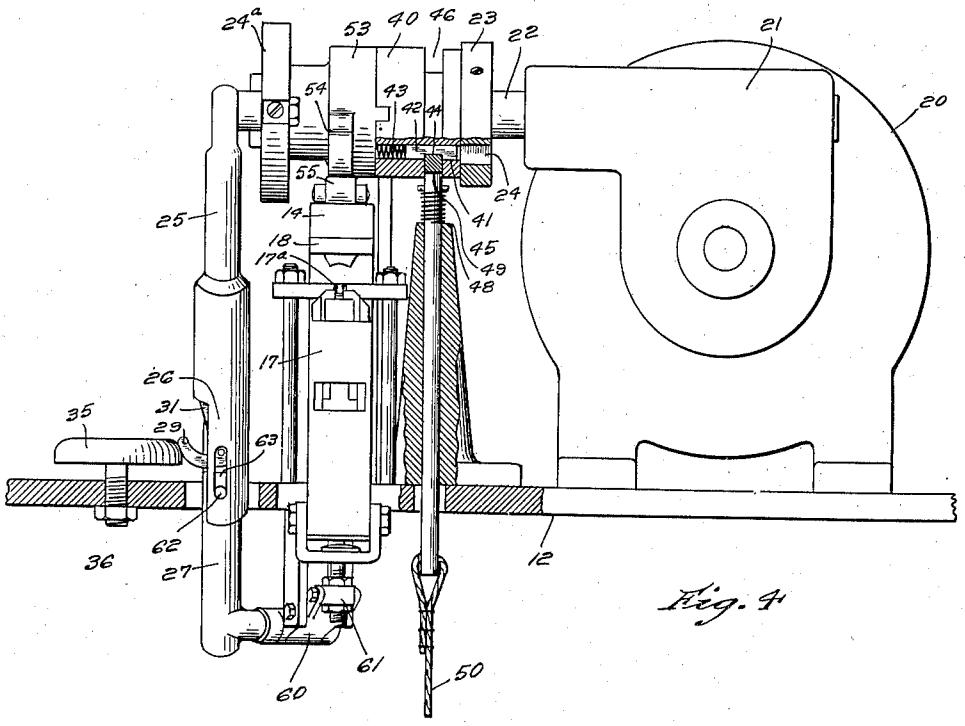


Fig. 4

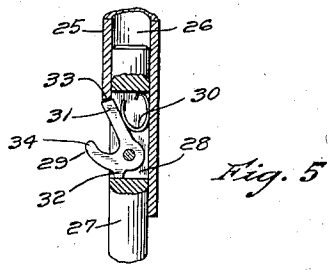


Fig. 5

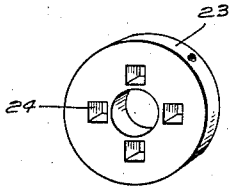


Fig. 6



Fig. 8

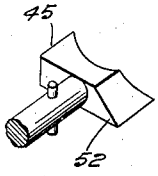


Fig. 7

INVENTOR
Earle L. Morrow
BY
Nathaniel Frucht
ATTORNEY

Sept. 30, 1941. E. L. MORROW 2,257,509

LINKING MACHINE

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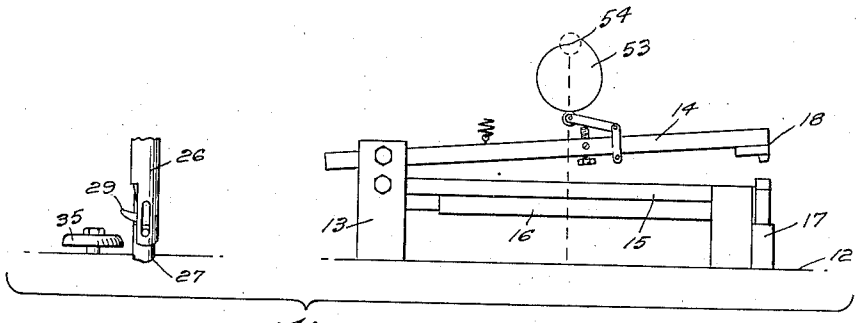


Fig. 9

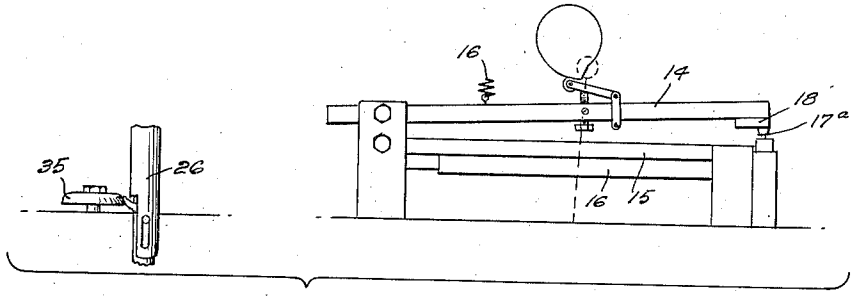


Fig. 10

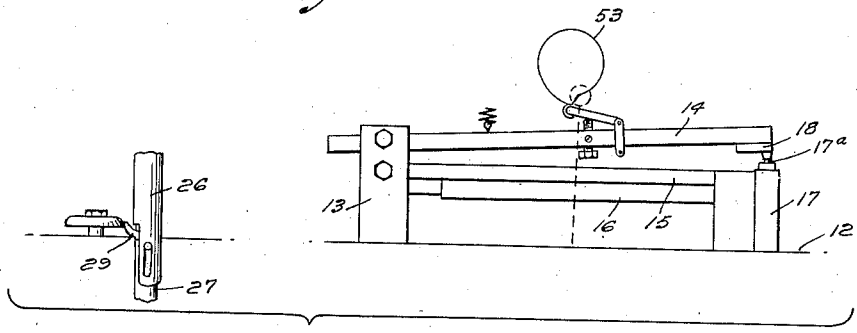


Fig. 11

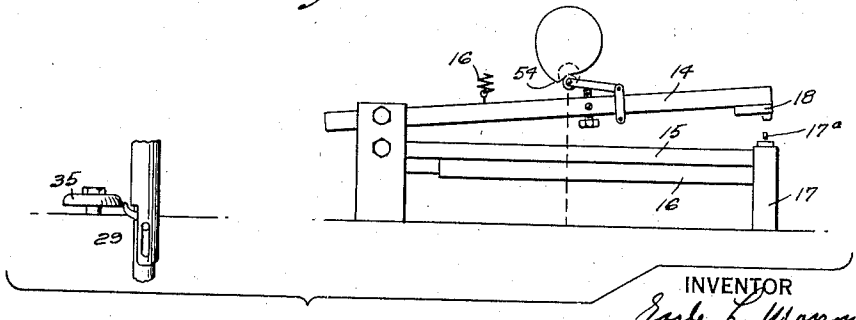


Fig. 12

INVENTOR
Earle L. Morrow
BY
Nathaniel Frucht
ATTORNEY

Sept. 30, 1941. E. L. MORROW 2,257,509

LINKING MACHINE

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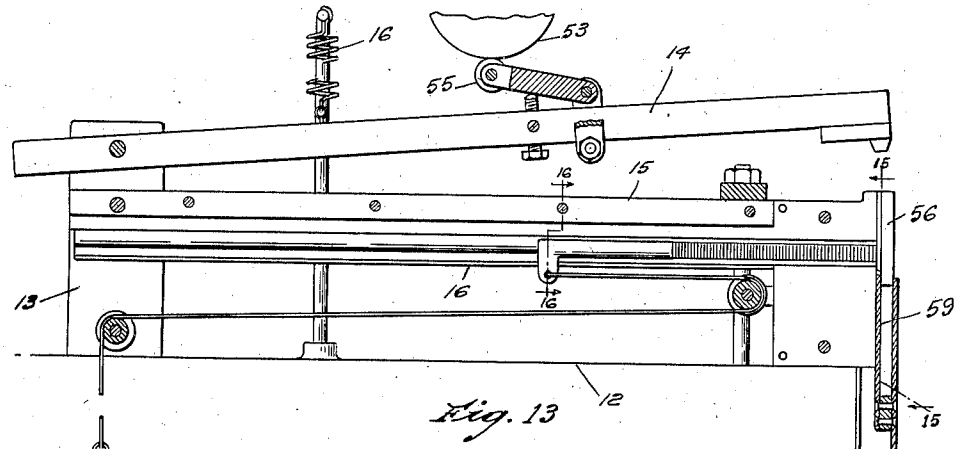


Fig. 13

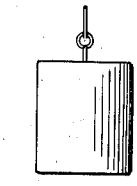


Fig. 14

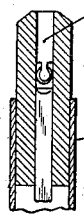


Fig. 15

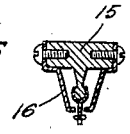


Fig. 16

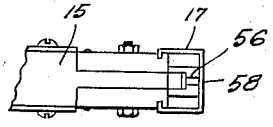
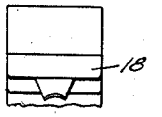


Fig. 17



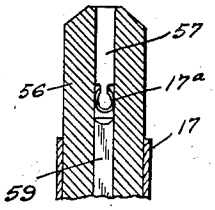
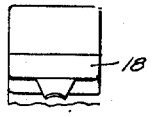


Fig. 18



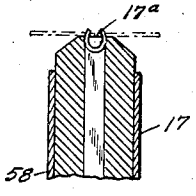


Fig. 19

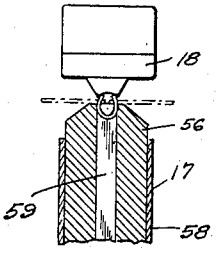


Fig. 20

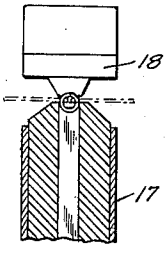
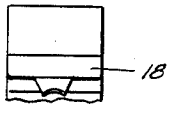


Fig. 21



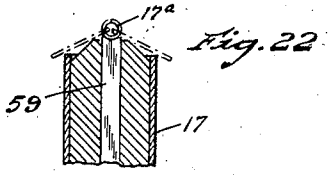


Fig. 22

INVENTOR
Earle L. Morrow
BY
Nathaniel Finch
ATTORNEY

Patented Sept. 30, 1941

2,257,509

UNITED STATES PATENT OFFICE

2,257,509

LINKING MACHINE

Earle L. Morrow, Johnston, R. I., assignor to Frank Morrow Co., Inc., a corporation of Rhode Island

Application May 1, 1940, Serial No. 332,726

6 Claims. (Cl. 59—1)

My present invention relates to the jewelry art, and has specific reference to a novel method and a novel apparatus for linking two pieces of jewelry, such as for example findings.

It is the principal object of my invention to provide a novel apparatus for linking together articles of jewelry, such as findings, to replace hand linking.

It is a further object of my invention to utilize open links, successively removed from a magazine or the like, and to mechanically close each open link after two articles to be joined have been placed in linking position.

A further object of my invention is to provide an arrangement whereby different sizes of connecting links may be readily used, by interchanging the link magazine.

Another object of my invention is to provide a positioning apparatus for the open link, which may be selectively set to expose a predetermined portion of the link side, for hooking articles to be joined thereto.

With the above and other objects and advantageous features in view, my invention consists of a novel apparatus and a novel method of linking, more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto.

In the drawings:

Fig. 1 is a side elevation, partly broken away, of the novel machine;

Fig. 2 is a perspective view of a single open-ended link;

Fig. 3 is a perspective view showing the closing of the open-ended link to join two articles of jewelry or the like;

Fig. 4 is an enlarged detailed view, partly broken away, showing details of the clutch mechanism;

Fig. 5 is a sectional detail of the actuating mechanism for the lower jaw;

Fig. 6 is a perspective view of the clutch disk;

Fig. 7 is a perspective view of the manual control for the clutch key;

Fig. 8 is a perspective view of the clutch key;

Figs. 9 to 12 inclusive are diagrammatic views showing successive positions of the upper and lower jaw and corresponding positions of the lower actuating element;

Fig. 13 is a side elevation of the link magazine, parts being removed;

Fig. 14 is an end view of the upper jaw;

Fig. 15 is a section taken along line 15—15 on Fig. 13;

Fig. 16 is a section on line 16—16 on Fig. 13;

Fig. 17 is a top plan view of the lower jaw; and

Figs. 18 to 22 inclusive are diagrammatic views showing the relative positions of the upper and lower jaws and of the connecting links.

It has been found desirable to use a semi-automatic linking apparatus for joining articles of jewelry or the like which are to be joined by connecting links. I have devised an apparatus which utilizes open end links positioned in a magazine, preferably in strip form, and successively conveys the links to a positioning head, which grips each open link and positions it with its open ends vertically upwardly, so that two articles to be joined may be hooked over the open ends, whereupon a pressure jaw moves downwardly to close the open ends and complete the connecting link. The pressure jaw is then moved upwardly and the positioning jaw ejects the completed link and positions a succeeding open link for the next joining.

Referring to the drawings, the improved machine includes a support 10 provided with legs or standards 11 and a top 12, the top carrying a rear standard 13 in which the ends of the upper jaw lever 14 and the lower jaw lever 15 are pivotally mounted, the upper jaw lever 14 having a spring 16 continually urging it to upward position. The lower jaw support 15 carries a detachable magazine 16 in which open links 17*a*, see Fig. 2, are housed, and are continually urged laterally toward the lower jaw mechanism 17 by any conventional means such as a spring, or by the slide and weight arrangement illustrated in Fig. 13. Referring now to Fig. 4, a continually operating electric motor 20 conveys power through a suitable reduction gearing 21 to a power shaft 22 which has a clutch plate 23 keyed thereto, the clutch plate 23 having a plurality of clutch openings 24 therein, as illustrated in Fig. 6. The mechanism for operating the lower or positioning jaw mechanism includes a disk 24*a* which is keyed to the power shaft 22 at the end thereof, and operating rod 25 mounted on the face of the disk 24*a* for reciprocating motion upon rotation of the disk. The lower portion of the operating rod 25 is of a hollow shell formation as indicated at 26, and houses a rod 27 which has a vertical slot 28 in which a pivoted pawl 29 is spring pressed outwardly by means of a U-shaped spring 30, the upper finger 31 of the pawl 29 being normally positioned in the line of vertical movement of the lower end of the shell 26, and the lower end of the pawl having a tooth or detent 32 for better contact with the end of the slot 28.

When the housing 26 is moved downwardly, the edge 33 thereof engages the finger 31 to carry the operating rod 27 downwardly with it, until the lower arm 34 of the pawl 29 contacts a cam disk 35 locked to the surface of the table 12, as by a bolt 36, in adjustable vertical relation to the movement of the rod 25. The engagement of the arm 34 with the cam disk 35 swings the pawl inwardly on its pivot against the tension of the spring 30, and permits downward movement of the operating rod 25 and shell 26 without further movement of the rod 27.

The mechanism for operating the movable upper head is also disclosed in Fig. 4, and includes a rotatable sleeve 40 which has a transverse passageway 41 housing a slidable key 42 of rectangular formation, which is pressed laterally by a spring 43 into engagement with one of the clutch openings 24. The key 42 has a slot 44 in which an arcuate stop 45 is movable, the collar having a circular groove or recess 46 therefor, the arcuate key 45 normally extending into the slot 44 to retain the clutch key 42 in inoperative position by means of the upward movement of the spring 47, which is positioned on the arcuate key operating rod 48 and pressed against an abutment 49 secured to the table 12. The rod 48 has an operating strap or rod 50 attached thereto, the lower end of the rod 50 being connected to a foot pedal 51, see Fig. 1, which is pivotally mounted to the machine support 10. When the foot pedal 51 is depressed, thus pulling the rod 50 downwardly, the arcuate key 45 is withdrawn from the slot 44 and allows the clutch key 42 to move to the right so as to engage one of the clutch slots 24, thus causing positive rotation of the sleeve 40. This rotation continues as long as the foot pedal 51 is depressed, but ends as soon as the foot pedal 51 is permitted to rise by pressure of the spring 47, the arcuate member 45 having a sharp bevelled edge 52, see Fig. 7, which enters into the slot 44 and forces the clutch key 42 back against its spring 44 to declutch the collar from the disk 23. The sleeve 40 is keyed to a cam plate 53 having a cam edge 54 which contacts a roller 55 which is adjustably mounted on the upper lever 14 to produce actuating movement of the pressure jaw 18, the adjustment of the roller 55 varying the stroke of the upper jaw.

The lower jaw mechanism 17 comprises a block 56 having a vertical slot 57 into which the links 17*a* are horizontally fed successively and in which they are vertically slidable with the open end upwardly. The block 17 is surrounded by a vertically slidable housing 58 which houses a plunger 59 slidable in the slot 57 as shown in Fig. 13. The lower portion of the housing 58 is pivoted to a lever 60 which in turn is pivoted to the underside of the table top 12 as shown in Fig. 1 and has its opposite end pivotally engaging the rod 27. The pivot engagement between the tube 58 and lever 60 is adjustable, as at 61, to permit adjustment of the length of the vertical stroke of the plunger.

The operation of the linking mechanism may now be described as follows: The foot pedal 51 is depressed to cause engagement of the clutch mechanism, as hereinabove described, and operation of the cam 54. As the foot pedal is depressed, the upper and lower jaws and the cam mechanism are positioned as shown in Fig. 9, the hollow shell 26 and rod 27 being positioned as shown in Fig. 9, and the plunger 59 in the slot 57 being positioned as shown in Fig. 18. When the cam 54 has made a quarter turn, it reaches the position shown in Fig. 1, the upper jaw being still in upward position inasmuch as the cam roller 55 has as yet not reached the high point of the cam 54; however, the shell 26 has pushed the rod 27 downwardly sufficiently to cause the lever 60 to push the plunger 59 and a link 17*a* into the position shown in Fig. 19. At this point the pawl 29 is tripped by the cam plate 35 so that further movement of the cylinder 26 does not move the rod 27 but causes a lost motion as the pin 62 rises within the slot 63 in the shell 26. At this point also, the link 17*a* is pushed partially out of the slot 57 and held in position by the plunger 59 so that two articles to be joined may be placed over the open arms of the link as shown in dotted lines in Fig. 19. Further movement of the cam 54 causes the cam roller 55 to ride up on the cam as shown in Fig. 10 and pushes the jaw member 14 downwardly. In this position the upper jaw member 18 has just reached the upper edges of the link 17*a* as shown in Fig. 20 and the pin 62 in the rod 27 has slid upwardly in the slot 63 until it just begins to engage the upper end of the slot. As the cam roller 55 rides over the high point of the cam 54, as shown in Fig. 11, the upper jaw member 18 is given sufficient downward push to close the link as shown in Fig. 21 and to cause the cylinder 26 to begin to push the rod 27 downwardly again. As the cam roller reaches the position shown in Fig. 12, where it has snapped by the cam high point 54, the upper jaw member 14 snaps open upwardly and simultaneously therewith the rod 27 is given an additional slight push downwardly which causes the plunger 59 to push the link completely out of its slot 57 as shown in Fig. 22. As the cam continues to ride around to the position shown in Fig. 9 again, the upper jaw member 14 retains its open position, but the cylinder 26 is pulled upwardly and causes the pin 62 to slide to the lower end of the slot 63, at which point the spring 30 pushes the pawl to the position shown in Fig. 5 and the mechanism is ready for a second cycle.

It can thus be readily seen that the hereinabove described mechanism is adapted to successively move an open link to a predetermined position, permitting insertion of articles on the open arm of the link, moves to close the link, and then ejects the closed link from the mechanism. The adjustment 61, which regulates the stroke of the plunger 59, permits a predetermined portion of the arms of the link to become exposed so that varying thicknesses of the articles to be joined may be accommodated. It is also possible by varying the front slot portion of the mechanism to provide different widths and thicknesses of slots to accommodate different sizes of links without reorganizing the entire mechanism. The link 17*a* may be separate, or may be in strip form or of solid metal heavily scored which permits the plunger 59 to break off sufficient metal to form a link on each upward stroke. It should also be noted that while I have described a certain type of clutch mechanism for stopping or starting the device, other types of clutch mechanism may be used and a conventional brake mechanism may also be used to provide an immediate stopping of the jaws when the clutch is released.

While I have described a specific constructional embodiment of my invention and a specific linking method, it is obvious that changes may be made in the size and shape of the parts, in their

relative arrangement and the materials used without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. In an apparatus of the type described, a magazine for holding open connecting links, means for feeding said links from said magazine to a slot, a positioning jaw reciprocable in said slot, a cooperating pressure jaw pivotally movable above said slot, means for reciprocating said positioning jaw to move an open link to exposed position at the end of said slot, and means for moving said pressure jaw to close said exposed link, said second named means being adapted to move said positioning jaw to eject said link from said slot after the closing action of said pressure jaw.

2. In an apparatus of the type described, a magazine for holding open connecting links, means for feeding said links from said magazine to a slot, a positioning jaw reciprocable in said slot, a cooperating pressure jaw pivotally movable above said slot, means for reciprocating said positioning jaw to move an open link to exposed position at the end of said slot, and means for moving said pressure jaw to close said exposed link, said second named means being adapted to move said positioning jaw to eject said link from said slot after the closing action of said pressure jaw, said reciprocating means including a telescopic link for arresting movement of said positioning jaw during the movement of said pressure jaw.

3. In an apparatus of the type described, a magazine having a depending track, open connecting links in strip form of substantially U-shaped slidable on said track, a follower adapted to push successive links of said strip into a slot at right angles to said track, a positioning jaw reciprocable in said slot and adapted to cut successive links from said strip and to push them in exposed position at the end of said slot, and a pivotally mounted pressure jaw movable over said slot and adapted to close said exposed link.

4. In an apparatus of the type described, a magazine having a depending track, open connecting links in strip form of substantially U-shape slidable on said track, a follower adapted to push successive links of said strip into a slot at right angles to said track, a positioning jaw reciprocable in said slot and adapted to cut successive links from said strip and to push them in exposed position at the end of said slot, and a pivotally mounted pressure jaw movable over said slot and adapted to close said exposed link, said positioning jaw being movable to eject said link from said slot after the closing action of said pressure jaw.

5. In an apparatus of the type described, a magazine for feeding open connecting links to a slot, a positioning jaw reciprocable in said slot, a cooperating pressure jaw pivotally mounted over the end of said slot, a power driven cam, adjustable means associated with said pressure jaw and riding on said cam whereby movement of said cam causes movement of said pressure jaw, and means connected with said cam for reciprocating said positioning jaw to move a link to exposed position at the end of said slot.

6. In an apparatus of the type described, a magazine for feeding open connecting links to a slot, a positioning jaw reciprocable in said slot, a cooperating pressure jaw pivotally mounted over the end of said slot, a power driven cam, adjustable means associated with said pressure jaw and riding on said cam whereby movement of said cam causes movement of said pressure jaw, and means connected with said cam for reciprocating said positioning jaw to move a link to exposed position at the end of said slot and to move said positioning jaw to eject said link after the closing action of the pressure jaw.

EARLE L. MORROW.