Sept. 29, 1959 J. LONG 2,906,855

MACHINE

Filed July 19, 1956 4 Sheets-Sheet 1

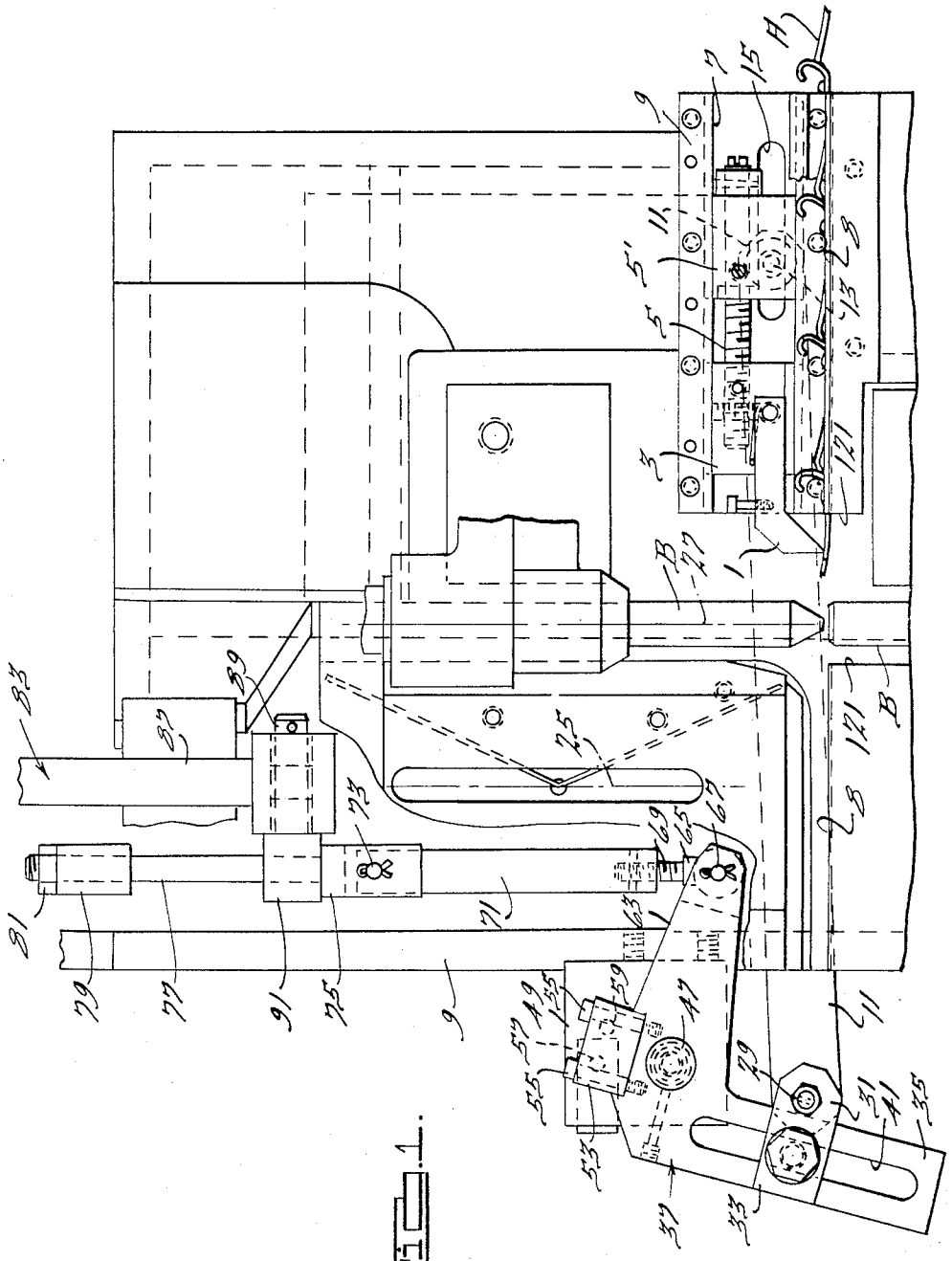

FIG. 1.

INVENTOR.
Jasper Long.
BY
Harness, Dickey & Pierce
ATTORNEYS

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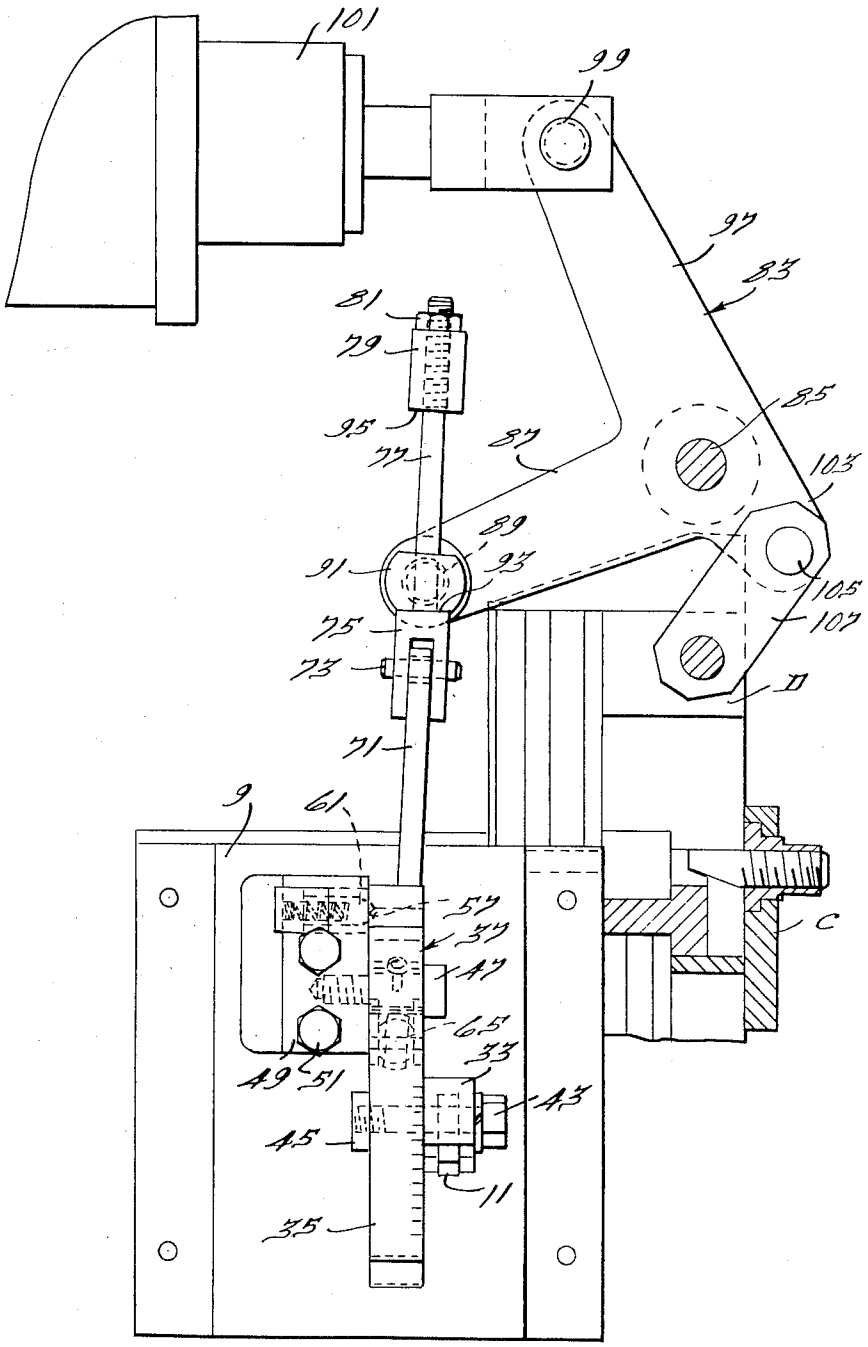

Fig. 2.

INVENTOR.
Jasper Long
BY
Harness, Dickey & Pierce
ATTORNEYS

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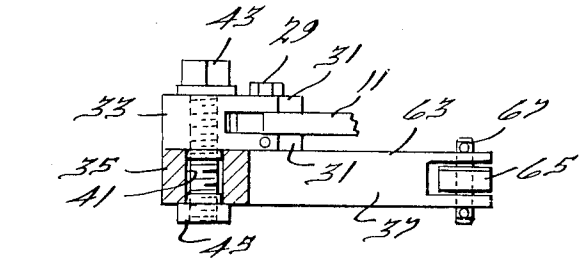

FIG. 3.

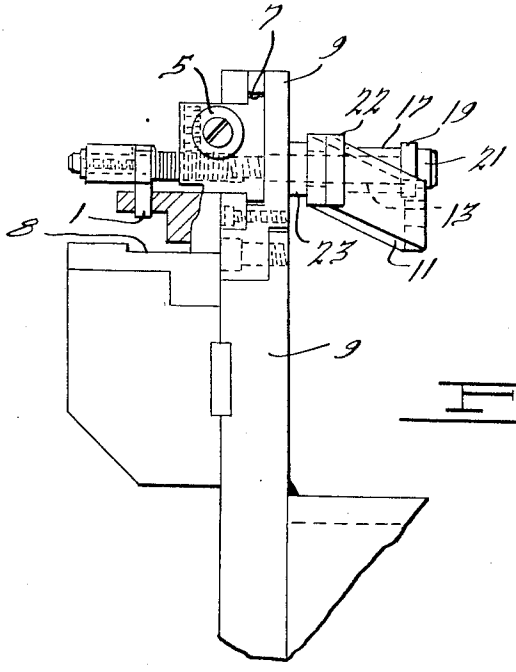

FIG. 4.

INVENTOR.
Jasper Long.

BY

Harness, Dickey & Pierce.
ATTORNEYS

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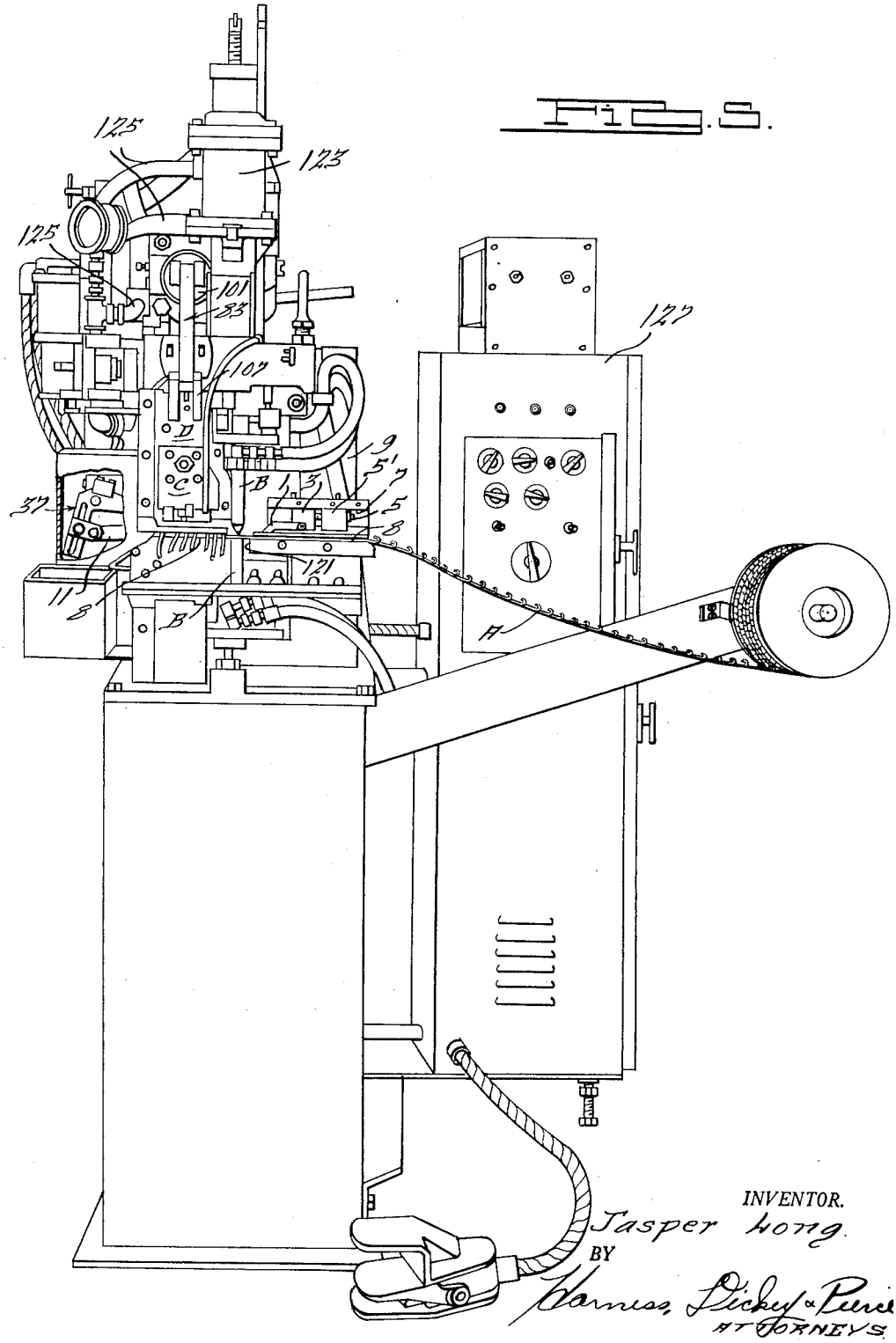
FIG. 5.



INVENTOR.
Jasper Long
BY
Harness, Dickey & Pierce
ATTORNEYS

United States Patent Office 2,906,855 Patented Sept. 29, 1959

2,906,855

MACHINE

Jasper Long, Sturgis, Mich., assignor to Wade Electric Products Co., Sturgis, Mich., a corporation of Michigan

Application July 19, 1956, Serial No. 598,920

6 Claims. (Cl. 219—79)

This invention relates to electric terminal applying machines into which strips of terminals are fed and in which the terminals may be attached to lead wires. In particular, this invention concerns the feed mechanism for such strips and constitutes a modification of the feed mechanism shown in my copending application, assigned to the assignee hereof, Serial No. 498,211, filed March 31, 1955 of which the present case is a continuation-in-part. Reference may be had to said copending case for a complete description of the environment in which my present invention may be used.

It is the object of this invention to provide a feed construction for strips of terminals or the like in which the length of the feed stroke may be readily adjusted.

While my copending case shows a means of adjusting the length of feed stroke, such means employs a dwell, the length of which is controlled to adjust the length of stroke. In the present invention I provide for adjustment of the length by using a variable length drive link for the feed pawl instead of using the dwell.

The invention is illustrated in the accompanying drawings in which:

Figure 1 is a front view of a terminal applying machine embodying the invention and having parts broken away and removed;

Fig. 2 is a side view taken from the left of Fig. 1 and with parts broken away and removed;

Fig. 3 is a view of the bottom of the feed adjustment mechanism shown in Fig. 1;

Fig. 4 is a view taken from the right of Fig. 1 with parts removed; and

Fig. 5 is a front view of the complete machine embodying the invention.

The feed pawl 1 is pivoted on a block 3 which is connected by stud 5 to a drive block 5', the blocks and pawl forming a feed carriage, sliding in way 7 of frame 9, for feeding a strip A of terminals through the machine on a guide surface 8 as completely described in my copending application. The stud 5 threads into block 3 but is rotatably supported in block 5' so that rotation of the stud will vary the distance between the blocks and thus the start position of pawl 1.

The drive block is driven by a link 11 which is pivoted thereto by pin 13 threading into the block and working in slot 15 in the frame 9. The connection is made tight to prevent any play in the carriage by means of a coil spring 17 which is confined between washer 19 against pivot head 21 and a washer 22 against the outer face of link 11, the link bearing against a washer 23 which slides against the back of frame 9. The end of the link 11 is angled as shown to enable it to clear certain frame structure (not shown) but it will be seen that as the link moves to the left the pawl 1 will feed the strip into the weld electrodes B (where a lead wire is inserted and spot welded to the terminal) and the stake and cutoff mechanism C (not shown in detail here but shown completely in my copending case) which act, respectively, along center lines 25 and 27.

The other end of link 11 is pivotally attached by a stud 29 between the legs 31 of a block 33. The block is carried by a leg 35 of a bellcrank 37 and fits in a slot 41 thereof so that it can be clamped in various positions along the length of the slot 41 by bolt 43 threading into a nut 45 that is shaped to slide but not turn in the slot. It can be seen that rocking of the bellcrank about its fixed pivot 47 will cause link 11 to move longitudinally thus moving the feed pawl 1. It will be clear that the amount that the link 11 is moved depends upon the position of block 33 in slot 41 and this governs the length of stroke of the pawl. The back of leg 35 may be graduated as shown to cooperate with an index line on the block 33 so that the desired length of stroke may be preset.

The bellcrank pivot 47 threads into a block 49 that is fixed to the machine frame 9, as by bolts 51 threading into the frame. The top of the bellcrank has a detent block 53 attached to it by bolts 55 and this carries detent recesses 57 and 59 which correspond respectively to opposite ends of the stroke of the link 11 and pawl 1. A detent plunger 61 in block 49 is spring pressed against block 53 and will seat in recesses 57 or 59 to yieldably hold the bellcrank stationary unless a positive drive force is applied to it, i.e. undesired movement due to friction is prevented.

The other leg 63 of bellcrank 37 is forked to receive a swivel fitting 65 (available on the open market) that is partly spherical or rounded so that it can rock out of the plane of the bellcrank as well as pivot relative thereto about pin 67. The fitting 65 has a stud end 69 which threads into the bottom of link 71. The top of link 71 is pivoted by pin 73, to accommodate arcuate movement of leg 63, in the forked bottom end 75 of link extension 77, a block 79 being threaded in the top of extension 77 and held in place by nut 81.

The bell crank 83 is rocked about fixed pivot 85 on the frame 9 and its lower leg 87 is pivoted at 89 to a block 91 that can slide on extension 77 between the face 93 on the bottom end 75 and face 95 on block 79. It is clear that when block 91 forcibly engages and drives face 93 downwardly the bellcrank 37 will move clockwise to pull pawl 1 to the left and feed strips to the welding and crimping stations; and when it engages face 95 the bellcrank 37 will rotate counterclockwise to index the pawl 1 to the right to pick up another terminal. The arcuate movement of the end of leg 87 is accommodated in link 71 by the aforementioned pivotal and rock socket connection of fitting 65.

The other leg 97 of bellcrank 83 is pivoted at 99 to the end of the piston rod of air cylinder 101 which is operated in parallel synchronism with the welder cylinder (using the same air lines) as taught in my copending case. A short leg 103, more or less in alignment with leg 97 but on the opposite side of the pivot 85, is pivoted at 105 to short links 107 (corresponding to links 279 in my copending case) which drive the slide D that carries the crimp, cutoff, and pilot punch mechanism C as fully described in my copending case. It will be seen that when the bellcrank leg 87 goes up the links 107 will go down so that there will be a crimp and cutoff operation—during the end of this period the pawl 1 being reacted to the right as described. When the leg 87 goes down the links 107 will go up to withdraw the crimp, cutoff, and pilot punches —during the end of this period the pawl 1 being forced to the left to index the strip into position for the next down stroke of the slide.

It will be noted that the space between faces 93 and 95 provides a dwell so that the feed pawl 1 does not move at the beginning of the stroke of the air cylinder. Thus, the retraction of pawl 1 to the right will occur when the strip is held in place by the punch and pilot assembly; and the feed movement to the left will occur after the punch

and pilot have been lifted out of the strip. The detents 57 and 59 will prevent movement due to friction of the sliding of the block on extension 77 and prevent play or slop in the drive linkage.

As can be seen in Fig. 5, the welder B is, as suggested in my copending case, positioned between the punch set C and the feed mechanism, the electrodes fitting in a gap 121 formed in the retainer and guide surface structure 8 which is otherwise the same as described in said prior application. The air cylinder 123 reciprocates the upper electrode as described in said case and it is connected in parallel to cylinder 101 by air conduits 125. The panel box 127 provides electric controls for the spot weld apparatus to adjust time of welding etc., as is known in this art. It may be noted that by putting the welder B next to the punch and pilot set C, the latter will provide piloting of the strip to insure proper positioning of the individual terminals in the welder despite heat expansion of the connecting strip between adjacent terminals. This will eliminate the need for structure 61 described in my copending case.

I claim:

1. In a machine for operating upon elements in strip form, a reciprocating drive member, a pivotal bellcrank having one leg pivoted to said drive member, a first link drivably connected to the other leg of said bellcrank to be moved lengthwise, means connecting said link to said other bellcrank leg and incorporating lost motion so that said bellcrank moves a predetermined amount before said link moves, mechanism for operating upon said elements directly connected to said bellcrank to continuously move therewith, means providing a guide surface for said strip, a feed carriage for the strip, means supporting said carriage for reciprocating movement in ways extending parallel to said strip and guide surface, a second link extending substantially parallel to said ways and guide surface and tightly pinned at one end to said carriage, a second bellcrank having a leg swivelly pinned to an end of said first link, and means pivotally connecting the other leg of said second bellcrank to said second link, said means including a sliding clamp for connecting the second link at different positions along the length of said bellcrank leg.

2. In a terminal applying machine for attaching lead wires to terminals in strip form, means providing a guide surface for supporting a strip of terminals, a feed carriage, a spot welder, and a mechanism to operate on said terminals located in sequence along said surface, means providing for operation of said welder, carriage, and mechanism in timed relation, means providing an opening in said surface in which said spot welder is disposed between said carriage and mechanism, said spot welder including a lower electrode having a top terminal supporting surface substantially in alignment with said guide surface, a way for supporting said carriage to reciprocate, reciprocating drive means, a linkage connecting said carriage to said drive means, means in said linkage to provide predetermined adjustable lost motion therein at the beginning of each stroke of said means, and means directly connecting said mechanism to said drive means to move continuously therewith.

3. The invention set forth in claim 2 including means in said linkage to adjust the amount it moves said carriage.

4. The invention set forth in claim 3 including means to adjust the starting position of said carriage.

5. The invention set forth in claim 2 including detent means to yieldably hold said carriage in stationary position during said lost motion.

6. The invention set forth in claim 5 including spring means tightly pressing said linkage against said carriage to prevent looseness between them.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,906,855 September 29, 1959

Jasper Long

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 61, for "reacted" read -- retracted --.

Signed and sealed this 5th day of April 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

UNITED STATES PATENT OFFICE

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