April 8, 1947. N. DASHER 2,418,761

MACHINE FOR MAKING SLIDE FASTENER STRINGERS

Filed Oct. 7, 1943 3 Sheets-Sheet 1

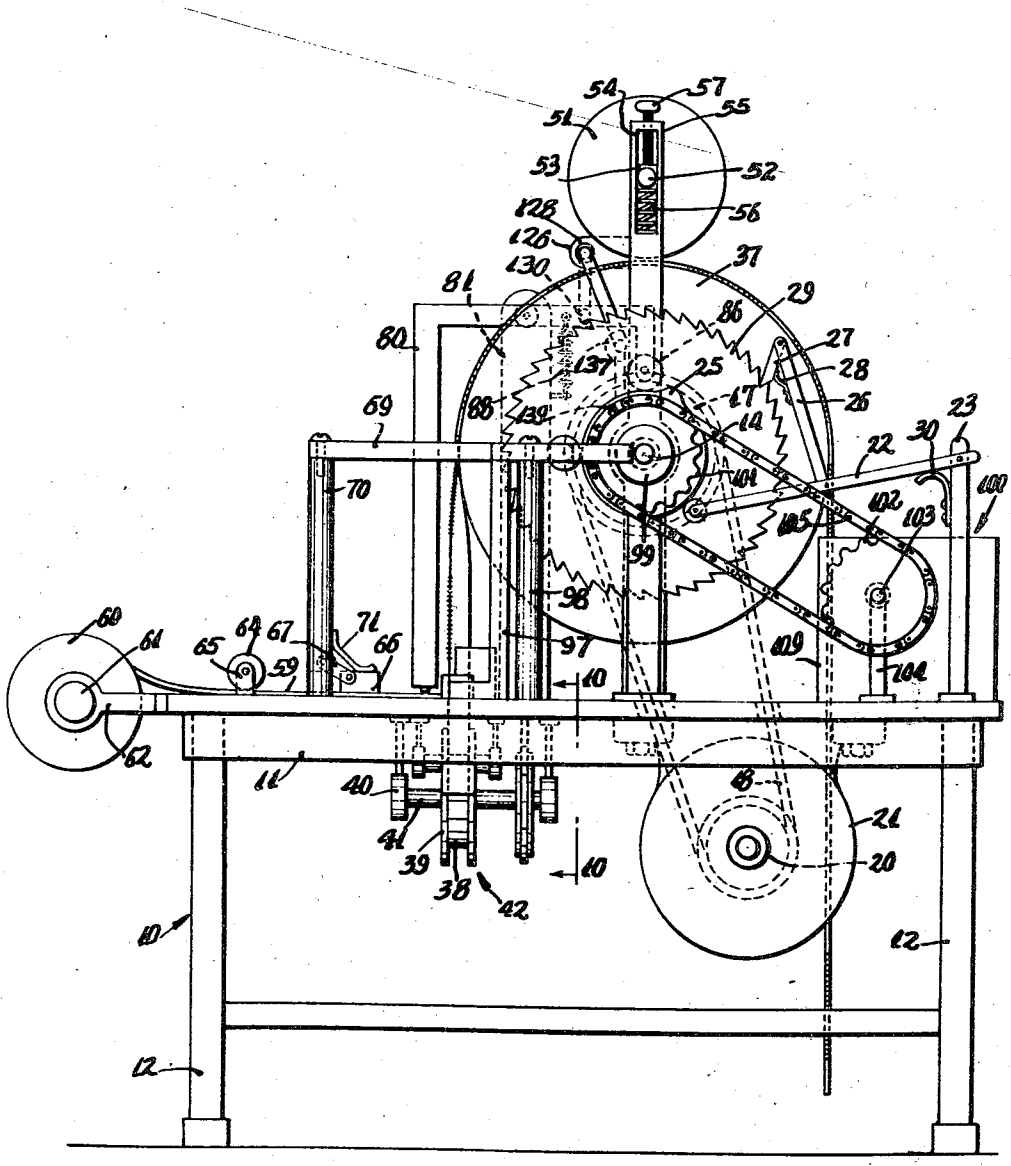


Fig. 1.

INVENTOR.
Norman Dasher

BY

ATTORNEY

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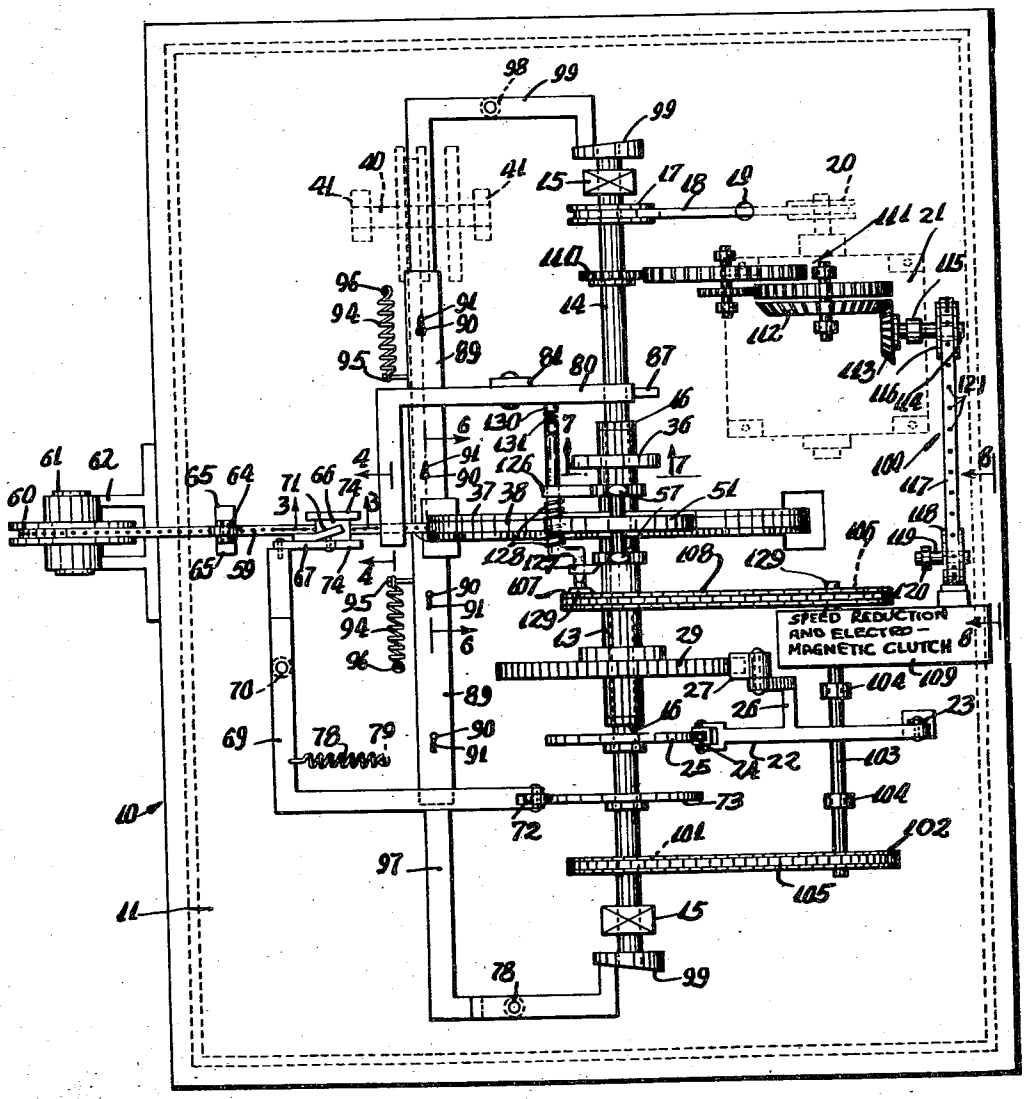


Fig. 2.

INVENTOR.
Norman Dasher

BY

Zoltan Polachek
ATTORNEY

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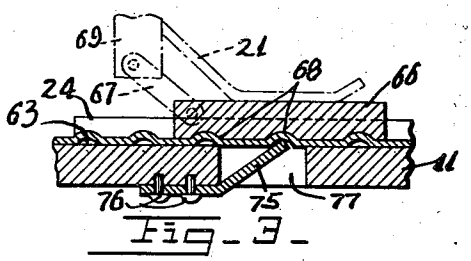


Fig. 3.

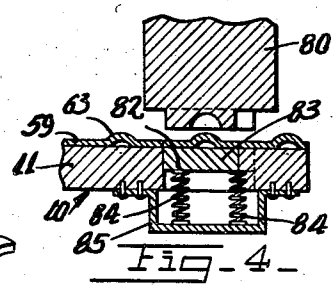


Fig. 4.



Fig. 5.

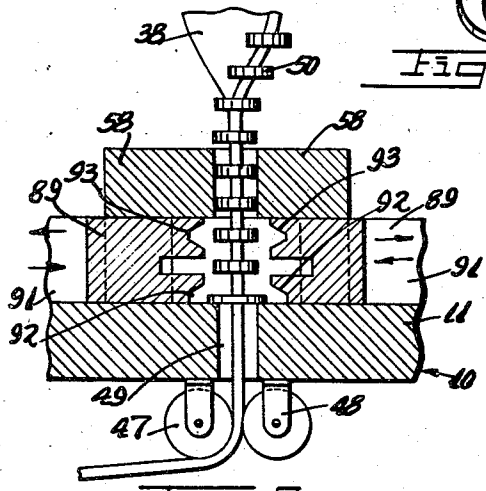


Fig. 6.

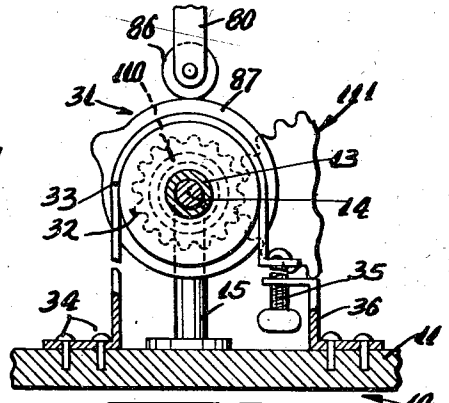


Fig. 7.

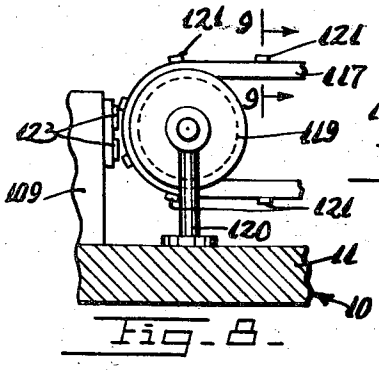


Fig. 8.

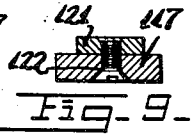


Fig. 9.

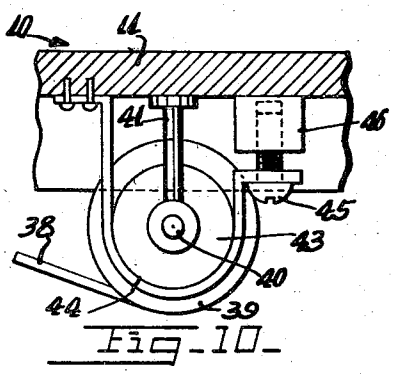


Fig. 10.

INVENTOR.
Norman Dasher

BY

ATTORNEY

Patented Apr. 8, 1947 2,418,761

UNITED STATES PATENT OFFICE

2,418,761

MACHINE FOR MAKING SLIDE FASTENER STRINGERS

Norman Dasher, New York, N. Y.

Application October 7, 1943, Serial No. 505,406

3 Claims. (Cl. 153—1)

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This invention relates to new and useful improvements in a machine for making slide fastener stringers.

More specifically, the invention proposes the construction of a machine for making slide fastener stringers characterized by a tubular shaft and a concentric inner shaft with a means for continuously driving the inner shaft to control the engagement of metallic scoops upon one edge of a continuous strip of tape moved by a drum mounted on the tubular shaft with a means arranged between said shafts in a manner to advance the outer shaft and tape in steps representing the distances between the scoops of said slide fastener stringers.

Still further, the invention proposes the provision of a guide block for supporting a section of tape leading to said drum at which point the scoops are adapted to be clamped upon said tape and provision of a means for advancing a metal strip to said guide block in a manner to permit the scoops to be cut from said strip adjacent said block and in a position to be clamped upon said tape.

Another object of the invention proposes the provision of a punch at a point adjacent said block and operated by said inner shaft in a manner to cut said scoops from the advancing strip of metal.

Still another object of this invention proposes the provision of a clamp means operated by said inner shaft in a manner to clamp a scoop out from said advancing strip of metal upon said advancing tape for each of its stationary positions.

Still further, the invention proposes the provision of a gap spacer means arranged between said tubular and inner shafts and controlled by said inner shaft for advancing said tape a selected amount at selected periods or after a series of a given number of scoops have been engaged upon the tape in a manner to form a blank space between the groups along which the tape may be cut to form separate slide fastener stringers of a given length.

It is a further object of this invention to construct a machine for making slide fastener stringers which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features

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of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a side elevational view of a machine for making slide fastener stringers constructed in accordance with this invention.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a partial enlarged vertical sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a partial enlarged vertical sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a perspective view of one of the scoops before being clamped upon the tape.

Fig. 6 is an enlarged partial vertical sectional view taken on the line 6—6 of Fig. 2.

Fig. 7 is an enlarged partial vertical sectional view taken on the line 7—7 of Fig. 2.

Fig. 8 is an enlarged partial vertical sectional view taken on the line 8—8 of Fig. 2.

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 8.

Fig. 10 is an enlarged vertical sectional view taken on the line 10—10 of Fig. 1.

The machine for making slide fastener stringers, according to this invention, includes a frame 10 consisting of a table top 11 supported upon a plurality of legs 12. A tubular shaft 13 and a concentric inner shaft 14 are rotatively mounted upon the top 11 of the frame 10. The inner shaft 14 has its ends extended beyond the ends of the tubular shaft 13 and these extended ends are rotatively supported in bearings 15 mounted upon the table top 11. The tubular shaft is capable of rotating independently of the inner shaft 14 and is retained against axial movement relative to the inner shaft 14 by means of collars 16 mounted on the inner shaft 14 and which engage the ends of the tubular shaft 13.

Means is provided for continuously driving the inner shaft 14. This means comprises a pulley 17 mounted on one end of the shaft 14 and over which a belt 18 extends. The belt extends downwards through openings 19 formed in the table top 11 and engages over a second pulley 20. The pulley 20 is mounted on the extended driven shaft of an electric motor 21. The electric motor 21 is mounted on the underside of the table top 11.

Means is also provided for driving the tubular shaft 13 in steps representing the distances between the scoops of a slide fastener stringer. This means is driven by the inner shaft 14 and comprises a lever 22 pivoted at one end upon a bracket 23 mounted on the table top 11. The other end of the lever 22 is provided with a roller 24 which bears against a cam 25 mounted

on one of the extended ends of the inner shaft 14. Intermediate of its ends the lever 22 is formed with an upwardly extending arm 26 provided at its top end with a pivotally mounted pawl 27. A leaf spring 28 mounted on the arm 26 urges the pawl 27 towards a ratchet wheel 29 mounted on one end of the tubular shaft 13. A leaf spring 30, Fig. 1, mounted on the bracket 23 bears against the lever 22 and maintains it in raised position in which the roller 24 will continually engage the cam 25. As the cam 25 rotates with the inner shaft 14 it will pivot the lever 22 downwards causing the pawl 27 to turn the tubular shaft 13 a distance equal to the distance between scoops of a slide fastener. After the projecting portion of the cam 25 passes, the spring 30 will urge the lever 22 upwards again and cause the pawl to idle back over the teeth of the ratchet wheel 29.

A brake means 31 is provided upon the tubular shaft 13 for holding the tubular shaft against being turned back when the pawl 27 idles over the teeth of the ratchet wheel 29. This means is characterized by a brake drum 32, Fig. 7, mounted on the tubular shaft 13 and over which a brake band 33 extends. One end of the band 33 is securely attached by several pins 34 to the table top 11 on one side of the brake drum 32. The other end of the band 33 is rotatively attached to one end of a screw 35 which rotatively engages a bracket 36 mounted on the table top 11 on the other side of the brake drum 32.

The screw 35 is to be adjusted so that the brake band 33 lightly grips the brake drum 32 and exerts sufficient pressure to prevent the tubular shaft 13 from being rotated backwards on the return stroke of the pawl 27 relative to the ratchet wheel 29.

A drum 37 is mounted upon the tubular shaft 13 for supporting the tape 38 from which the slide fastener stringers are being made. The tape 38 comes from a spool 39 located beneath the table top 11. The spool 39 is fixedly mounted upon a shaft 40 rotatively supported in a pair of brackets 41 mounted upon the bottom face of the table top 11. A brake 42 is provided in conjunction with the shaft 40 for preventing the spool from rotating too freely to unwind the tape 38 more quickly than it is being used by the machine. This brake 42 comprises a brake drum 43, Fig. 10, mounted on the shaft 40 and over which a brake band 44 extends. One end of the brake band 44 is attached to the bottom face of the table top 11 and the other end is rotatively engaged upon a screw 45 which threadedly engages a boss 46 fixedly mounted on the bottom face of the table top 11.

From the spool 39 the tape 38 passes through a pair of adjacent rollers 47 mounted on the bottom face of the table top 11. These rollers 47, Fig. 6, are rotatively supported in brackets 48 mounted on the bottom face of the table top 11 on either side of an opening 49. The tape 39 then passes upwards through the opening 49 and has the scoops 50 attached thereto adjacent the top face of the table top 11 and before the tape 38 passes over the drum 37.

A counterpressure roller 51 is positioned above the drum 37 and urges the tape 38 against the drum 37 to feed the tape 38 in steps representing the distances between the scoops 50 as the drum is moved in these steps by the means previously described. This counterpressure roller 51 is rotatively supported on a shaft 52 which has its ends supported in blocks 53. The blocks 53 are slidably supported in slots 54 formed in upwardly

extending brackets mounted on the table top 11 on opposite sides of the drum 37. The tubular shaft 13 passes through intermediate bearing portions formed in the brackets 55. Expansion springs 56 operate between the base walls of the slots 54 and the bottom faces of the blocks 53 for urging the blocks into a raised position in which the counterpressure roller 51 will be out of contact with the drum 37. Screws 57 are threadedly engaged through the top portions of the brackets 55 and urge the blocks downwards against the action of the springs 56 to engage the counterpressure roller 51 against the drum 37.

Guide blocks 58, See Fig. 6, are mounted upon the top face of the table top 11 for engaging an area of the tape 38 before it passes over the drum 37 for directing this area of the tape with an edge portion thereof towards a metal strip 59 which is being advanced towards this edge portion and from which the metal scoops 50 are cut and engaged upon this edge portion.

The metal strip 59 comes from a spool 60, Figs. 1 and 2, rotatively mounted on a stud shaft 61 carried by a bracket 62 mounted on the back edge of the table top. The metal strip 59 is formed with a plurality of equally spaced upwardly extending projections 63 and after coming off the spool 60 the metal strip 59 passes beneath a guide roller 64 rotatively supported in a pair of spaced brackets 65 mounted on the table top 11.

Means is provided for advancing the metal strip 59 towards the guide block 58. This means comprises a shoe 66, see Fig. 3, pivotally supported upon one end of a link 67. The bottom face of the shoe 66 is formed with inwardly extending recesses 68 which engage over the upwardly extending projections 63 of the metal strip 59. The free end of the link 67 is in turn pivotally supported upon the bottom end of a lever 69, Figs. 1 and 2, which is pivotally supported intermediate of its ends upon an upwardly extending bracket 70 projecting from the table top 11. A leaf spring 71 is mounted on the bottom end of the lever 69 and bears against the top face of the shoe 66 to urge it into facial contact with the metal strip 59. The free end of the lever 69 carries a roller 72 which engages against a cam 73 mounted on the inner shaft 14. The cam 73 is capable of moving the lever 69 a sufficient distance to move the metal strip a distance equal to one space between adjacent upwardly extending projections 63 of the metal strip 59.

Spaced tracks 74 are formed on the table top 11 and extend along the sides of the shoe 66 limiting it to movement in a direction parallel to the length of the metal strip 59. Means is provided for holding the metal strip in its advance positions to prevent the shoe from pulling it back after having been advanced. This means comprises a leaf spring 75, Fig. 3, which has one of its ends securely attached to the bottom face of the table top 11 by means of pins 76. The free end of this leaf spring 75 is extended upwards through an opening 77 formed in the table top 11 and extends into one of the projections formed in the metal strip 59. The leaf spring 75 is extended in the direction the metal strip moves and when the metal strip 59 is moved forwards by the shoe 66 the spring 75 will merely flex downwards. However, on the back stroke of the shoe 66, the spring 75 will maintain its engaged position with its respective projection 63 caus-

ing the shoe 66 to idle over the projections 63 against the action of the spring 71.

The lever 69 is drawn into a position in which its roller 72 maintains contact with the cam 73 by means of a spring 78. The spring 78 has one end connected to the lever 69 and its other end connected with a projection 79 from the table top 11.

A punch mechanism is provided for punching the scoops 50 from the metal strip 59 in the vicinity of the guide block 58. This punch mechanism comprises a top movable punch die 80, Figs. 1 and 4, pivotally mounted intermediate of its ends upon a bracket 81. The bottom of the die 80 is normally superimposed above the advancing metal strip 59 and has a complementary die recess 82 cut in the table top. A filler element 83 is vertically slidably mounted in the recess 82 and is normally urged into a raised position by the expansion springs 84, see Fig. 4. The springs 84 operate between the bottom of the filler element 83 and a bracket 85 extended across the bottom of the recess and mounted on the bottom face of the table top 11. The springs 84 merely exert enough pressure to urge the filler element 83 into a position flush with the top of the table top, so that the cut scoops 50 will be advanced towards the tape 38 by the advancing metal strip 59 to be clamped thereon.

The free end of the movable punch die 80 is provided with a roller 86 which bears against a cam 87 mounted on the inner shaft 14. A spring 88 operates between the end of the movable punch die 80 and a portion of the bracket 81 for urging the die 80 into a position in which its roller 86 will continually engage its respective cam 87.

Clamp means is provided for clamping a scoop 50 in position upon the tape for each stationary position of the tape 38. This clamp means is characterized by clamp members 89, Figs 2 and 6, which extend laterally outward from the guide blocks 58 and which are slidably mounted on the top face of the table top. Pins 90 extend from the table top 11 through slots 91 formed in the clamp members 89 and comprise the means for slidably mounting the clamp members 89. Each of the clamp members 89 has superimposed clamp jaws 92 and 93. The aligned clamp jaws 92 are designed to initially lightly clamp the scoops 50 upon the edge portion of the tape 38 and the aligned clamp jaws 93 are designed to complete the clamping action and cause the scoops to be fixedly clamped upon the edge of the tape 38.

Springs 94 operate between pins 95 mounted on the side of the clamp members 89 and pins 96 mounted on the top face of the table top 11 for urging the clamp members 89 into an inoperative position. Means controlled by the inner shaft 14 urges the clamp members 89 into an operative position against the action of the springs 94. This means comprises levers 97 pivotally mounted intermediate of their ends upon posts 98 extending upwards from the table top 11. One of each of the levers 97 bears against one end of one of the clamp members 89 and its other end bearing against a cam 99 mounted on its adjacent end of the inner shaft 14. These cams 99 act to urge the levers to in turn urge the clamp members 89 into their operative positions.

A gap spacer means 100, operated by the inner shaft 14 is provided for advancing the tape 38 a selected amount at selected periods for forming a blank space on the tape 38 between adjacent

groups of scoops 50 at which points the tape 38 may be cut to separate the completed slide fastener stringers. This gap spacer means 100, comprises a sprocket wheel 101, Figs. 1 and 2, mounted on the inner shaft 14 and a second sprocket wheel 102 mounted upon one end of a stud shaft 103. This shaft 103 is rotatively supported in several bearings mounted on the table top 11. A sprocket chain 104 engages the wheels 101 and 102 for continually driving the shaft 103 from the inner shaft 104. The opposite end of the shaft 103 carries a sprocket wheel 106 aligned with a complementary sprocket wheel 107 on the tubular shaft 13. A sprocket chain 108 engages over the sprocket wheels 106 and 107 for transmitting rotations of the shaft 103 to the tubular shaft 13.

Mounted intermediate of the ends of the shaft 103 there is a speed reduction and electro-magnetic clutch unit 109 which is normally open preventing rotations of the shaft 103 from being transmitted to the tubular shaft 13. A novel means is provided for closing the unit 109 to cause rotations of the shaft 103 to be transmitted to the tubular shaft 13 to quickly advance the tape 38 to form the desired blank spots. This means comprises a gear 110 mounted on the inner shaft 14 and which meshes with a gear of a speed reduction train of gears 111 which terminates in a bevel gear 112, Fig. 2. The bevel gear 112 in turn meshes with a bevel gear 113 mounted on a stud shaft 114 rotatively supported in a bracket 115. The free end of the stud shaft 114 carries a pulley 116 over which a belt 117 extends. The other side of the belt 117 extends over a second pulley 118 mounted on a stud shaft 119 rotatively supported in a bearing 120.

The belt 117 carries a plurality of spaced metallic contacts 121 releasably held in position by means of screws 122, Fig. 9. These contacts 121 are designed to bridge a pair of electrical contacts 123 mounted on the side of the speed reduction and electro-magnetic clutch unit 109, Fig. 8, to close the clutch of this unit and cause transmission of rotations of the shaft 103 to the tubular shaft 23 to take place. Since the speed reduction chain of gears 111 will cause the belt 117 to be moved very slowly and the inner shaft 14 causes one scoop to be clamped upon the tape 38 for each complete revolution, a number of scoops will be clamped on the tape between each time a contact 121 of the belt 117 closes the contacts 123 to cause the tape to be rapidly advanced to form the blank spot on the tape. The space between the contacts 121 will control the number of scoops that will be engaged upon the edge portion of the tape 38 between each blank space. The use of the screws 122 for holding the contacts 121 upon the belt 117 permits these contacts 121 to be removed from the belt or be added to the belt as desired.

An interruptor unit is associated with the punch die 90 for holding same in a depressed condition during those periods that the tape 38 moves for producing the scoopless areas. More specifically, this means includes a bolt-like rod 125 slidably mounted in lugs 126 and 127 projecting from the edges of the brackets 55. A spring 128 is coaxially mounted on a portion of the bolt-like rod 125 and acts against the lug 126 and a bent portion of the bolt-like rod 125 for urging said rod 125 towards the sprocket chain 108. One or more cams 129 are mounted upon the side of the said sprocket chain 108 for

moving the bolt-like rod 125 into latching position. The latching position of this rod is one in which it indirectly holds the punch die 80 in said depressed condition.

The bolt-like rod 125 is provided with a depressible head 130 which is slidably mounted so that it may be depressed. A small spring 131 holds the head 130 in a normally extended position. When one of the said cams 129 shifts the bolt-like rod 125 laterally, the head 130 which normally engages against the side of the punch die 80 becomes depressed in relation to said bolt-like rod 125. The next time that the cam 87 lifts the tail end of the punch die 80 upwards, the head 130 rides beneath the tail end of the punch die 80 and so holds the front end in its depressed condition. Even though the cam 87 then moves into an inoperative position, the punch die 80 remains locked until such time that the cam 129 rides free of the bolt-like rod 125. When the punch die 80 is in its depressed condition the shoe 66 merely idles back and forth upon the projections 63 of the metal strip 59 without advancing the same.

The operation of the device is as follows:

The inner shaft 14 will be continually driven by the motor 21 and for each complete revolution of the inner shaft 14 one scoop 50 will be clamped upon the edge portion of the tape 38 and the tape will be advanced a distance equal to the distance between adjacent scoops 50. The arrangement of the cams is such that the steps required to punch the scoops 50 and clamp them in position on the tape will take place in succession. The contacts 121 are engaged upon the belt 117 in desired spaced positions for permitting a desired number of scoops to be engaged upon the tape 38 before it is rapidly advanced to form the blank spaces at which the tape is to be cut forming the stringers of a desired length.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A machine for making slide fasteners having a tubular shaft and a concentric continuously driven inner shaft with a drum mounted on said tubular shaft and over which the completed slide fastener stringer is adapted to pass and means driven by said inner shaft for driving said tubular shaft in steps representing the distance between the scoops of slide fastener stringers, means for advancing a metal strip having spaced upwardly extending projections to a position adjacent said drum to have scoops stamped therefrom and clamped in position on the tape of said slide fastener, comprising a shoe engaging said strip and formed with spaced recesses engaging said projections, a pivotally mounted lever, a cam on said inner shaft engaging one end of said lever to pivot said lever to move said shoe to advance said strip, a spring for returning said lever to its starting position, and means pivotally connecting said shoe to the other end of said lever to be operated thereby.

2. A machine for making slide fasteners having a tubular shaft and a concentric continuously driven inner shaft with a drum mounted on said tubular shaft and over which the completed slide fastener stringer is adapted to pass and means driven by said inner shaft for driving said tubular shaft in steps representing the distance between the scoops of slide fastener strings, means for advancing a metal strip having spaced upwardly extending projections to a position adjacent said drum to have scoops stamped therefrom and clamped in position on the tape of said slide fastener, comprising a shoe engaging said strip and formed with spaced recesses engaging said projections, a pivotally mounted lever, a cam on said inner shaft engaging one end of said lever to pivot said lever to move said shoe to advance said strip, a spring for returning said lever to its starting position, and means pivotally connecting said shoe to the other end of said lever to be operated thereby, and means for holding said strip against moving backwards when the shoe idles back to its starting position over said projections when said lever is moved back by said spring.

3. A machine for making slide fasteners having a tubular shaft and a concentric continuously driven inner shaft with a drum mounted on said tubular shaft and over which the completed slide fastener stringer is adapted to pass and means driven by said inner shaft for driving said tubular shaft in steps representing the distance between the scoops of slide fastener stringers, means for advancing a metal strip having spaced upwardly extending projections to a position adjacent said drum to have scoops stamped therefrom and clamped in position on the tape of said slide fastener, comprising a shoe engaging said strip and formed with spaced recesses engaging said projections, a pivotally mounted lever, a cam on said inner shaft engaging one end of said lever to pivot said lever to move said shoe to advance said strip, a spring for returning said lever to its starting position, and means pivotally connecting said shoe to the other end of said lever to be operated thereby, and means for holding said strip against moving backwards when the shoe idles back to its starting position over said projections when said lever is moved back by said spring, said latter means comprising a leaf spring positioned adjacent the bottom face of said metal strip, said upwardly extending projections forming recesses on the bottom face of said strip, and said leaf spring having its free end directed in the direction in which said tape moves and engaging in said recesses.

NORMAN DASHER.

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