Jan. 20, 1942. P. SCHINDLER 2,270,688

BX CABLE STRIP FORMING MACHINE

Filed Oct. 13, 1941 2 Sheets-Sheet 1

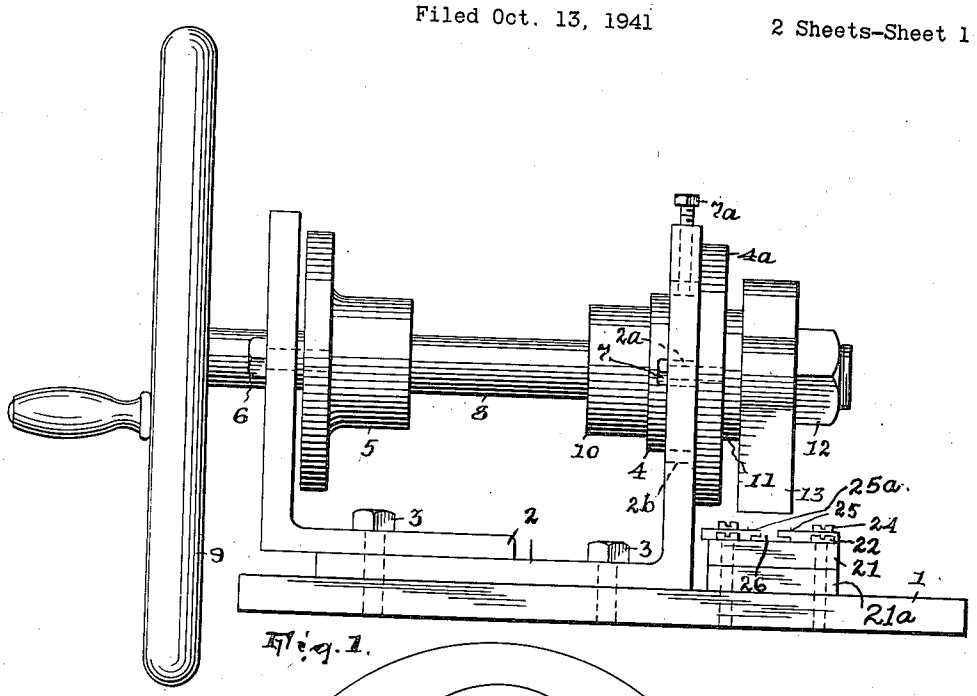


Fig. 1.

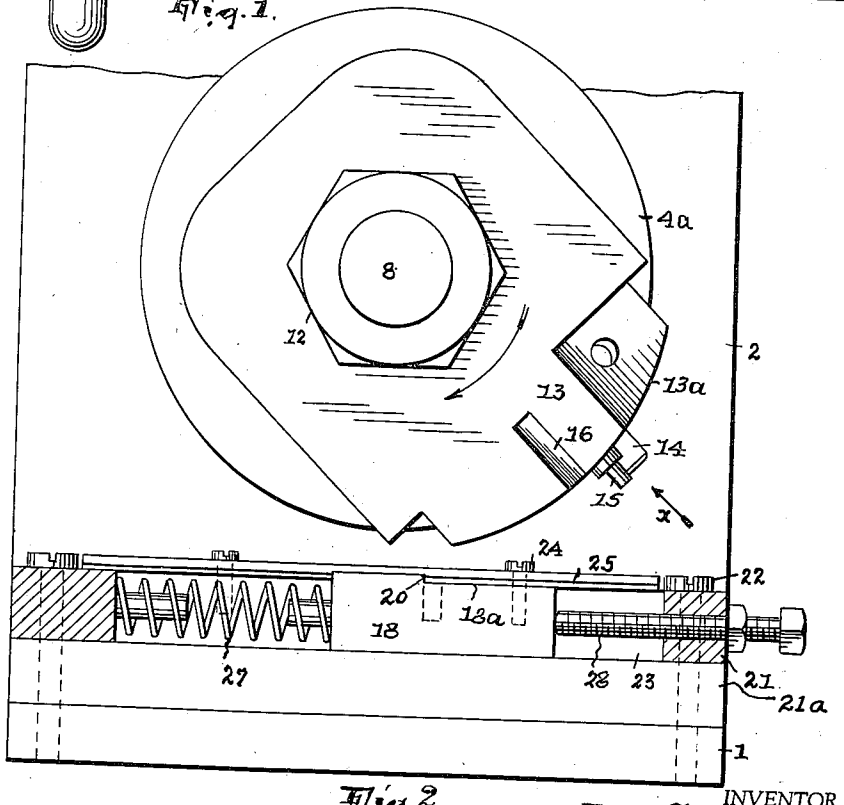


Fig. 2.

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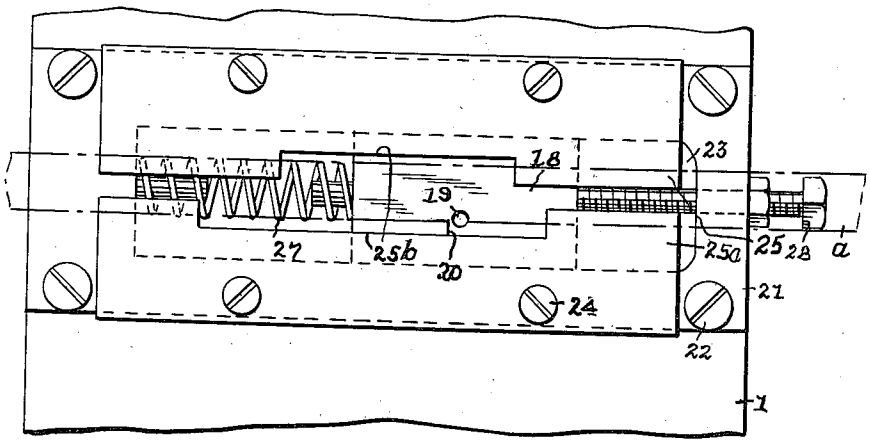


Fig. 3.

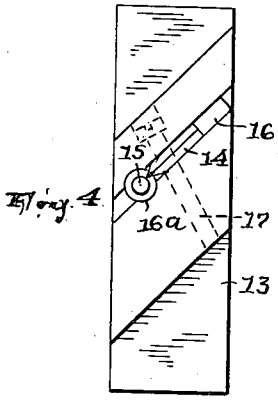


Fig. 4.

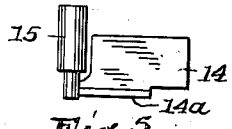


Fig. 5.

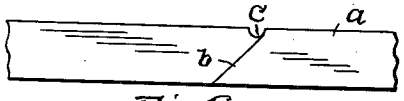


Fig. 6.

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Patented Jan. 20, 1942

2,270,688

UNITED STATES PATENT OFFICE

2,270,688

BX CABLE STRIP FORMING MACHINE

Paul Schindler, Bayonne, N. J., assignor to
William L. Pison, Clifton, N. J.

Application October 13, 1941, Serial No. 414,894

3 Claims. (Cl. 164—16)

In the Bedell Patent No. 2,086,152 is set forth a flexible conduit for electric conductors (or what are known as BX cables) consisting of a metal strip spirally wound upon itself so that one edge of the strip is exposed and the other hidden and having a plurality of spaced scores extending diagonally across its inner face and notches at its exposed edge in coincidence with the scores.

In operating on the strip to form the scores I have found that such cannot be accomplished by any conventional machine (such as a press) in which the scoring tool is made to act on the strip as to the whole edge of its scoring edge at once, for in such case the metal of the strip is quite likely to undergo crystallizing and so cause the strip to part in the act of forming it, or at one or more scoring points in shaping it to form the spiral conduit, or too readily in the finished product. Instead of operating on the strip in that way, therefore, according to this invention the scoring blade is made to act progressively on the strip, or by what amounts to a rolling action. For this purpose the scoring tool, together with the tool for forming the notches, is made to project from the periphery of a rotary element and the strip is supported in substantially tangential relation to a circle concentric with the axis of said element and of course in position to be engaged by the two tools, and said element and strip are so supported that the latter may undergo movement relatively to the former lengthwise of the strip in the direction to favor the rolling. Whereas the particular purpose here is to form a strip or other "work" with both the scoring and the notches my invention of course applies where the work is merely scored, to wit, by a tool whose acting edge of course extends crosswise of the axis of said element, as in bias relation thereto when the strip is to be formed to produce said spiral conduit.

In the drawings,

Fig. 1 is a right side elevation of the machine;

Fig. 2 is an elevation as seen from the right in Fig. 1, with a portion of the base of the fixed structure in section in the plane of the near side of the die;

Fig. 3 is a plan of so much of the base as includes said die;

Fig. 4 is an elevation of the tool-carrying head viewed as per the arrow *x* in Fig. 2;

Fig. 5 shows the tools in side elevation; and

Fig. 6 is a plan of a fragment of the strip as formed by the machine.

The supporting structure in the example shown includes the following parts: A base-plate 1; two reverse L-shaped brackets 2, one seated on the other and the latter on the base-plate and both fixed to the base-plate by screws 3; and bearings 4 and 5 supported by the upstanding portions of the brackets. Bearing 4 is secured to its bracket so as to be capable of some vertical adjustment, being in an opening 2*a* thereof and having a flange 4*a* held to the bracket by screws 7 penetrating vertical slots 2*b* in the bracket, there being tapped into the latter a vertical adjusting screw 7*a* in contact with the bearing. Other parts of the supporting structure will appear hereinafter.

A shaft 8 is journaled in the bearings, having a hand-wheel 9 fixed thereto and being held against lengthwise displacement by bosses 10 and 11 fast to the shaft in any way and arranged on opposite sides of bearing 4. Clamped fast to the shaft, as by a boss 11 and a nut 12, is a head 13 which carries the tools, they being arranged to project from the rounded periphery 13*a* of the head. The tools are a scoring blade 14 and a punch 15. They are set in a slot 16 in the head which crosses the axis of the shaft, here at about 45°, being enlarged at 16*a* to receive the punch, 17 being a screw for exerting clamping pressure on the tools.

A die 18 is to support the strip *a* to be scored and notched within the orbital paths of the tools so that the scoring blade 14 will indent or score the strip, as at *b*, and the punch will penetrate it, here at one edge to form the notches, as *c*. And in this operation the strip is to move in a path substantially tangential of a circle concentric with the axis of the element including the shaft and all parts rotative therewith in response to the rotary thrust of the latter. The strip-supporting surface 18*a* of the die is here flat and apertured at 19 to receive the punch. It also has an upstanding abutment 20 whose purpose will appear. To support the die and confine it to a rectilineal path the fixed portion of the supporting structure is completed as follows:

A pair of elongated superposed blocks 21 and 21*a* reaching crosswise of the base-plate are secured thereon by screws 22 under head 13, the upper one having a slot 23 closed at the bottom by the lower block and thus forming a guideway in which is fitted and may slide the die with its surface 18*a* facing head 13 and so disposed that its aperture 19 is in the specific zone of rotary movement of the punch (which it is to receive) and its said surface for its full width will support the strip under the pressure of the

scoring blade. The surface 18a of the die is substantially flush with the top surface of the upper block, and secured by screws 24 on the latter is a pair of plates 25 and 25a which, by having flanges projecting toward each other, provide, with the portions of said top surface of the upper block which are lengthwise offset from its slot, a passage 26 to receive the work or strip a being operated on, as shown by Fig. 2. The passage 26 is so positioned as to maintain the work with one longitudinal edge thereof bisecting aperture 19 in the die. The inner margins of the two plates are cut away, as at 25b, to afford clearance for the tools 14 and 15.

The rotary tool-including element rotates as per the arrow in Fig. 2.

Consider the operation, first, only in respect to tool 14. The work is assumed to be in passage 26 and supported against displacement away from the axis of said element by the die and with its surface to be scored facing said axis and lying within the orbit of the edge 14a of the scoring tool, as by the adjustment possible by turning screw 7a; but the work may respond to the rotary thrust of said element to displace it tangentially of a circle described around said axis, here because what directly supports it (the die) is itself so displaceable. Therefore, when the tool 14 engages the work it and the work travel together, the tool in effect rolling on the work and impressing or indenting it and thus acting to score it.

To insure that the die will move in synchrony with the work under the rotary thrust of the tool-including element the latter is made in some way to engage the die itself, as by providing the latter with the abutment 20, which is here arranged in the orbit of the tool 15 and so as to be engaged by the latter as it is about to enter the aperture 19. Without this expedient the die may lag and so cause the work to lag.

When, during each revolution of the rotary element, it operates on the work and the latter is displaced tangentially in response to the rotary thrust, as described, and said element then clears the work the die is preferably returned to the position it occupies before such displacement, here by a spring 27 interposed between the die and the left-hand end of its guideway. The return movement of the die should be limited in some way so that on the next revolution of said element the tool 15 will assuredly enter aperture 19, for which purpose there is an adjustable stop formed by a set-screw 28 tapped into the upper block 21 at the right-hand end of said guideway.

After each operation on the work the attendant may, in the present example, shift the same lengthwise so as to space the next scoring and punching the desired distance from the ones last formed.

Having thus fully described my invention, what I claim is:

1. A machine for deforming a metal strip at intervals thereof comprising fixed structure, a rotary element journaled in said structure and adapted always to be rotated in one direction through complete cycles and including a portion projecting from and itself including a substantially straight scoring edge facing away from and oblique to the periphery of said element, a strip-supporting die confined by said structure to reciprocate in a path opposed and parallel to a tangent of the orbit of said edge and arranged to support the strip with only a limited section of its thickness within said orbit, said die having an abutment projecting into the orbit of said portion and arranged to be engaged thereby as soon as said edge, in rotating with said element, engages the strip, whereby said die will be moved with said strip in one direction lengthwise of said path while the strip is being advanced by said edge, means normally urging the die in the opposite direction, and means, adjustable in said structure lengthwise of said path, to limit the movement of the die in said opposite direction.

2. A machine for deforming a metal strip at intervals thereof comprising a rotary element having blade and punch portions both projecting from the periphery of said element and the blade portion having a substantially straight scoring edge facing away from and obliquely crossing said periphery and the punch portion projecting radially further than the blade portion and being bisected by the plane of and projecting radially beyond said straight edge, and means, in which said element is journaled, for supporting the strip with only a limited section of its thickness within the orbital range of said edge and meanwhile confining the strip in the zone of said edge and to movement lengthwise of itself and with one lateral margin of the strip in a plane parallel with said zone and cutting the zone of said punch portion.

3. A machine for deforming a metal strip at intervals thereof comprising a rotary element having blade and punch portions both projecting from the periphery of said element and the blade portion having a substantially straight scoring edge facing away from and obliquely crossing said periphery and the punch portion projecting radially further than the blade portion and being bisected by the plane of and projecting radially beyond said straight edge, fixed structure in which said element is journaled, and a strip-supporting die confined by said structure to reciprocate in a path opposed to, and parallel to a tangent of, the orbit of said edge and arranged to support the strip with only a limited section of its thickness within said orbit, said die having an abutment projecting into the orbit of the punch portion and arranged to be engaged thereby as soon as said edge, in rotating with said element, engages the strip, whereby the die will be moved with said strip in one direction lengthwise of said path while the strip is being advanced by said edge, means normally urging the die in the opposite direction, and means, adjustable in said structure lengthwise of said path, to limit the movement of the die in said opposite direction, one of the parts formed by said structure and die affording means to confine the strip with one lateral margin in a plane parallel with the zone of said edge and cutting the punch portion.

PAUL SCHINDLER.