

Dec. 8, 1931.

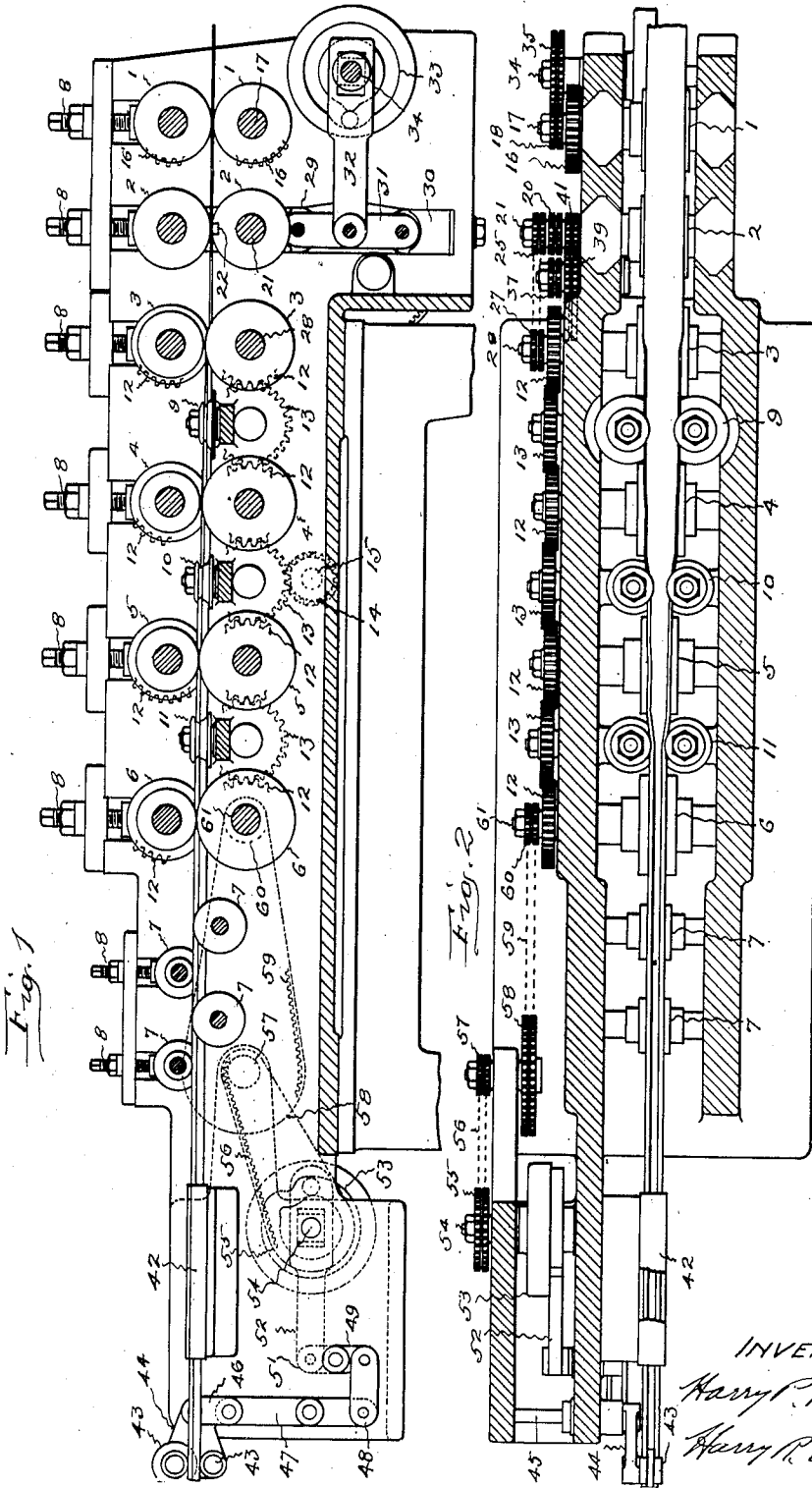
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1,835,002

MACHINE FOR COLD ROLLING CONDUITS

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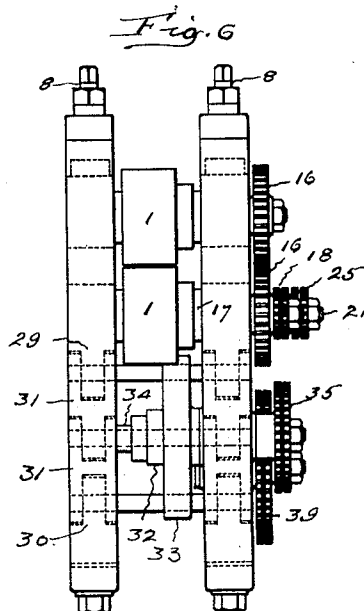
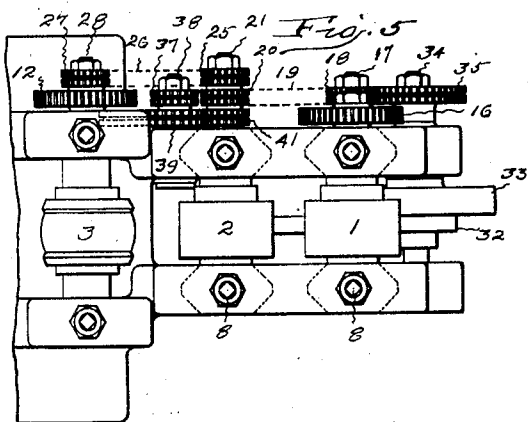
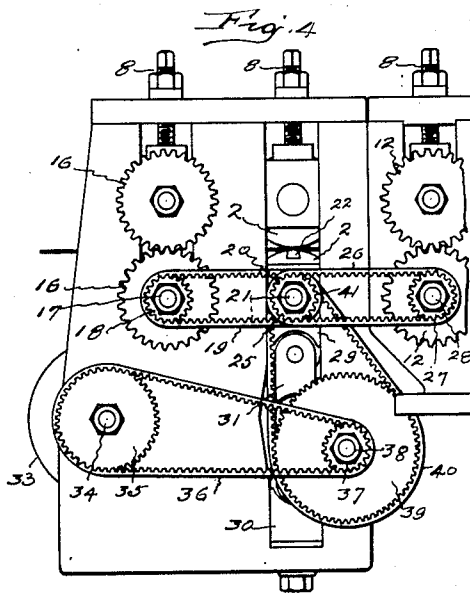
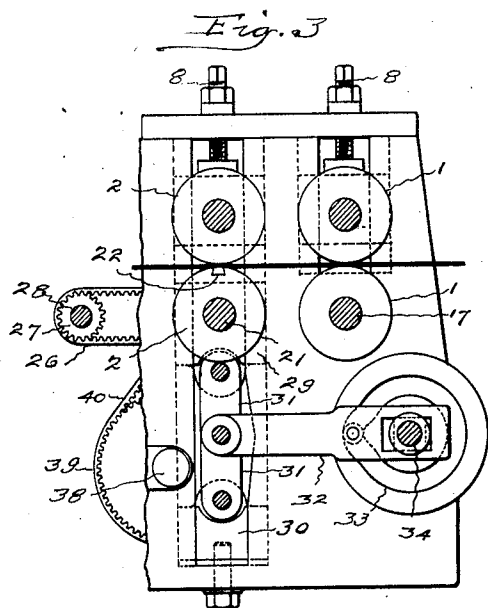
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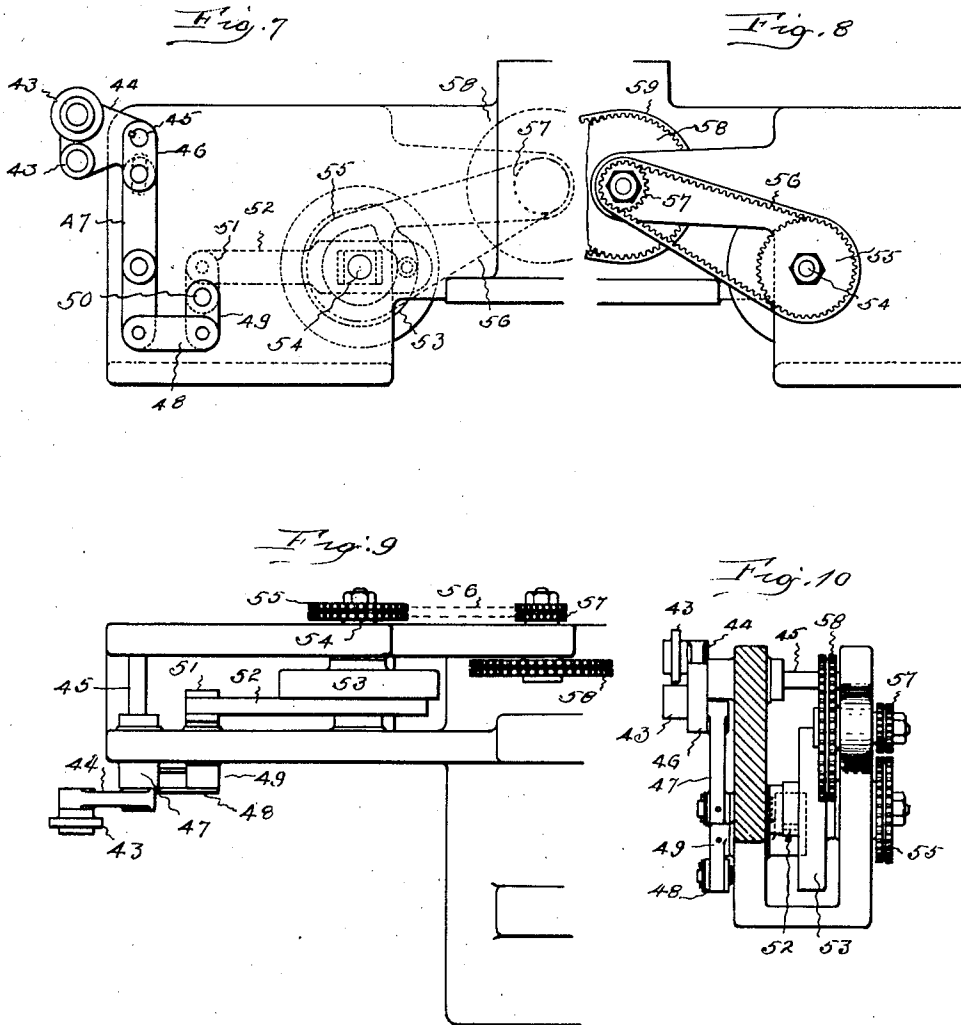
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MACHINE FOR GOLD ROLLING CONDUITS

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4 Sheets-Sheet 3



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MACHINE FOR GOLD ROLLING CONDUITS

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Fig. 13

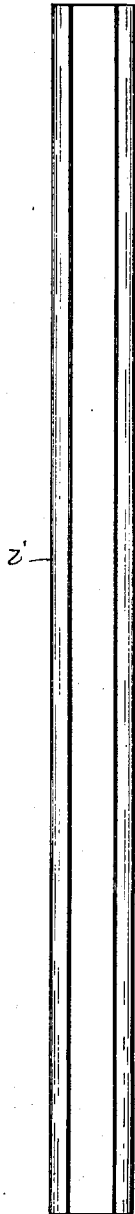


Fig. 11

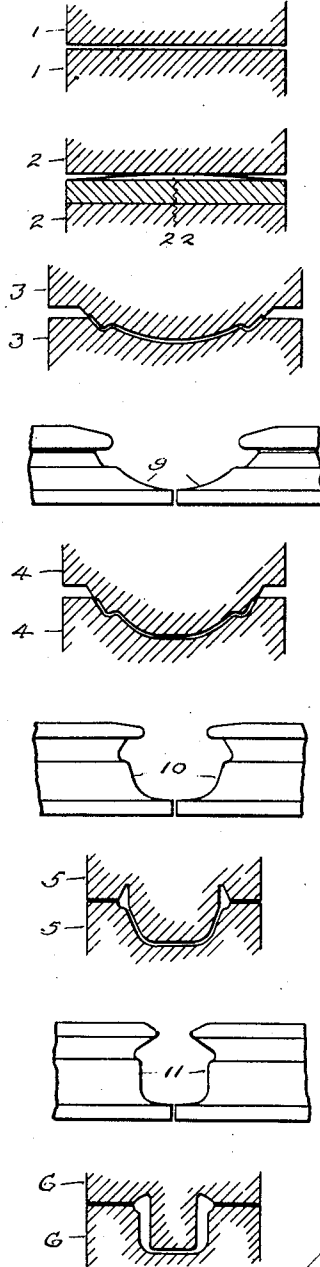
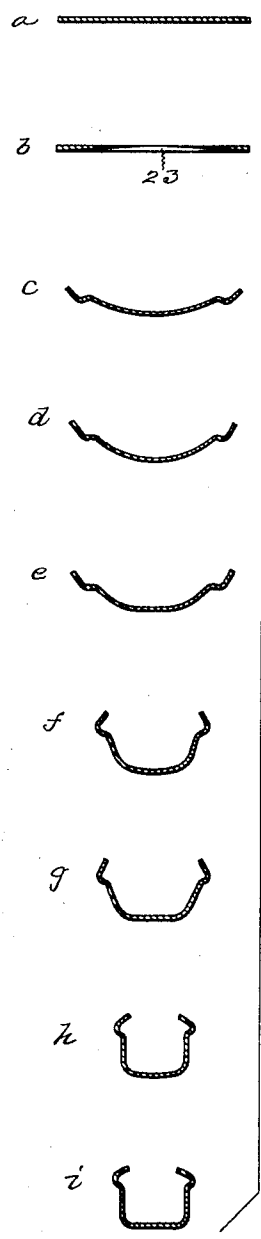


Fig. 12



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UNITED STATES PATENT OFFICE

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MACHINE FOR COLD ROLLING CONDUITS

Application filed December 1, 1930. Serial No. 499,176.

This invention relates to a machine for cold rolling a continuous strip of flat metal and delivering it in lengths that are channel shaped in cross section and that are particularly designed to be used as surface conduits for electric wiring.

The object of the invention is to provide a rolling machine into which a cold strip of indefinite length of flat metal, as steel, may be continuously fed and delivered in accurately formed conduit strips of definite lengths.

If the conduit is formed in a continuous length and is severed into strips of the desired lengths after it has been formed additional labor and loss of time is involved. Should the flat strip be cut into the desired lengths before being rolled into channel shape, as a result of the resilience of the metal the channel is wider adjacent to the ends than for the remainder of its length.

In order to eliminate the extra labor and time required for cutting continuously formed conduit, and to obviate the defect of non-uniformity of the width of the channel, the machine which embodies this invention is constructed with rolls for continuously feeding the flat strip of stock of indefinite length, rotatable means for scoring the traveling flat stock at predetermined definite intervals, rolling dies for progressively reducing the scored flat stock to channel shape, and means for breaking the stock where scored after it has been formed into channel shape, all of which operations are performed without interrupting the feed of the stock, and finished conduit strips which are of uniform shape and dimension throughout their lengths are rapidly produced.

In the accompanying drawings Fig. 1 shows an elevation of the machine with the front wall of the frame cut away. Fig. 2 shows a horizontal section of the machine on the plane of travel of the stock. Fig. 3 is a front elevation on somewhat larger scale of the mechanism for feeding and scoring the stock. Fig. 4 is a rear elevation of the mechanism for feeding and scoring the stock. Fig. 5 is a top view of the feeding and scoring mechanism. Fig. 6 is an edge view of the feeding and scoring mechanism. Fig. 7 is a

front elevation of the breaking mechanism at the discharge end of the machine. Fig. 8 is a rear elevation showing part of the drive for the breaking mechanism. Fig. 9 is a top view of the mechanism shown in Fig. 7. Fig. 10 is a vertical section of the breaking mechanism. Fig. 11 is a diagrammatic representation showing the contours of the several rolls employed in the machine for feeding, scoring and forming the stock from flat to channel shape. Fig. 12 is a similar representation of the shapes of the stock formed by the respective rolls. Fig. 13 is a plan of a piece of conduit formed by the machine.

In the machine illustrated fixed to rotatable shafts horizontally mounted in the side frames are a pair of feed rolls 1; a pair of scoring rolls 2; pairs of forming rolls 3, 4, 5 and 6; and straightening rolls 7. The upper of these rolls are mounted in bearings that may be adjusted by means of screws 8 for the purpose of regulating the pressure between the pairs of rolls. Between the forming rolls on vertical arbors are pairs of idle rolls 9, 10 and 11. The shafts of the forming rolls are provided with intermeshing gears 12, and the gears on the shafts of the lower rolls are connected by intermediate gears 13 so that all the forming rolls will be driven alike. These gears may be driven from a master gear 14 on a motor driven shaft 15, Fig. 1.

The peripheral surfaces of the feed rolls 1 are flat and the shafts of these rolls have intermeshing gears 16. The shaft 17 of the lower feed roll has a sprocket 18 that is connected by a chain 19 with a sprocket 20 on the shaft 21 of the lower of the scoring rolls 2 so that the feed rolls will be driven from and have the same surface speed as the scoring rolls, Figs. 4, 5.

The lower scoring roll 2 has a projecting blade 22 that extends across its face parallel with the axis of the roll. This blade 22 is desirably curved, as shown in Fig. 11, so as to make the indentation deeper in the middle than at the edges of the stock, as shown at 23 in Fig. 12. The upper scoring roll runs idle. The shaft 21 of the lower scoring roll has a sprocket 25 that is connected

by a chain 26 with a sprocket 27 on the shaft 28 of the lower of the first pair of forming rolls so that the scoring roll with the blade will rotate at the same speed as the forming rolls, Figs. 4, 5.

While the scoring rolls have the same surface speed as the feeding and forming rolls so that the scoring blade when acting on the stock will travel with the stock at the same speed, the stock must not be scored at each rotation of the scoring rolls, but only after a considerable length of stock has been fed. This is accomplished in the machine shown by mounting the bearing for the shaft 21 of the lower scoring roll in blocks 29 that are vertically movable in the side frames and interposing between these bearing blocks and bed blocks 30, toggle links 31. These toggle links are contracted to draw the scoring roll down and expanded to lift the scoring roll, by a link 32 that is reciprocated a slight distance by a properly timed cam 33, Figs. 3, 4, 6. The shaft 34 of this cam has a sprocket 35 that is connected by a chain 36 with a sprocket 37 on a shaft 38. The shaft 38 also has a sprocket 39 that is connected by a chain 40 with a sprocket 41 on the shaft 21 of the lower scoring roll. The gearing between the scoring roll shaft 21 and the cam shaft 34 is so designed and timed that the scoring roll, which rotates at the same speed as the feed and forming rolls, makes several revolutions to one revolution of the cam 30 which lifts the scoring roll into scoring position. While the scoring blade travels at the same surface speed as the feeding and forming rolls, it is raised by the cam and toggle mechanism only at such intervals as to indent the stock after the desired length has been fed and formed, Figs. 4, 5.

As the stock is thin and flat when passing between the scoring rolls and the scoring blade does not completely sever the stock, entering but a few thousandths of an inch below the surface, the necessary movement of the roll carrying the scoring blade toward and from the stock is not sufficient to disturb the driving connections between the gears and chains which are more or less flexible. While the scoring blade enters the stock but a short distance, it scores completely across the stock from edge to edge in order that the finished channel will break without stretching or distorting the shape of the channel at the break.

As diagrammatically illustrated in Figs. 11 and 12 the feed rolls 1 pass the flat stock *a* into the machine to the scoring rolls 2 which at the predetermined times form a score across the stock, as shown at *b*. The contours of the first forming rolls 3 bend the edges and slightly curve the center of the stock to the shape *c*, and the side rolls 9 may then further concave the stock, as shown at *d*. The contours of the second forming rolls

4 concave the stock some more and leave it substantially in the shape *e* and the side rolls 10 may bend in the edges slightly more, to the shape *f*.

The third pair of forming rolls 5 have such contours as will flatten the bottom and straighten and turn up the sides of the stock to the shape *g*. The side rolls 11 may close in the sides to the shape shown at *h*, and the fourth pair of forming rolls may then close down the edges of the stock and produce the channel *i* shown in Figs. 12 and 13.

As previously stated, if the stock is sent through the machine in a continuous strip, which is necessary for speed and increased output, it must be severed into commercial lengths. Should the stock be sent through in short pieces, the resilience of the metal causes ends to open out after the stock has passed through the last pair of forming rolls producing strips in which the channel is somewhat wider at the ends than along their length. To avoid this the stock is scored in its flat state, as above mentioned. This scoring is such that it weakens the stock at intervals, but the edges are held together so that they do not spring outward.

As the continuous length of scored channel of uniform width throughout its entire length is formed, it is broken off where it has been scored. In accomplishing this, after the channel has passed between the straightening rolls 7 at the discharge end of the machine, it is passed through a die 42 and from that between rolls 43 which at the proper time are quickly raised and then brought down, so as to bend up and then break down the channel at the scored points as they emerge from the channel die, Fig. 1.

The breaking rolls are mounted on an arm 44 fixed to a shaft 45 that has an arm 46 connected with the upper end of a lever 47. The lower end of this lever is connected by a link 48 with an arm 49 fixed to a shaft 50 that has an arm 51 to which is connected a link 52 that at the proper times is reciprocated by the cam 53 on the cam shaft 54, Figs. 7, 9. On the end of the cam shaft 54 is a sprocket 55 that is connected by a chain 56 with a sprocket 57 attached to a shaft on which is a sprocket 58, Figs. 7-10. The sprocket 58 is connected by a chain 59 with a sprocket 60 fixed to the shaft 61 of the lower of the last pair of forming rolls 6.

By means of these connections the cam 53 is driven from the forming rolls at a reduced speed so that at the proper time it will cause the breaking rolls to quickly move up and down and break the stock where scored. The reduction of speed in this case is the same as that provided for driving the cam 33 which raises the scoring roll into scoring position, so that the scoring roll at the entrance end and the breaking rolls at the discharge end will act synchronously, and the

breaks will be made as the scored points pass out of the guide at the discharge end.

All of the elements of this machine are driven from the same source and cooperatively act to perform their functions. The scoring blade has the same surface speed as the stock, but a definite length of stock passes through the forming rolls and is shaped between each action of the scoring blade, and the break is made at the discharge end at the same time a score is being made at the entrance end. By varying the timing of the cams the length of the pieces of stock which are formed from flat into channel shape may be altered as desired. As the stock runs continuously through the machine it may be very rapidly formed, and as the stock is not severed until after it has been completely formed into channel shape, the output is of uniform width, and although formed in continuous length it is easily broken into the required commercial lengths.

The invention claimed is:

1. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, means for scoring the flat metal strip from edge to edge at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, and means for breaking the channel where scored.

2. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, a roll for scoring the flat metal strip from edge to edge at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, and means for breaking the channel where scored.

3. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, a rotary blade for scoring the flat metal strip at intervals as it is fed, means for carrying said blade into and out of the path of the flat strip, means for drawing the scored flat strip into a continuous length of channel, and means for breaking the channel where scored.

4. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, a roll carrying a blade for scoring the flat metal strip at intervals as it is fed, toggle mechanism for moving said roll toward and from the path of the flat strip, means for drawing the scored flat strip into a continuous length of channel, and means for breaking the channel where scored.

5. A machine for forming metal conduit which comprises rolls for feeding a continuous strip of flat metal into the machine, a roll carrying a blade for scoring the flat metal strip, rolls for drawing the scored flat strip into a continuous length of chan-

nel, means for rotating said rolls at the same surface speed, means for moving said scoring roll toward and from the path of the flat strip, and means for breaking the channel where scored.

6. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, means for scoring the flat metal strip from edge to edge at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, and means movable across the path of the formed channel for breaking the channel where scored.

7. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, means for scoring the flat metal strip from edge to edge at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, and means movable across the path of the formed channel and operating in synchronism with the scoring means for breaking the channel where scored.

8. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, means for scoring the flat metal strip at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, and rolls movable up and down across the path of the formed channel for breaking the channel where scored.

9. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, means for scoring the flat metal strip at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, means movable across the path of the formed channel, and mechanism for oscillating said last mentioned means and causing the channel to break where scored.

10. A machine for forming metal conduit which comprises means for feeding a continuous strip of flat metal into the machine, means for scoring the flat metal strip at intervals as it is fed, means for drawing the scored flat strip into a continuous length of channel, means for breaking the channel where scored, and mechanism operating in synchronism with the scoring means for oscillating said breaking means and causing it to break the channel where scored.

11. A machine for forming metal conduit which comprises rolls for feeding a continuous strip of flat metal into the machine, a roll with a blade for scoring the flat metal strip from edge to edge at intervals as it is fed, and rolls for drawing the scored flat strip into a continuous length of channel.

12. A machine for forming metal conduit which comprises rolls for feeding a continuous strip of flat metal into the machine, a

roll with a blade for scoring the flat metal strip from edge to edge at intervals as it is fed, rolls for drawing the scored flat strip into a continuous length of channel, and
5 means movable across the path of the formed channel for breaking the channel into predetermined lengths.

13. A machine for forming metal conduit which comprises rolls for feeding a continuous strip of flat metal into the machine, a
10 roll with a blade for scoring the flat metal strip from edge to edge at intervals as it is fed, rolls for drawing the scored flat strip into a continuous length of channel, means
15 for breaking the channel where scored, and mechanism for rotating the feed rolls, scoring roll and drawing rolls in synchronism.

14. A machine for forming metal conduit which comprises rolls for feeding a continuous strip of flat metal into the machine, rolls
20 for drawing the flat strip into a continuous length of channel, a roll arranged intermediate the feed rolls and drawing rolls for scoring the flat metal strip from edge to edge at
25 intervals as it is fed, and rolls movable across the path of the formed channel and operating in synchronism with the scoring rolls for breaking the channel where scored.

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