Feb. 25, 1941. H. W. PARRISH ET AL 2,232,964

CORRUGATING MACHINE

Original Filed Oct. 26, 1933 2 Sheets-Sheet 1

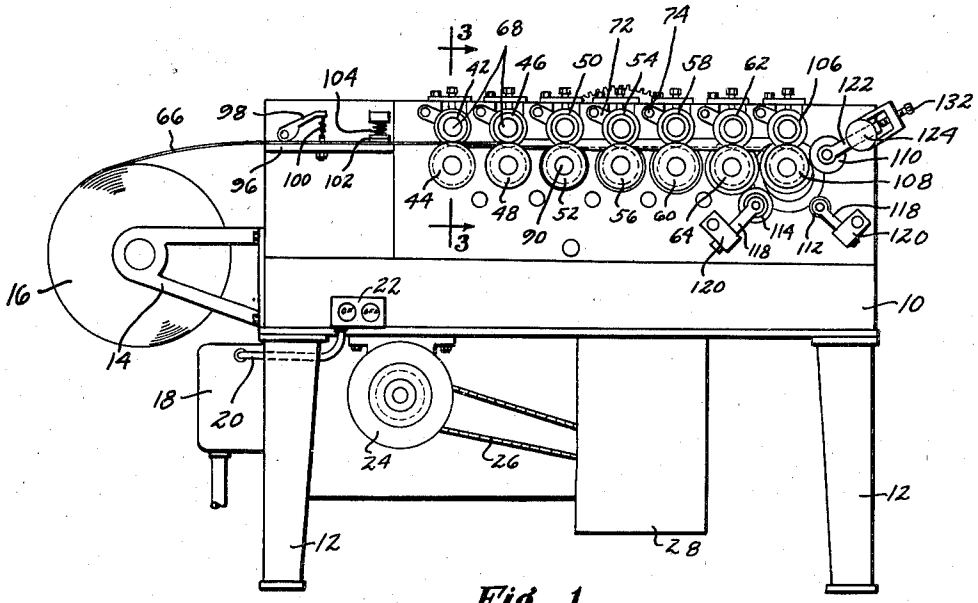


Fig. 1

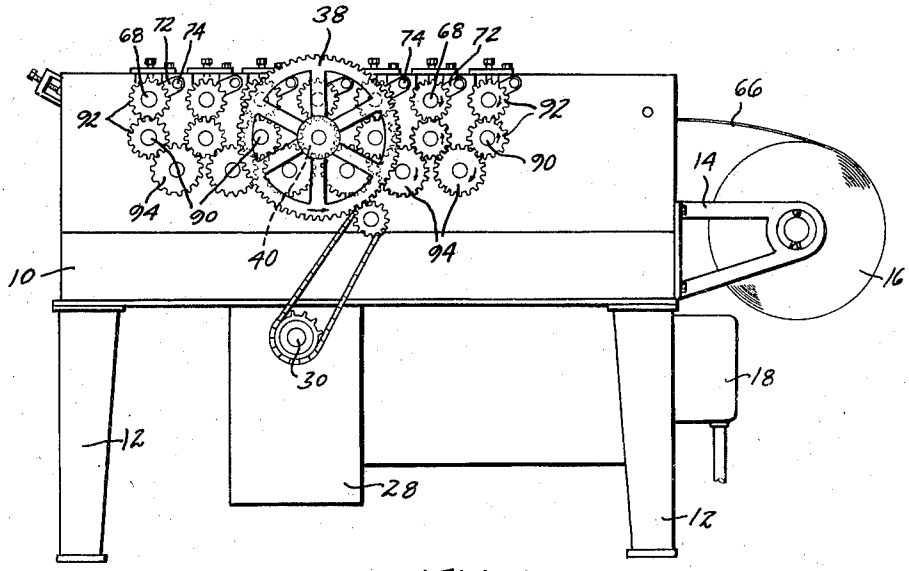


Fig. 2

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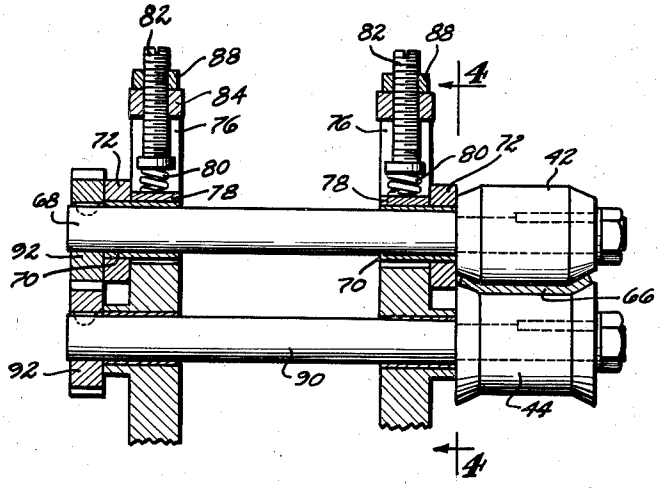


Fig. 3

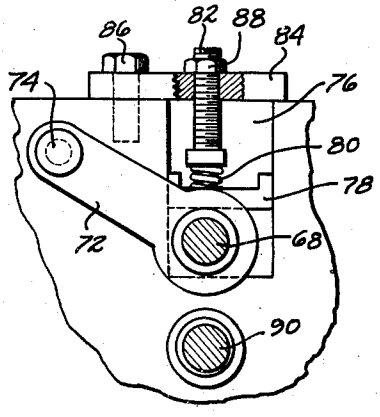


Fig. 4

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UNITED STATES PATENT OFFICE

2,232,964

CORRUGATING MACHINE

Hale W. Parrish, South Bend, Ind., and Lawrence G. Dickeson, Bridgeport, Conn., assignors to National Standard Company, Niles, Mich., a corporation of Michigan

Original application October 26, 1933, Serial No. 695,270. Divided and this application November 14, 1938, Serial No. 240,230

3 Claims. (Cl. 153—77)

This invention relates to machines for corrugating metal strips lengthwise, for example for use in making flexible conduits, and is illustrated as embodied in a machine for forming such conduits by helically winding the strips over a mandrel.

An object of the invention is to provide simple and very effective means for adjusting the spring tension acting on the corrugating rolls of such a machine. Another object is to provide mountings for the rolls such that in case something goes wrong the rolls can be quickly and easily separated without changing the adjustment of the spring tension, so that when the parts are again in place the springs or their equivalents are held under the same tension as before.

The above and other objects and features of the invention, including various novel combinations of parts and desirable particular constructions, will be apparent from the following description of the illustrative embodiment shown in the accompanying drawings, in which:

Figure 1 is a side elevation of the machine showing the series of corrugating rollers and the mandrel and the bending roller;

Figure 2 is a side elevation of the opposite side of the machine showing the intermeshing driving gears;

Figure 3 is a partial section of the line 3—3 of Figure 1 showing the mounting of the shafts of the machine and particularly the means for adjusting the pressure on the corrugating rollers; and

Figure 4 is a partial section on the line 4—4 of Figure 3 showing the means for temporarily releasing the upper shaft without disturbing the adjustment which determines the pressure on the corresponding spring.

The invention is shown in the drawings embodied in a machine fully described in our application No. 695,270, filed October 26, 1933, now Patent No. 2,162,355 of which the present application is a division.

The illustrated machine comprises a suitable base 10 supported on legs 12 and having at one end a pair of brackets 14 for rotatably supporting a reel 16 of material such as a long narrow strip of steel plated with copper or other bonding material on both sides.

The desirability of the use of this particular material, or a similar material is more fully set forth in Patent No. 1,964,289, granted June 26, 1934 to Clayton C. Harrah, and which describes and claims the complete method of forming the corrugated conduit in a novel series of steps of which the corrugating operation performed by the machine of the present application forms one step. So far as the present application is concerned, however, it is not essential that this particular material be used inasmuch as this machine is capable of use in forming conduits of other kinds than that formed by the method of the above-mentioned patent.

The base 10 supports a suitable switch and fuse-box 18 from which there leads a conduit 20 containing wires leading to a control switch 22 and a motor 24 mounted on the lower face of the base 10. The motor 24 is connected by means such as a sprocket chain 26 with a gear-reduction unit 28 having a low speed driving shaft 30 drivably connected by means such as a second chain 32 and suitable sprockets cooperating therewith to a shaft 34. The shaft 34 is shown with a small pinion 36 meshing with a large driving gear 38 which has at its hub 40 a small gear described below and which drives the series of gears for the corrugating and forming rollers.

There are a series of pairs of corrugating and forming rollers 42—44, 46—48, 50—52, 54—56, 58—60, 62—64, etc. These rollers are formed for progressively forming and deepening a corrugation in a strip 66 of steel drawn from the reel 16. The upper rollers 42, 46, etc., are mounted on horizontal shafts 68 which are journalled near their ends in bearings 70 (Figure 3) carried by pairs of swinging arms 72 fixedly mounted on pivots or shafts 74 mounted in fixed bearings. The bearings 70 for these upper shafts are arranged as shown in Figures 3 and 4 near the bottom ends of slots 76 in the machine frame and urged toward the bottoms of the slots 76 by shoes 78 which are urged downwardly by strong springs 80 so that the corresponding rollers are held in their lowermost positions against the material being corrugated under spring pressure.

The pressure of the springs 80 may be adjusted by turning stops 82 which are threaded into holding plates 84. Plates 84 are detachably secured by machine screws 86 to the machine frame. By loosening or removing the fastenings 86, the assembly 82—84—88 may be swung out of the way, so that the spring-held shaft may be allowed to swing upwardly in its arms 72, in case of a jamming of the strip 66 or the like. After making the desired correction or removing the jammed metal, the plates 84 are replaced and the fastenings 86 tightened or replaced to give the same adjusted tension of the springs

80 as before without requiring any new adjustment of the stops 82. The stops 82 may be locked in their adjusted positions by means such as lock nuts 88. The lower rollers 44, 48, etc., are mounted on shafts 90 rotatably mounted in fixed bearings carried by the machine frame.

The shafts 68 and 90 are provided at the ends shown in Figure 2 with pairs of intermeshing gears 92, so that each of the upper shafts 68 is driven directly and at the same speed by the corresponding shaft 90. Another gear 94 meshes with each adjacent pair of the lower series of gears 92 so that all of the gears 92 are driven at the same speed, all of the lower series in one direction and all of the upper series in the opposite direction. The center one of the lower series of the gears 92 is attached to or integral with the hub 40 of the large driving gear 38 described above.

From the foregoing description it will be seen that the gear 38 which is driven ultimately by the motor 24 drives all of the rollers 42 to 64 and draws the strip 66 through the machine, at the same time forming and gradually deepening the corrugation in this strip. In order to provide a substantially constant drag on the strip 66, the strip is urged against a plate 96 by a friction cam 98 urged in a direction to clamp the strip 66 by means such as a spring 100. A suitable block 102 of lubricating material may be urged yieldingly against the strip 66 by a spring 104.

Just beyond and in line with the last pair of rollers 62—64, there is a pair of members comprising an upper roller 106 which is substantially like the roller 62 but which instead of cooperating with a lower forming roller similar to the roller 64 cooperates with a rotating bending mandrel 108. The roller 106 and mandrel 108 are driven by the last pair of gears 92. A short distance angularly around the mandrel 108 there is arranged a bending roller 110 having a profile corresponding to that of the corrugated strip, and which bends the strip on a circular arc about the mandrel. The exact curvature of the strip as it is so bent, and therefore the diameter of the conduit, is determined by the position of the roller 110 angularly with respect to the mandrel 108. The further the bending roller 110 is adjusted around the mandrel 108, the smaller the diameter of the conduit which is formed.

A pair of guide rollers 112 and 114 are preferably provided to guide the strip as it is so bent about the bottom of the mandrel 108 (although not necessarily or usually in contact therewith) to cause the proper overlapping of the margins of adjacent convolutions to form the spirally or helically wound conduit 116 as shown in Figure 6. The guide rollers 112 and 114 are shown mounted on slides 118 adjustably clamped in guides 120.

While one illustrative embodiment has been described in detail, it is not our intention to limit the scope of the invention to that particular embodiment, or otherwise than by the terms of the appended claims.

We claim:

1. A machine for forming corrugated strips for use in making conduits or the like comprising a frame carrying a plurality of pairs of parallel shafts having intermeshing gears at their ends on one side of the frame and cooperating corrugating rolls at their ends on the other side of the frame, the gears of the lower shafts being driven by power, each of the upper shafts having a pair of bearings adjacent its ends, parallel pivotally-mounted swinging arms on the frame carrying said bearings, said frame being formed in its sides with substantially vertical slots in which the bearings are movable, springs in said slots engaging the bearings and urging them toward the other shaft, holding plates removably secured to the frame over the slots, and adjustable stops carried by the holding plates and engaging the springs to vary their compression, said holding plates being releasable to release the springs without altering the setting of the stops.

2. In a machine for corrugating strips and the like and having a frame formed with an open vertical slot in its side, the combination of a pair of shafts mounted on the frame and carrying cooperating corrugating rolls and having intermeshing driving gears thereon, one of said shafts being fixedly journaled in the frame, a bearing for the other of said shafts movable in said slot, a pivotally mounted swinging arm on the frame carrying said bearing, a spring engaging the bearing to urge it toward said one of the shafts, an adjustable stop for the spring, and a holding plate carrying the adjustable stop and releasably secured to the frame adjacent the slot so that when the holding plate is released the spring will be released without altering the setting of the adjustable stop.

3. In a machine for corrugating strips and the like and having a frame formed with an open vertical slot in its side, the combination of a pair of shafts mounted on the frame and carrying cooperating corrugating rolls and having intermeshing driving gears thereon, one of said shafts being fixedly journaled in the frame, a bearing for the other of said shafts movable in said slot, an arm pivoted to the frame carrying said bearing, a spring lying within the slot and engaging the bearing to urge it toward said one of the shafts, an adjustable stop for the spring projecting into the slot, and a holding plate carrying the adjustable stop and releasably secured to the frame over the open end of the slot so that when the holding plate is released the spring will be released without altering the setting of the adjustable stop.

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