C. N. FREY.

ROTARY CORRUGATING MACHINE.

APPLICATION FILED SEPT. 18, 1908.

1,017,400.

Patented Feb. 13, 1912.

3 SHEETS—SHEET 1.

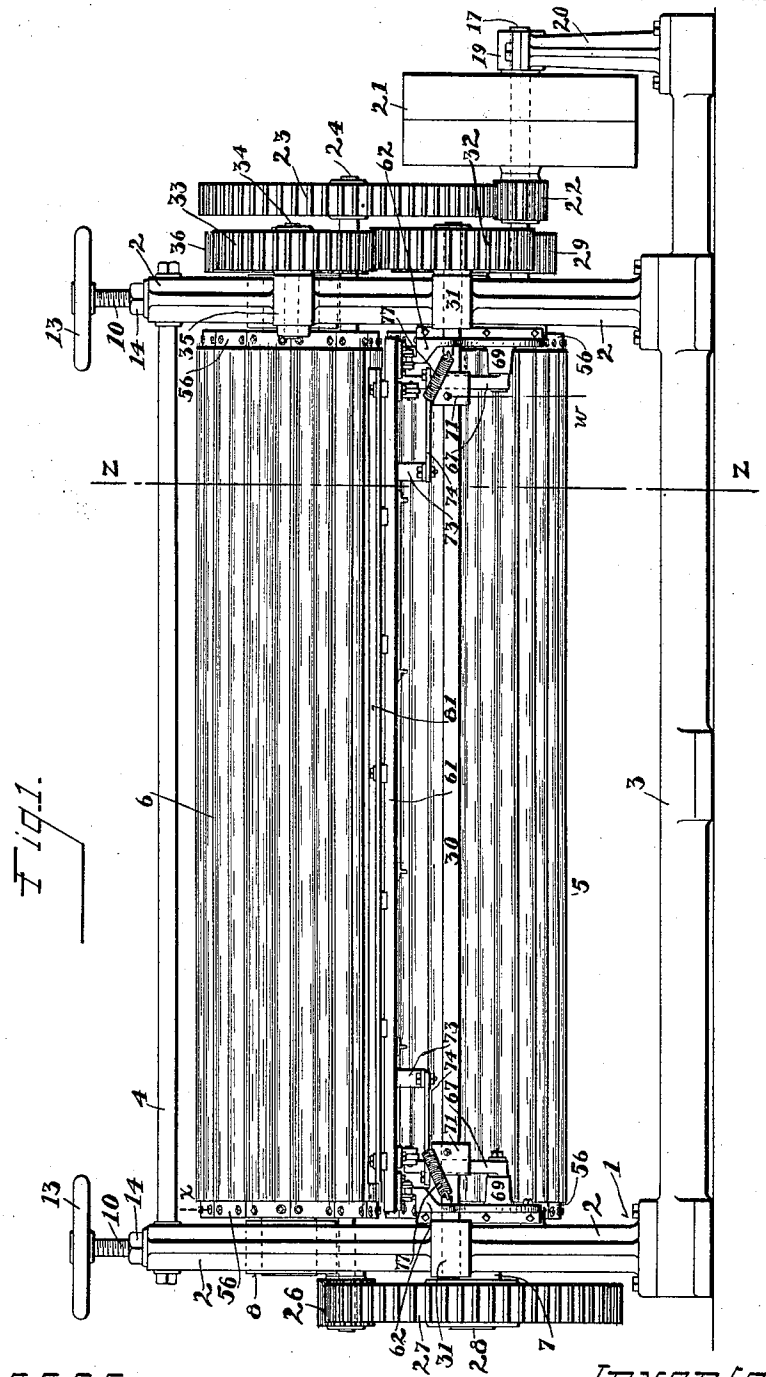

Fig. 1.

Witnesses.
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3 SHEETS—SHEET 2.

Fig. 3.

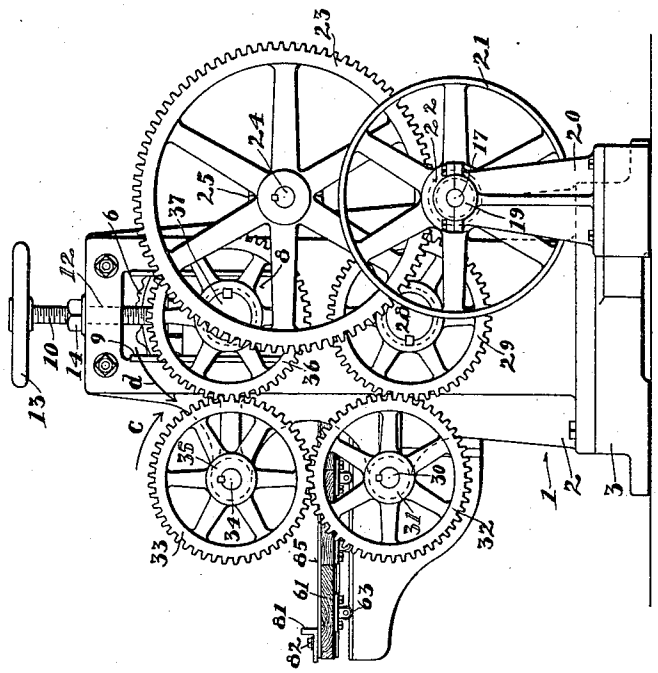
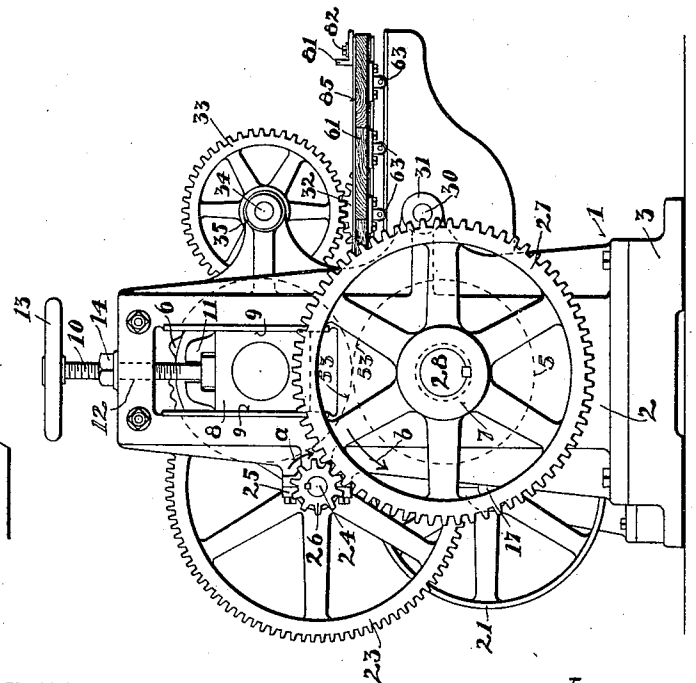


Fig. 2.



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3 SHEETS—SHEET 3.

FIG. 7.

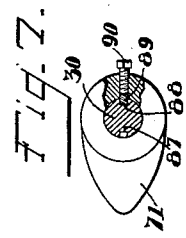


FIG. 6.

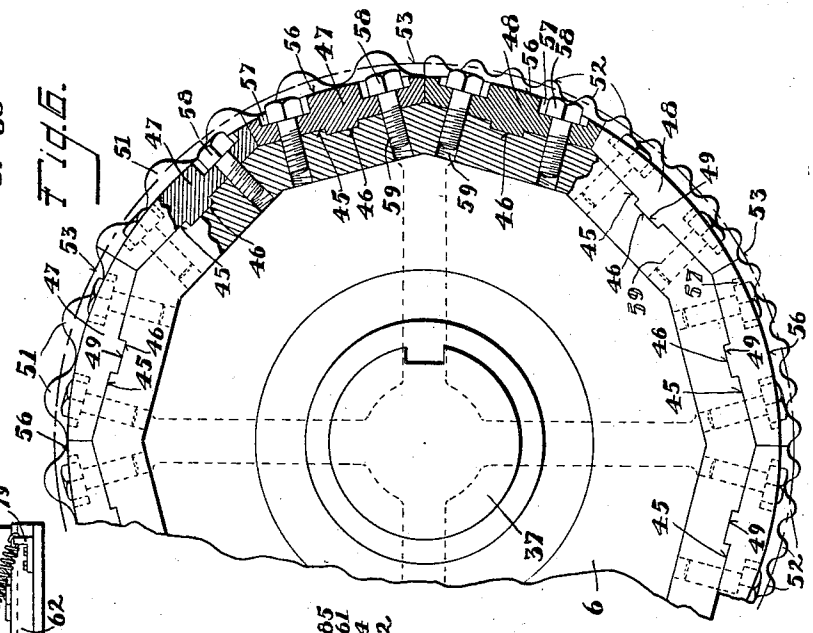


FIG. 5.

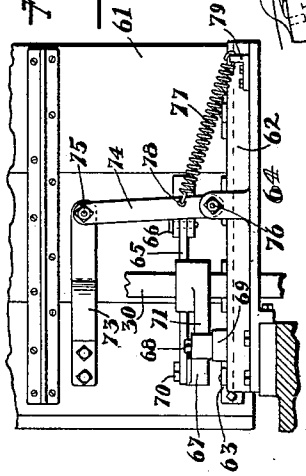
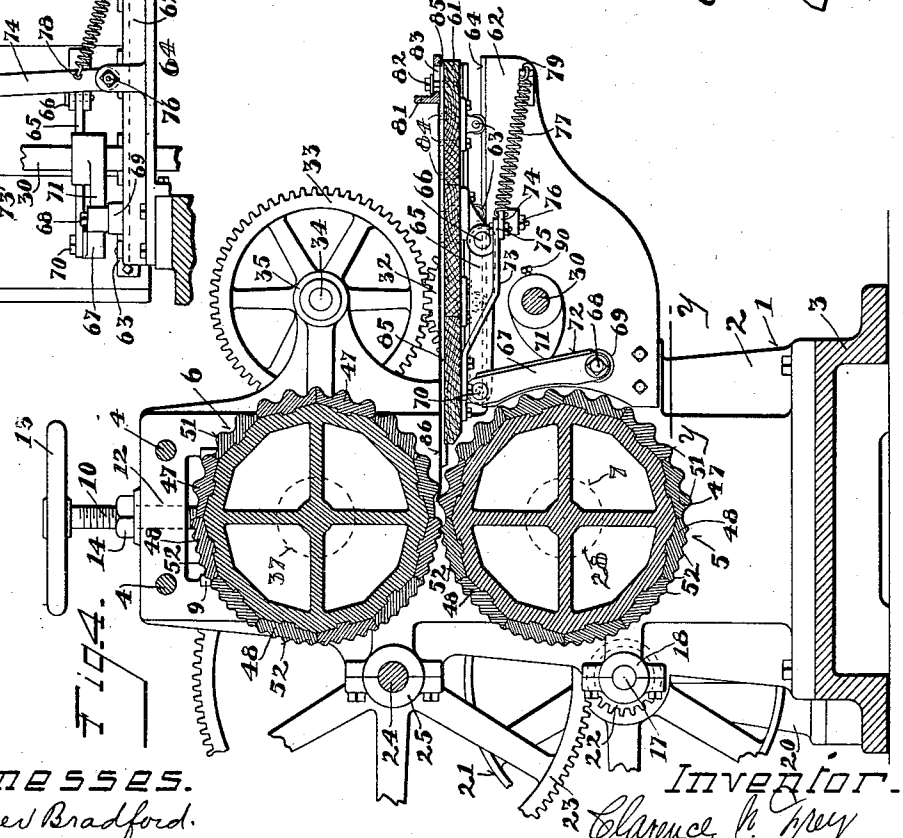


FIG. 4.



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UNITED STATES PATENT OFFICE.

CLARENCE N. FREY, OF CINCINNATI, OHIO, ASSIGNOR TO THE J. M. ROBINSON MANUFACTURING COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

ROTARY CORRUGATING-MACHINE.

1,017,400. Specification of Letters Patent. **Patented Feb. 13, 1912.**

Application filed September 18, 1908. Serial No. 453,599.

To all whom it may concern:

Be it known that I, CLARENCE N. FREY, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Rotary Corrugating-Machines, of which the following is a specification.

My invention relates to rotary corrugating machines for sheet metal and the like and has for its object the providing of new and novel means for operating the rotary corrugating rollers, for feeding the stock between the corrugating rollers, and for mounting the patterns or dies on the rollers, and the invention will be readily understood from the following description and claims, and from the drawings, in which latter—

Figure 1 is a front elevation of my improved device. Fig. 2 is a tail-end elevation of the same. Fig. 3 is a head-end elevation of the same. Fig. 4 is a vertical cross-section of the same on the line *z*—*z* of Fig. 1. Fig. 5 is a bottom view of one end of the table, the frame being in section on the line *y*—*y* of Fig. 4. Fig. 6 is an enlarged end elevation of one of the corrugating rollers, partly broken away, and partly in section on the line *x* of Fig. 1 for showing the means for securing the dies to the rollers; and, Fig. 7 is a detail in section on the line *w* of Fig. 1, showing the means for securing the table-actuating cam to its operating shaft.

1 represents the main frame, comprising the side-frames 2 connected at their bottoms by the bed-plate 3, and also connected by cross-rods 4.

5 is the lower corrugating roller and 6 is the upper corrugating roller. The lower corrugating roller is journaled in bearings 7 in the side-frames and the upper corrugating roller is journaled in bearing-blocks 8 adjustable up and down in slide-ways 9 of the side-frames by means of screw-rods 10 journaled in the bearing-blocks at 11 and adjustable in internally-threaded bearings 12 in the side-frames. The screw-rods may also be provided with hand-wheels 13 and are adapted to be clamped in adjusted positions by jam-nuts 14.

17 is a main drive-shaft journaled in a bearing 18 in the main frame and in a bearing 19 in a standard 20 secured to the bed-plate 3. Pulleys 21 or other driving means may be on the drive-shaft. The drive-shaft has a pinion 22 thereon which meshes with a gear 23 on a shaft 24 extending lengthwise of the machine and journaled in bearings 25 in the respective side-frames. The shaft 24 also carries a pinion 26 which meshes with a gear 27 on one of the trunnions 28 of the lower roller 5 for turning said roller. It will be noted that the direction of the force of this drive is downward for causing the force of the drive to be in the direction of the stress of the weight of the lower roller. The gear 27 is preferably at one end of the lower roller, there being a gear 29 on the other trunnion 28 at the other end of said lower roller.

30 is a shaft which extends longitudinally of the frame and is journaled in bearings 31 in the respective side-frames of the machine. This shaft carries a gear 32 which meshes with the gear 29 and is in turn meshed by a gear 33 on a stud 34 which is secured in a bearing 35 of one of the side frames. The gear 33 meshes with a gear 36 on one of the trunnions 37 of the upper roller. The directions of rotation of the pinion 26 and the gear 27 are respectively indicated by the arrows *a b* and the directions of rotation of the gears 33 and 36 are respectively indicated by the arrows *c d*. From the directions of rotation of the gears 33 and 36 it will be noted that the direction of the force of the drive upon the upper corrugating roller is also downward, by which means I cause the force of the drive of the upper roller to supplement the weight of said roller for preventing a separation or yield of the upper roller from the lower roller when the corrugating action is taking place for providing additional power in the corrugating action, and providing an exceptionally powerful machine capable of producing accurate corrugations.

The corrugating rollers are each provided with a series of die-setting faces 45 of narrow cross-section extending longitudinally of the roller. I have shown twelve of these setting-faces on each of the said rollers, each setting-face being provided with a longitudinal groove 46. These setting-faces are adapted to receive the dies 47 48. Each of the dies has a tongue 49 extending longitudinally thereof, these tongues being received into the grooves 46 for definitely positioning the dies laterally upon said faces and thereby resisting the sidewise stress of the

corrugating action upon the dies, which corrugating action tends to force the respective dies sidewardly. The dies 47 48 are respectively provided with corrugations 51 52 extending longitudinally of the rollers, the corrugations 51 being shown about twice as large as the corrugations 52, the corrugations 51 being disposed at one side of the vertical axes of said rollers, while the corrugations 52 are disposed at the other side of said axes, the pitch-line however, shown at 53, being the same for said respectively sized corrugations or for other sized corrugations which may be provided on the dies. In this manner the machine may at all times be provided with a plurality of sizes of corrugations for reducing the necessity of frequent changing in the dies. Half the circumference of the respective rollers will accommodate the widest sheets corrugated in practice. These sheets usually ranging from 24 to 36 inches in covering width. The time occupied by the machine in completing the revolution of the corrugating rollers after the sheet has passed into contact therewith, is occupied by the retraction of the table, which is rapidly accomplished, and the placing of a new sheet upon the table for the next succeeding corrugating action by the machine, so that no time is wasted by the machine by providing the corrugating rollers thereof with a plurality of sizes of corrugating dies.

The corrugations of the respective dies are interrupted in advance of the ends of said dies for forming blank faces 56, preferably provided with recesses 57 for receiving the heads of bolts 58 which pass through the dies into threaded apertures 59 in the rollers for securing the dies to the rollers, the heads of said bolts being within the pitch-line of said corrugating roller.

61 is a table which slides back and forth on brackets 62 secured to the respective side-frames, the table preferably being provided with rollers 63 traveling on tracks 64 on said brackets. Adjacent each end of the table there is a link 65 articulated therewith at 66. A contact-arm 67 is pivoted at 68 to a lug 69 at each table-bracket and is articulated at 70 with said respective links. Cams 71 are secured to the shaft 30 and rotate therewith and are arranged to contact the contact-arms 67, which latter are preferably provided with shoes 72 of hardened metal for resisting the wear of the cams.

A bar 73 is secured to the table and has a lever 74 articulated therewith at 75, the lever being pivoted to the table-bracket at 76. A spring 77 is secured to the lever at 78 and to the table-bracket at 79, there being one of these springs at each end of the table for normally pushing the table backward or away from the corrugating rollers.

A gage 81 is adjustably secured to the table, as by having bolts 82 pass through slots 83 in said gage and into selective threaded holes 84 in metal strips 85 secured to the table.

The sheet it is designed to corrugate, shown at 86, may be fed between the corrugating rollers upon the meeting of the corrugations 51 or of the corrugations 52, depending upon which depth of corrugation it is desired to have imparted to the stock. I preferably accomplish this by providing means for securing the cams 71 to their shaft in two positions, in one of which positions the table will coöperate with the corrugations 51 and in the other with the corrugations 52. Thus the cam-shaft may be provided with keyways 87 88 into either of which a key 89 for the cam may be placed so as to cause the highest point on the cam to project in one of two opposite directions. A set-screw 90 may be threaded into the hub of the cam against the key. The cam is preferably a quick cam, that is, it is so shaped as to feed the sheet to be corrugated between the corrugating rollers with a quick movement to sufficient extent so that the stock may be gripped by either of the respective corrugations of said corrugating rollers, which then draw the sheet between them for performing the corrugating operation, the table meanwhile receding with a quick movement ready for the next sheet to be placed upon the same.

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

1. In a rotary corrugating machine, the combination of corrugating rollers, a stock-supporting table, gears for driving one of said rollers from the other of said rollers, a shaft under said table rotated by said gears, said shaft being parallel with said rollers, a cam on said shaft adjacent each end of said table, a contact-arm for each of said cams pivoted to the main frame, and a link between said contact-arm and table for causing movement of said table with relation to said corrugating rollers, substantially as described.

2. In a rotary corrugating machine, the combination of corrugating rollers, a stock-supporting table, gears for driving one of said rollers from the other of said rollers, a shaft under said table rotated by said gears, said shaft being parallel with said rollers, a cam on said shaft adjacent each end of said table, a contact-arm for each of said cams pivoted to the main frame, a link between each of said contact-arms and table for causing movement of said table in one direction with relation to said corrugating rollers, and means for automatically moving said table in the opposite direction with relation to said rollers, substantially as described.

3. In a rotary corrugating machine, the combination of corrugating rollers, each of which has corrugations of different depths on the respective halves of its circumference, said corrugations on each of said rollers having similar pitch-lines, said rollers being geared together for causing juxtaposition of corrugations of similar depth on both said corrugating rollers, a train of gearing comprising intermediate gears for accomplishing said gearing together of said rollers constructed for driving one of said corrugating rollers from the other of said corrugating rollers, a shaft parallel with said corrugating rollers extending longitudinally under said table and supporting one of said intermediate gears, a cam on said shaft adjacent each end of said table having connection with said table for moving said table in a given direction with relation to said corrugating rollers, and means for moving said table in the opposite direction with relation to said corrugating rollers.

4. In a rotary corrugating machine, the combination of corrugating rollers, each of which has corrugations of different depths on the respective halves of its circumference, said corrugations on each of said rollers having similar pitch-lines, said rollers being geared together for causing juxtaposition of corrugations of similar depth on both said corrugating rollers, a train of gearing comprising intermediate gears for accomplishing said gearing together of said rollers constructed for driving one of said corrugating rollers from the other of said corrugating rollers, a shaft parallel with said corrugating rollers extending longitudinally under said table and supporting one of said intermediate gears, a cam on said shaft adjacent each end of said table, means for securing said cams to said shaft at two opposing positions for causing movement of said table toward said corrugating rollers upon juxtaposition of either of said sizes of corrugations on said rollers.

5. In combination, in a rotary corrugating machine, a corrugating roller and corrugating dies therefor having longitudinal tongues and grooves therebetween, said corrugating dies having longitudinal corrugations terminating in advance of each end of said dies for forming blank spaces at each end of said dies, and means in said blank spaces at both ends of said dies for securing said dies to said rollers.

6. In combination, in a rotary corrugating machine, a rotary corrugating roller and a corrugating die thereon having longitudinal tongue and groove therebetween, said corrugating dies having longitudinal corrugations terminating in advance of each end of said die for forming a blank space at each end of said die, and bolts in said blank spaces at both said ends of said die for securing said die to said corrugating roller.

7. In combination, in a rotary corrugating machine, a corrugating roller having a plurality of die-securing faces upon each half of the circumference thereof, corrugating dies provided with corrugations of different depths for the die-securing faces of the respective halves of said corrugating roller, said corrugations of different depths having coincident pitch lines, said corrugations terminating in advance of each end of each of said dies for forming blank spaces at both ends of said dies, said dies and die-securing faces having tongue and groove connection between them extending longitudinally of said dies and die-securing faces, and bolts in said blank spaces at both ends of said dies screwing into said rollers, the heads of said bolts being within said pitch-lines.

8. In combination, in a rotary corrugating machine, a corrugating roller having a plurality of die-securing faces upon each half of the circumference thereof, corrugating dies provided with corrugations of different depths for the die-securing faces of the respective halves of said corrugating roller, said corrugations of different depths having coincident pitch-lines, said corrugations terminating in advance of each end of each of said dies for forming blank spaces at both ends of said dies, said dies and die-securing faces having tongue and groove connection between them extending longitudinally of said dies and die-securing faces, said corrugations being interrupted at each end of each of said dies for forming blank faces at both ends of each of said dies within said pitch-lines, said last-named faces being provided with recesses, and bolts between said dies and rollers received through said faces in said recesses at both ends of said dies and located within said pitch lines.

In testimony whereof, I have signed my name hereto in the presence of two subscribing witnesses.

CLARENCE N. FREY.

Witnesses:
ADÈLE MEININGER,
J. L. KOHL.