No. 865,908. PATENTED SEPT. 10, 1907.

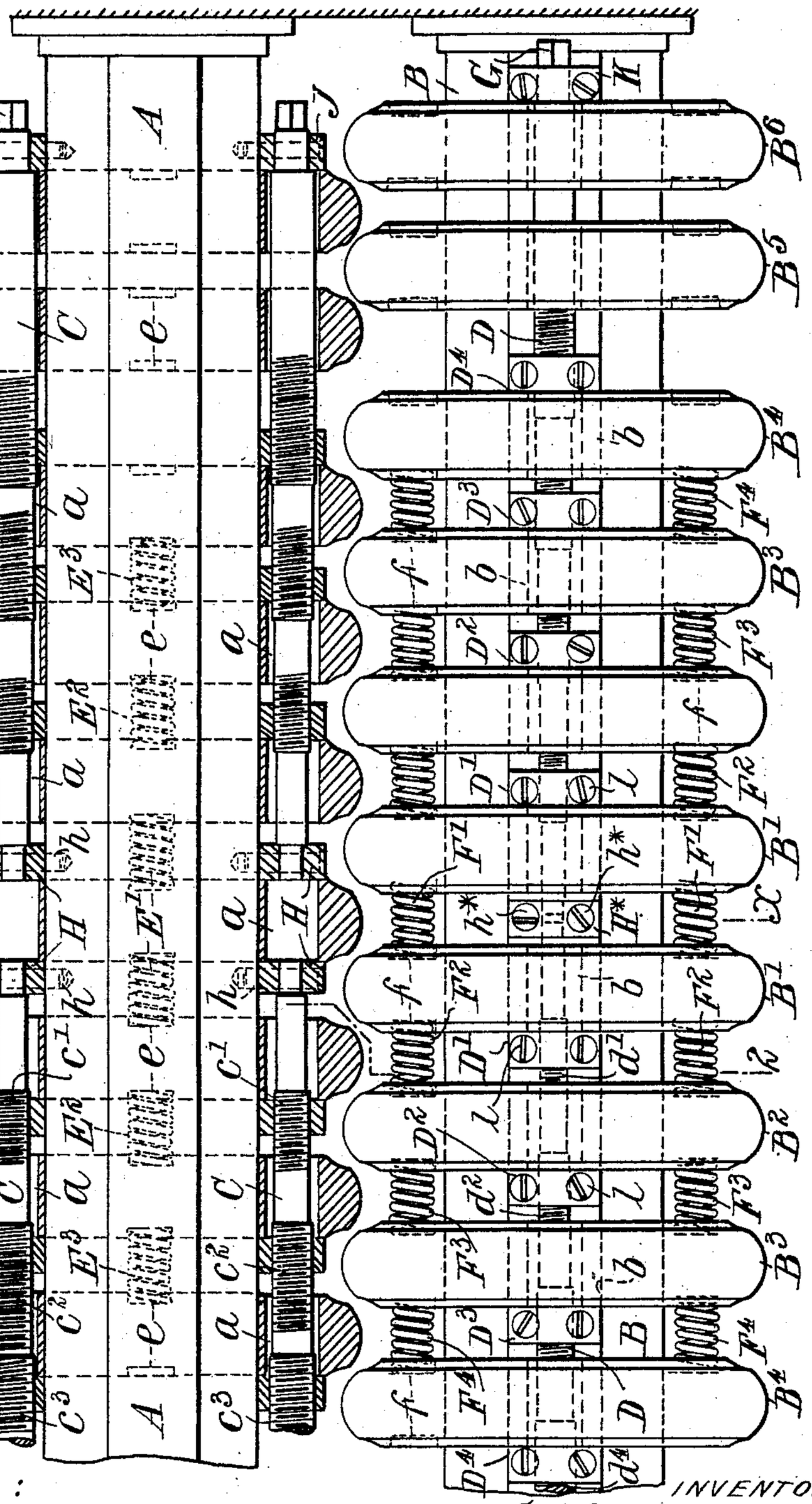
G. B. JOHNSON.

MACHINE FOR CORRUGATING SHEET METAL.

APPLICATION FILED DEC. 18, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



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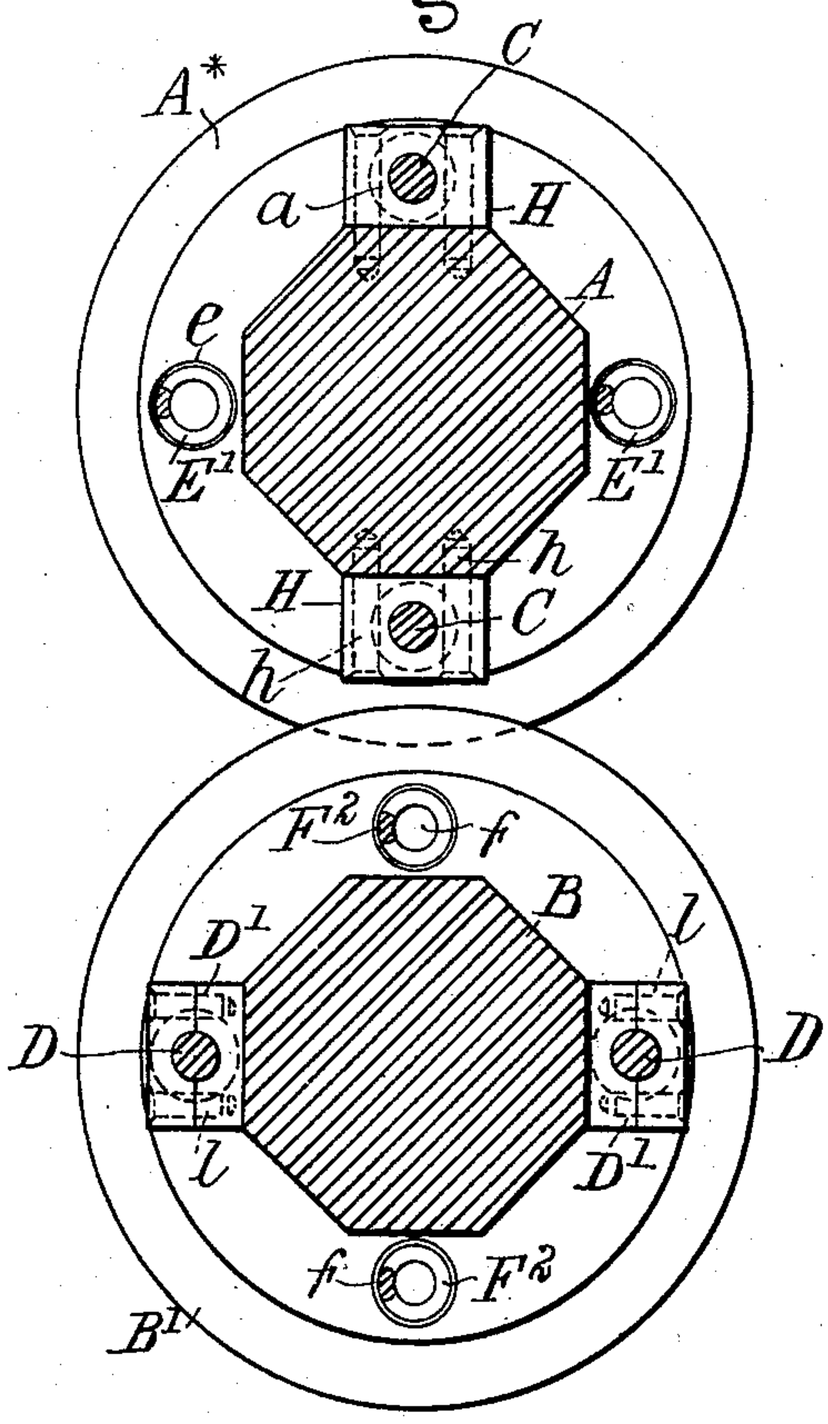
3 SHEETS—SHEET 2.

Fig. 2.



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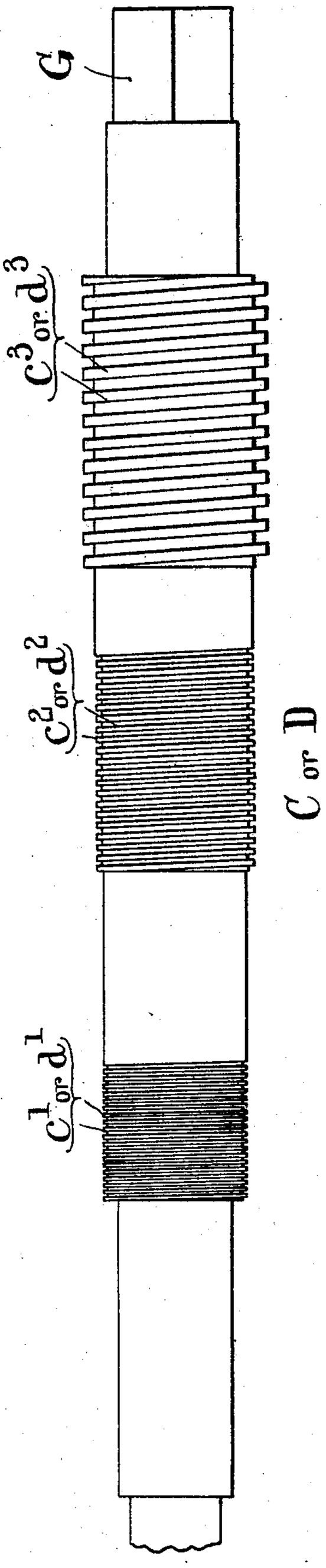
3 SHEETS—SHEET 3.

Fig. 3.



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MACHINE FOR CORRUGATING SHEET METAL.

No. 865,908. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed December 18, 1906. Serial No. 348,374.

To all whom it may concern:

Be it known that I, GODFREY BENINGTON JOHNSON, a subject of the King of Great Britain, and a resident of 8 Victoria street, in the city of Westminster, London, England, have invented a certain Improvement in Machinery for Corrugating Metal Sheets, of which the following is a full, clear, and exact description.

This invention relates to improvements in the sheet metal corrugating machine which was described in the specification of former Letters Patent of the United States of America, No. 815,710 granted to me on March 20, 1906, and which comprised a number of pairs of rolls each consisting of an arbor having mounted upon it a number of roll sections normally held by spring pressure at distances apart determined by stops fixed to the arbor. Each such machine was capable of producing (with a given set of rolls) corrugations of only one pitch apart, any variation called for in the pitch of the corrugations requiring all the rolls to be removed, and either replaced by others having the stops differently arranged, or altered by separately shifting each individual stop to suit the new pitch, both of these operations being tedious and expensive.

The object of the present invention is to render a corrugating machine of the kind referred to more readily adaptable for producing corrugations of any desired pitch (with certain limits), and to this end the invention consists in providing means whereby the necessary adjustment of the stops lengthwise of the roll arbors may be effected simultaneously for some or all of the stops, by a simple operation not involving the dismounting of the rolls.

The invention is illustrated in the accompanying drawings, wherein

Figure 1 is a part transverse section of a corrugating machine of the kind referred to, adapted to produce ordinary regular corrugations of alternately reversed curvature in a sheet of metal, the figure showing a single pair of corrugating rolls to which the invention is applied, and the upper roll being partly in section. Fig. 2 is a section through the same pair of rolls on line 2—2 of Fig. 1. Fig. 3 is a detail view on an enlarged scale, of the leading screw hereinafter referred to.

It is to be understood that the complete corrugating machine constructed as described in the specification of Letters Patent already referred to, may comprise any number of pairs of such rolls; the axes of the rolls in successive pairs being set progressively closer together in accordance with the progressive increase in the depth of the corrugations produced in the sheet of metal under treatment, and the stops, whereby are determined the normal distances apart of the roll sections in successive pairs of rolls, being adjusted at progressively diminishing distances apart in accordance with the progressive diminution in the effective width of the sheet of metal during its passage through the machine. The manner of applying the invention may however be the same for all the rolls throughout the machine.

In the drawings, A is the upper and B the lower arbor of a pair of rolls, the sections A^1 A^2 etc. of the upper roll and those B^1 B^2 etc. of the lower roll being mounted upon their respective arbors, which in the example illustrated, are octagonal in cross section and fit loosely in octagonal holes in the corresponding roll sections.

C^1 C^2 etc. and D^1 D^2 etc. are the stops appertaining to the roll sections A^1 A^2 etc. and B^1 B^2 etc. respectively, these stops serving to determine the distances at which the roll sections of the respective sets are normally held apart by means of springs E^1 E^2 etc. and F^1 F^2 etc. interposed between adjacent sections of the respective rolls.

According to the present invention the stops C^1 C^2 etc. and D^1 D^2 etc. are not fixed directly to the arbors A and B but are slidable thereon, the adjustment lengthwise of each arbor of the stops appertaining thereto being effected through the medium of two or more leading screws C or D which extend (through clearing holes *a* and *b* in the respective sets of roll sections) longitudinally of the arbor and which may be rotated separately by hand as shown. The stops C^1 C^2 etc. D^1 D^2 etc. have screw-threaded apertures for the passage of the leading screws C or D, upon which they work as nuts, so that, on a screw being revolved, all the stops which engage with it will be shifted simultaneously to the required extent, the stops bearing against the flat side of the arbor so as to be prevented from revolving along with the screw.

As the longitudinal center line of the sheet to be corrugated is usually required to remain (during its passage through the machine) constantly in the central vertical longitudinal plane *x*—*x* of the machine, said plane, which may be termed the "datum plane", cutting all the pairs of rolls in the machine at the middle of their length, the adjustment of the stops on any roll must in such case be effected by movement towards or from this central datum plane, the stops on opposite sides of the latter being moved in opposite directions. It is therefore preferred to employ for each roll two similar sets of leading screws extending from opposite ends to the middle of the length of the roll as indicated in Fig. 1, so as, on being rotated, to produce movement of the corresponding sets of stops in opposite directions.

It will be obvious that the extent to which each stop requires to be moved in effecting the adjustment, will increase with the distance of the stop from the datum plane *x*—*x*, while in a machine for producing regular

corrugations as in the example illustrated, the roll sections in any pair of rolls must remain always at equal distances apart. In order to enable these requirements to be complied with, the portions c^1 c^2 etc. or d^1 d^2 etc. of each leading screw C or D which are appropriated to the respective stops C^1 C^2 etc. or D^1 D^2 etc. are preferably provided with threads whose pitch varies progressively in successive portions of each screw according to the required ratio as shown in Fig. 3.

In the previous machine only a single spring was commonly used between each two adjacent roll sections, the spring being coiled about the arbor. According to the improved construction it is preferred to employ, in place of each such single spring, two or more independent springs such as E^1 E^1, E^2 E^2, etc. F^1 F^1, F^2 F^2, etc. spaced apart around the circumference of the arbor between the leading screws C C or D D, each spring being retained in position by its ends being received in pockets provided as indicated at *e e* and *f f* in the opposed faces of the respective roll sections.

In the example illustrated the number of corrugations to be produced in the sheet of metal under treatment is such as to necessitate the employment of an odd number (seven) of roll sections in the upper roll of a pair and an even number (eight) of the same in the lower roll. The middle section A* of those in the upper roll being therefore in the datum plane *x—x* already mentioned, will be stationary, and may be held against movement lengthwise of the arbor A by being placed between pairs of stops H H which are fixed to the arbor by set-screws as indicated at *h* and which also are furnished with bearings wherein the inner ends of the respective leading screws C C are journaled. The leading screws D D of the lower roll may have their inner ends journaled in a bearing block H* fixed to the arbor B by set screws (as indicated at *h**) between the innermost pair of roll sections B^1 B^1. The outer ends of the leading screws C C and D D are journaled in bearing blocks J and K fixed to the respective arbors A and B as indicated, all the leading screws having both ends shouldered so as, by abutting against the corresponding bearing blocks, to be prevented from longitudinal movement in either direction.

The outer end G of each leading screw is made of square or hexagonal shape in cross section so as to enable the screw to be turned when required by means of a spanner.

In order that the leading screws may be withdrawn from position so as to permit the insertion of other screws having threads of different pitch, whereby the stops may be adjusted with a view to the production of corrugations having pitches beyond the limits attainable with the leading screws previously in use, the successive threaded portions c^1 c^2 etc. d^1 d^2 etc. of the respective screws C and D, counting from the datum plane *x—x*, are made of progressively increased diameter so that, on removing the outer bearing blocks J K and rotating in the appropriate direction for screws C D, the latter will work out of the stops C^1 C^2 etc. and D^1 D^2 etc. and may be withdrawn through the clearing holes *a* and *b* in the roll sections and through openings in the side frames of the machine, other leading screws being introduced into position by the converse operation.

The stops C^1 C^2 etc. and D^1 D^2 etc. are preferably formed as split nuts whereof the halves are normally held together by means of set screws *l* as shown.

In Fig. 1, A^4 A^5 and B^5 B^6 are roll sections which, not being required for rolling the particular width of sheet for which the machine is supposed to be prepared, are temporarily thrown out of operation by being moved to the end (or ends) of the respective rolls, the leading screws C and D extending through and beyond these sections. It will thus be seen that no necessity exists for actually dismounting any of the roll sections, even if some of these are not required for any particular operation.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In a machine for corrugating sheet metal, pairs of rolls each consisting of an arbor and a number of roll sections mounted upon the arbor and normally held apart by spring pressure, means for determining the normal distance apart of said sections in a roll, the said means comprising stops slidable upon the arbor and having threaded apertures, and leading screws journaled in bearings carried by the arbor, successive portions of the length of each leading screw having threads of progressively varying pitch which engage in the threaded apertures in the respective stops, so that by the rotation of the screw the positions of all the stops wherewith it engages may be simultaneously adjusted, substantially as described.

2. In a machine for corrugating sheet metal, the combination with pairs of rolls, each comprising an arbor, a number of roll sections mounted upon said arbor, and springs for normally holding the sections apart, of stops slidable upon the arbor and having threaded apertures, and leading screws journaled in bearings carried by the arbor, each leading screw having successive portions of its length provided with threads of progressively varying pitch which engage in the threaded apertures in the respective stops, the said successive portions of each leading screw progressively diminishing in diameter from either end of the roll, substantially as and for the purpose set forth.

3. In a machine for corrugating sheet metal, the combination with pairs of rolls each comprising an arbor, a number of roll sections mounted upon said arbor, and springs for normally holding the sections apart, of stops slidable upon each arbor and having threaded apertures, and independent sets of leading screws for each roll, the leading screws being journaled in bearings carried by the arbor, the sets of leading screws extending in opposite directions from a point in the length of the roll, and having threads of progressively varying pitch which engage in the threaded apertures in the respective stops, whereby the stops with which the said sets of screws respectively engage may be adjusted independently and in opposite directions, substantially as described.

4. In a machine for corrugating sheet metal, pairs of rolls each consisting of an arbor, a plurality of roll sections mounted thereon, yielding means for holding the sections apart, stops for the roll sections slidable lengthwise of the roll arbor, and means for adjusting said stops.

5. In a machine for corrugating sheet metal, pairs of rolls each consisting of an arbor, a plurality of roll sections mounted thereon, yielding means for holding the sections apart, stops for the roll sections slidable lengthwise of the roll arbor and having threaded apertures, and leading screws carried by the arbor, successive portions of the length of each leading screw being provided with threads of progressively varying pitch which engage in the threaded apertures of the respective stops.

6. In a machine for corrugating sheet metal, pairs of rolls each consisting of an arbor, a plurality of roll sections mounted thereon, yielding means for holding the sections apart, stops for the roll sections slidable length-

wise of the roll arbor and having threaded apertures, and leading screws carried by the arbor and having threaded portions of progressively increased diameter adapted to engage the threaded apertures of the respective stops.

7. In a machine for corrugating sheet metal, pairs of rolls each consisting of an arbor, a plurality of roll sections mounted thereon, yielding means for holding the sections apart, sets of stops for the roll sections slidable lengthwise of the roll arbor and having threaded apertures, and sets of leading screws carried by the arbor and extending from opposite ends toward the middle of the length of the roll, the sets of leading screws engaging the respective sets of stops and adapted when rotated to move said sets of stops.

GODFREY BENINGTON JOHNSON.

Witnesses:
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