

A. MARK & W. E. SANDFORD.
 APPARATUS FOR CORRUGATING TUBES.

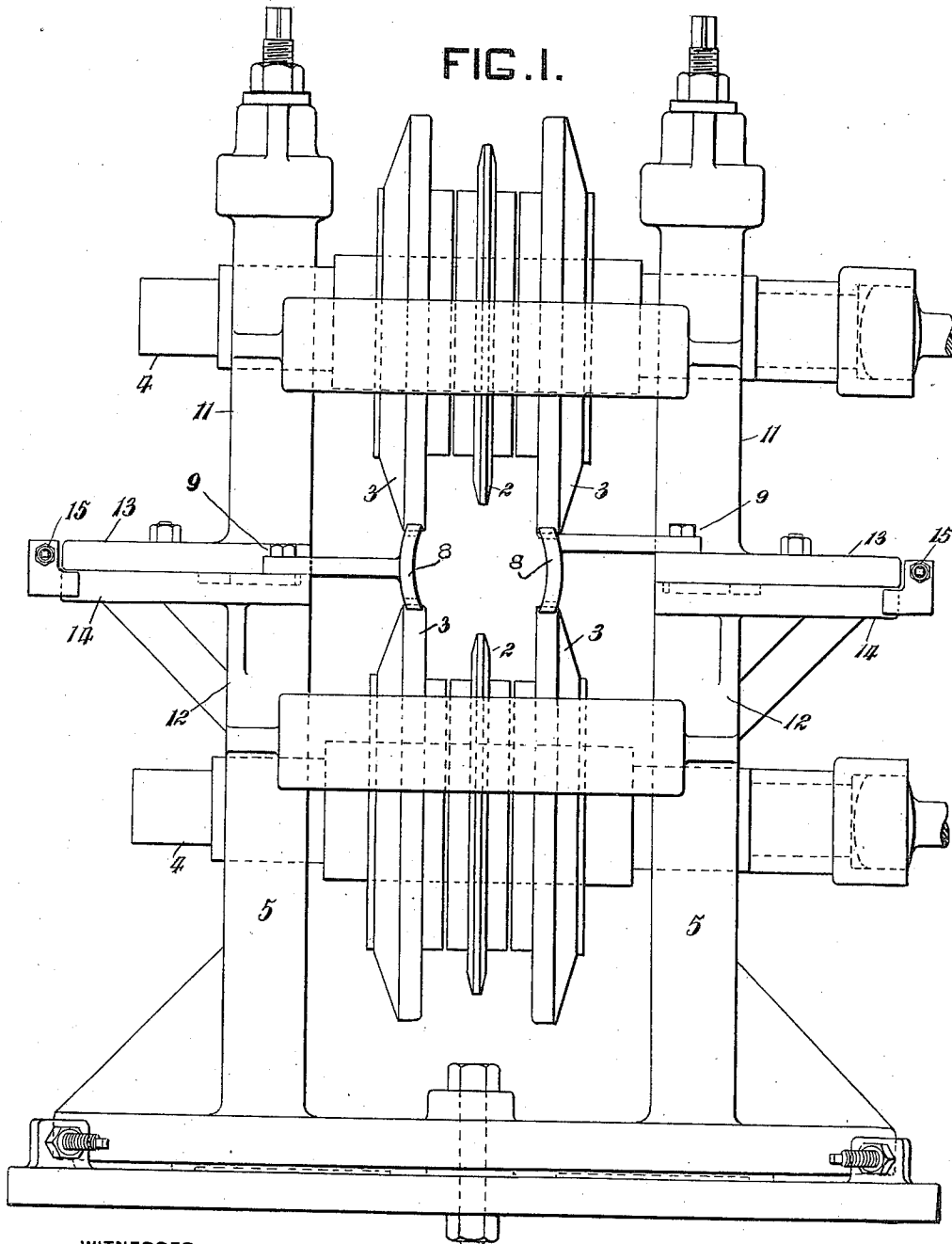
APPLICATION FILED AUG. 1, 1910. RENEWED APR. 27, 1912.

1,045,092.

Patented Nov. 19, 1912.

4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

H. A. Barth
A. M. Goodwin

INVENTORS

Arson Mark
William E. Sandford
 by *Bakewell & Keller*
Their Attys.

A. MARK & W. E. SANDFORD.

APPARATUS FOR CORRUGATING TUBES.

APPLICATION FILED AUG. 1, 1910. RENEWED APR. 27, 1912.

1,045,092.

Patented Nov. 19, 1912.

4 SHEETS—SHEET 2.

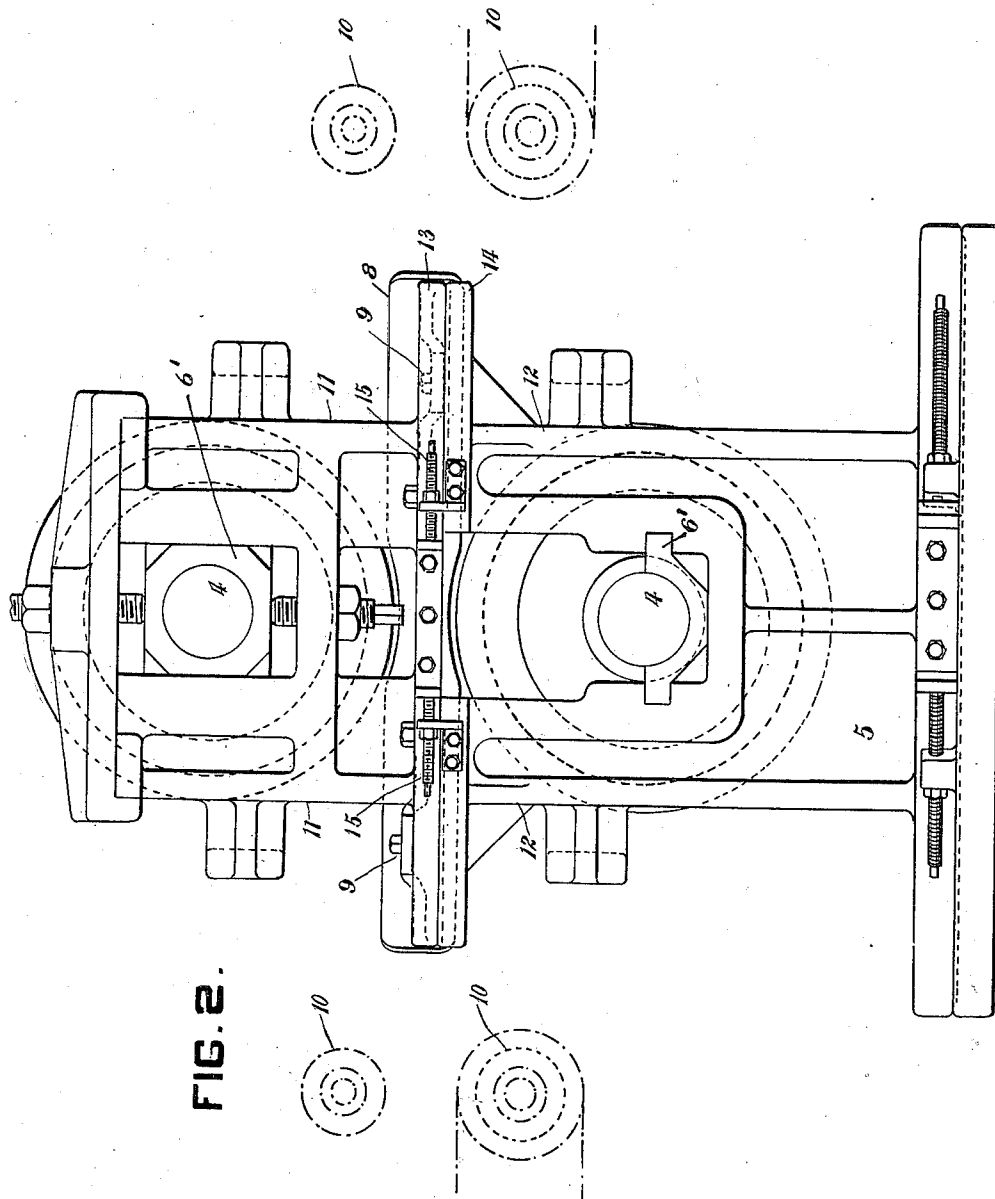


FIG. 2.

WITNESSES

H. A. Barth
A. M. Goodwin

INVENTORS

Anson Mark
William E. Sandford
by *Bakewell & Keller*
Min. Attys

APPARATUS FOR CORRUGATING TUBES.

1,045,092.

4 SHEETS—SHEET 3.

This technical drawing illustrates a mechanical assembly, possibly a camera shutter or a similar device, shown in a cross-sectional view. The assembly is contained within a circular housing (8). Key components include:

- 1**: A central shaft or lever arm.
- 2**: A coiled spring mechanism.
- 3**: A series of stacked plates or blades.
- 4**: A central vertical shaft or pin.
- 5**: A large, curved component at the top, possibly a shutter curtain or a guide.
- 6**: A small rectangular component, likely a stop or a guide.
- 7**: A small rectangular component, possibly a stop or a guide.
- 8**: The main circular housing or frame.
- 9**: Bolts or screws used for securing the housing.
- 10**: A small circular component, possibly a pin or a screw head.
- 11**: A small circular component, possibly a pin or a screw head.
- 12**: A small circular component, possibly a pin or a screw head.
- 13**: A small circular component, possibly a pin or a screw head.
- 14**: A small circular component, possibly a pin or a screw head.
- 15**: Adjustment screws or pins at the bottom of the housing.

A dashed line labeled **A** indicates a section line passing through the assembly.

McBath
AM Goodwin

Anson, Mark
William E. Lundford
by Bakewell & Kellen
their Attyys

A. MARK & W. E. SANDFORD.
APPARATUS FOR CORRUGATING TUBES.

APPLICATION FILED AUG. 1, 1910. RENEWED APR. 27, 1912.

1,045,092.

Patented Nov. 19, 1912.

4 SHEETS—SHEET 4.

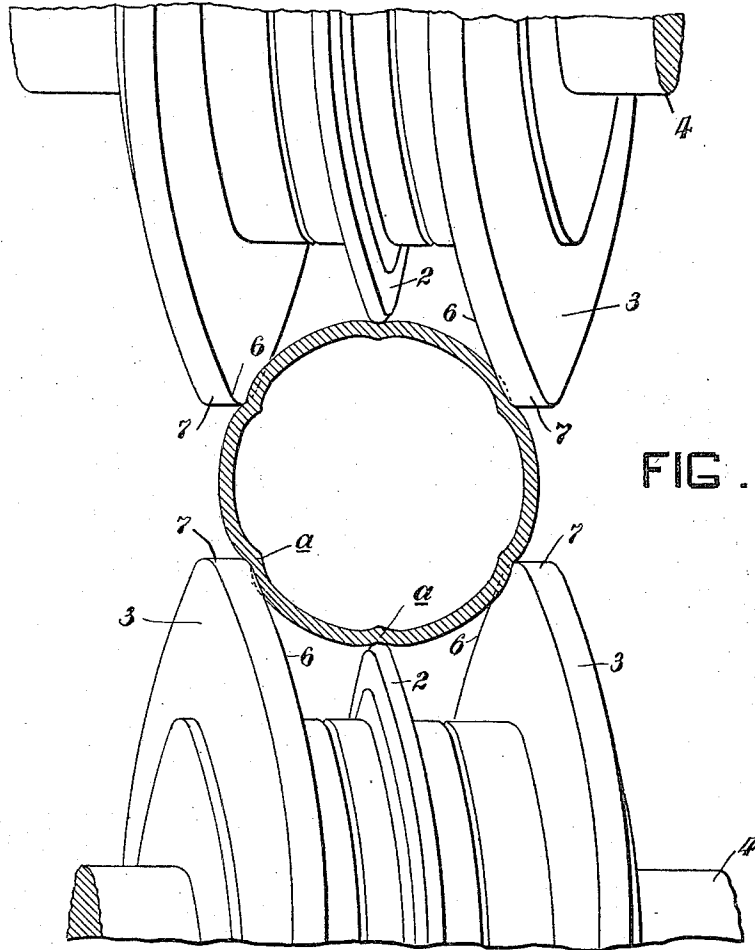
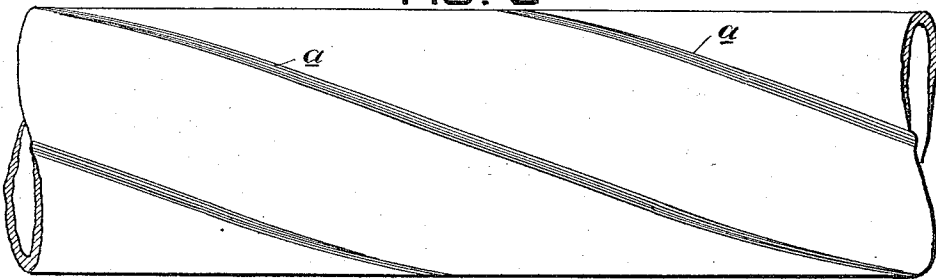


FIG. 4.

FIG. 5



WITNESSES

M. B. Smith
A. M. Goodwin

INVENTORS

Alanson Mark
William E. Sandford
by *Bakewell & Keller*
their attys.

UNITED STATES PATENT OFFICE.

ANSON MARK AND WILLIAM E. SANDFORD, OF ZANESVILLE, OHIO.

APPARATUS FOR CORRUGATING TUBES.

1,045,092.

Specification of Letters Patent.

Patented Nov. 19, 1912.

Application filed August 1, 1910, Serial No. 574,915. Renewed April 27, 1912. Serial No. 693,689.

To all whom it may concern:

Be it known that we, ANSON MARK and WILLIAM E. SANDFORD, of Zanesville, Muskingum county, State of Ohio, have invented certain new and useful Improvements in Apparatus for Corrugating Tubes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification.

The object of our invention is the provision of simple and efficient apparatus for indenting or corrugating pipe and the like; and it is particularly adapted for imparting spiral indentations or corrugations to such articles.

Our invention consists, generally stated, in providing a plurality of wheels or disks arranged in sets or series; the different sets or series being so disposed as to receive and impinge upon and indent or corrugate the wall of the pipe or tube, as will be hereinafter more fully described.

We will now describe our invention, referring to the accompanying drawings, so that others skilled in the art to which it appertains may understand and construct the same.

While in the accompanying drawings we have shown a particular form of framework or housing for operatively mounting the corrugating elements or disks, we do not desire to limit ourselves to any precise form or construction thereof, as this is a matter well understood by those skilled in the art and may be varied as desired without departing from our invention.

Figure 1 is a front elevation of an apparatus embodying our invention; Fig. 2 is a side elevation of the same; Fig. 3 is a top plan view, partly in section, showing the series of corrugating wheels or disks angularly disposed or skewed with reference to one another and to the line of feed of the pipe or tube; Fig. 4 is an enlarged fragmentary elevational view showing the wheels or disks in skewed relation and in operative engagement with a pipe or tube; the latter being shown in section; and Fig. 5 is a fragmentary elevation of a tube as spirally corrugated by our apparatus.

In describing our invention, the reference numerals 2 and 3 indicate the corrugating wheels or disks which are divided into two sets or series, the disks of each set being carried by a common shaft or spindle 4, which

are mounted, one above the other preferably in substantially parallel horizontal planes, in the suitable framework or housing 5.

The tube or pipe to be corrugated is fed longitudinally between the different sets of corrugating disks, the edge of each disk impinging upon and indenting or corrugating the wall of the tube or pipe, as indicated by the letter *a*, in such passage between the disks. If it is desired to impart straight or longitudinal corrugations to the tube, the tube is adapted to be fed to the disks on a line perpendicular to the axes of the shafts or spindles 4. And where it is desired to spirally corrugate or indent the tube, the shafts or spindles 4 are crossed or skewed with reference to one another and to the line A of feed of the tube, as shown in Fig. 3. Such angular disposition of the shafts 4 will cause the disks 2 and 3 to engage with the tube or pipe at an angle to the longitudinal axis thereof, setting up a spiral movement of the tube as it is caused to be fed between the disks, with consequent spiral corrugating of the tube, through such angular impingement of the corrugating disks thereupon. In both cases (straight and spiral corrugating) the disposition of the disks on their respective shafts or spindles is preferably such as to cause the central corrugating wheel or disks 2 to bear radially on the pipe or tube being corrugated, the outer disks 3, of each set or series, symmetrically disposed on each side of the central disk 2, engaging with the pipe at substantially a tangent, as shown in Figs. 1 and 4. In this tangential engagement of the disks 3 with the tube, only the inner side edge 6 of each of such disks is brought into operative engagement with the tube. To prevent this edge 6 from turning over under such tangential engagement with the curved wall of the tube or pipe, the disk is somewhat more thickly constructed than the disk 2, so as to provide a reinforcement at this point, as indicated by the numeral 7.

Disposed at each side of the apparatus, between the respective outer disks 3 of each series, are suitable guides 8 which are adjustably secured to the framework or housing 5. By means of these lateral guides the pipe or tube in its passage through the machine is held in a true central position or alinement with respect to the points of impingement of the corrugating disks, insuring thereby the placing of the indenta-

tions or corrugations in the tube in an even or uniform manner. In other words, the pipe or tube is prevented, by means of these guides, from shifting laterally in its passage between the disks, resulting in a uniform impingement of the several disks upon the curved wall of the tube.

Feeding of the pipe or tube between the sets of corrugating disks may be effected by any suitable means. The disks may be fixedly attached to the shafts or spindles 4 and such shafts positively driven by any suitable mechanism, the purchase of the revolving disks 2 and 3 on the pipe or tube propelling the latter along, or the disks may be loosely carried by the shafts or spindles 4, and the pipe fed thereto by suitable feeding mechanism, such as driven rolls, external to the corrugating elements or disks, as shown in Fig. 2. In this Fig. 2 such feed rolls are indicated by the numerals 10.

With respect to the angular or skewed relationship of the spindles 4, these shafts or spindles may be carried by a rigid or an adjustable framework or housing. To provide for such angular adjustment of the spindles 4, the framework or housing proper (indicated by the numeral 5) is preferably divided into two parts which are swiveled to each other at a point intermediate the two shafts 4, thus forming the upper and lower housings or portions 11 and 12, which carry the upper and lower shafts or spindles 4 respectively. These housings 11 and 12 are provided with the bolting plates 13 and 14 by means of which the housings may be rigidly locked to one another in their adjusted position; the numeral 15 indicating suitable screws coöperatively carried by the plates 13 and 14, for effecting minute adjustment of the housings.

The disks 2 and 3, when fixedly carried by the shafts or spindles 4 may be attached thereto in any desired manner. The preferable manner is to rigidly secure the central disk 2 to the spindle and bolt or otherwise fasten the outer disks 3 thereto. This arrangement will be found desirable by reason of the fact that disks 3 of varying diameters may be readily secured to and adjusted in coöperative association with the central rigid disk 2; the range of adjustment being completed by slidingly mounting the bearings 6' in which the shafts or spindles 4 are mounted, in the housing 5, so that shifting of the spindle 4 may be had for radial adjustment of the disk or disks 2. Such adjustments, of course, contemplate the accommodation of the apparatus to pipe or tubes of various diameters, and, in respect to the adjustment of the disks 3, radical changes in pitch of spiral corrugations. Material variations in the pitch of spiral corrugations may be made by

angular adjustment of the spindles 4, without necessarily substituting corrugating disks of different diameters, by reason of the fact that the points of operative contact of the disks with the tube or pipe will readjust themselves with a change in angular disposition of such shafts or spindles. The depth of the indentations or corrugations *a* is dependent upon the degree of association of the two sets of corrugating wheels or disks 2 and 3, and variations in which may be had through vertical adjustment of the upper shaft 4.

While we have shown a certain number of corrugating wheels or disks 2 and 3, we do not desire to limit ourselves thereto, as the number may be varied; being dependent on the number of indentations or corrugations it is desired to give the tube or pipe. And it will be apparent that many other changes may be made in the construction shown without departing from our invention, and we do not, therefore, desire to limit ourselves to the construction shown and described except as defined by the claims.

The advantages of our invention will be readily appreciated by those skilled in the art. The device is simple in construction and efficient in operation.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:—

1. In an apparatus for corrugating tubes, a series of individual corrugating disks having alining axes and skewed with relation to the line of feed of the tubes to be corrugated, the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact.

2. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes, the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact, and means for preventing lateral displacement of the tube.

3. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes, the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact, and the disks of one series being skewed with reference to those of the other series.

4. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes; the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact; the disks

of one series being skewed with reference to those of the other series, and means for preventing lateral displacement of the tube.

5 5. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes, and means for varying the shortest distance between the axes of the disks, the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact.

15 6. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes, the disks of one series being skewed with reference to those of the other series, and means for varying the shortest distance between the axes of the disks.

20 7. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes, the disks of one series being skewed with reference to those of the other series, means for varying the shortest distance between the axes of the disks, and means for varying their angular relationship, the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact.

30 8. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the disks of each series having alining axes and adapted to engage with the tube to be corrugated only at points of corrugating contact, and the series of disks being skewed with reference to one another.

40 9. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the disks of each series having alining axes and adapted to engage with the tube to be corrugated only at points of corrugating contact, the series of disks being skewed with reference to one another, and means for preventing lateral displacement of the tube.

50 10. In an apparatus for corrugating tubes, a plurality of corrugating disks arranged in a plurality of series, the disks of each series having alining axes, the series of disks being skewed with reference to one another, and means for varying the shortest distance between the axes of the disks.

11. In an apparatus for corrugating tubes, a plurality of corrugating disks arranged in a plurality of series, the disks of each series having alining axes, the series being skewed with reference to one another, means for varying the shortest distance between the axes of the disks, and means for varying their angular relationship, the disks being adapted to engage with the tube to be corrugated only at points of corrugating contact.

12. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the disks being disposed in substantially parallel planes, the disks of one series being skewed with reference to those of the other series and being adapted to engage with the tube to be corrugated only at points of corrugating contact, and means for mounting the disks, comprising a swiveled housing.

13. In an apparatus for corrugating tubes, a plurality of rotatory corrugating disks arranged in a plurality of series, the axes of the series being disposed in substantially parallel planes, the disks of one series being skewed with reference to those of the other series, and means for mounting the disks, comprising a housing swiveled intermediate the different series of disks.

14. In an apparatus of the character described, a plurality of corrugating disks arranged in a plurality of series, the disks of each series being concentrically mounted and being adapted to engage with the tube to be corrugated only at points of corrugating contact; the series being skewed with reference to one another, and means for mounting the disks, comprising a swiveled housing.

15. In an apparatus of the character described, a plurality of corrugating disks arranged in a plurality of series, the disks of each series being concentrically mounted; the series being skewed with reference to one another, and means for mounting the disks, comprising a housing, swiveled at a point intermediate the series of disks.

In testimony whereof, we have hereunto set our hands.

ANSON MARK.
WILLIAM E. SANDFORD.

Witnesses:

EDWD. R. MEYER,
L. G. MEREDITH.