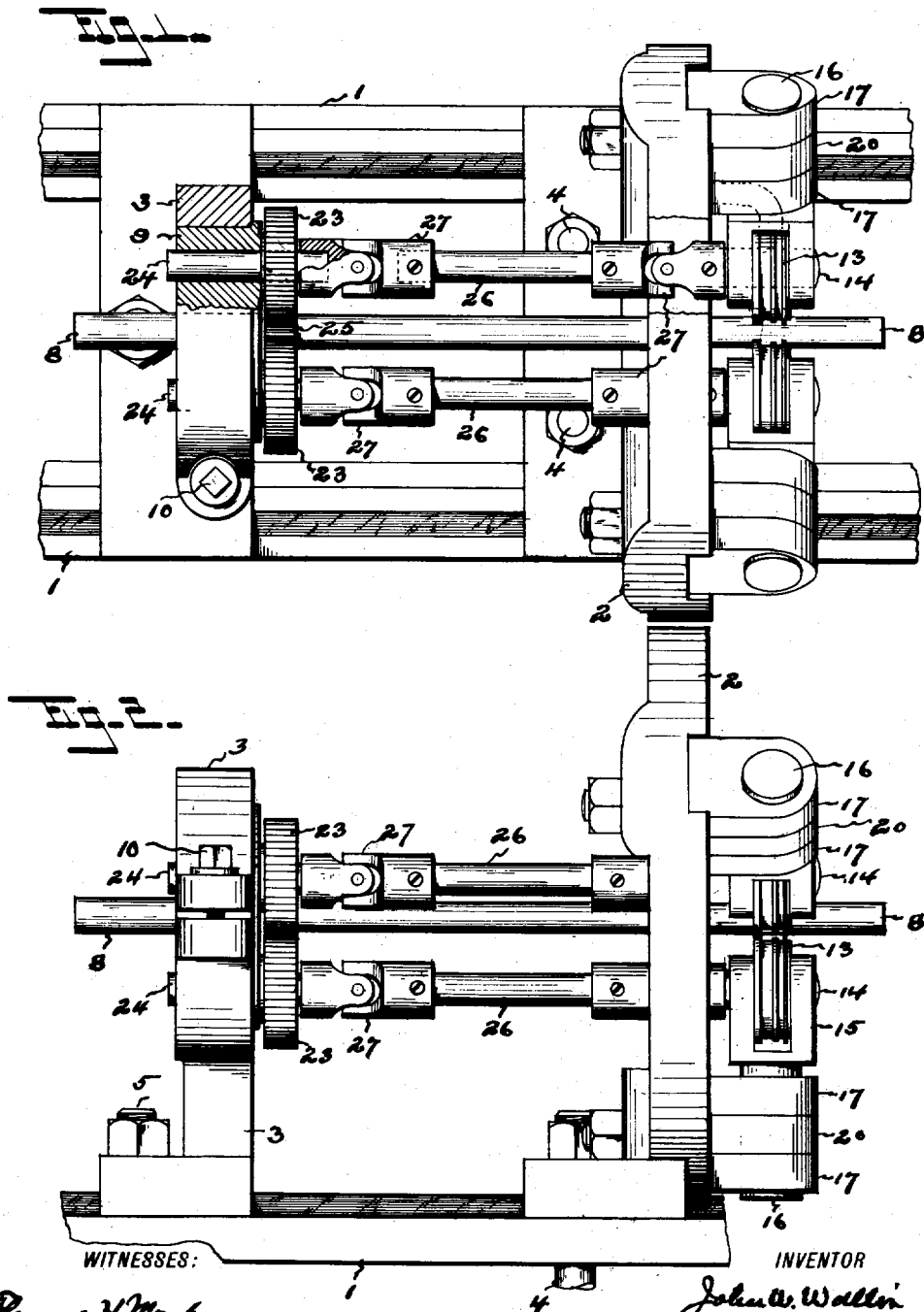


J. W. WALLIS.
SPIRAL TUBE MAKING MACHINE.
APPLICATION FILED JULY 25, 1910.

998,214.

Patented July 18, 1911.

3 SHEETS—SHEET 1.



WITNESSES:
Ramon H. Mark
Samuel A. Gardner

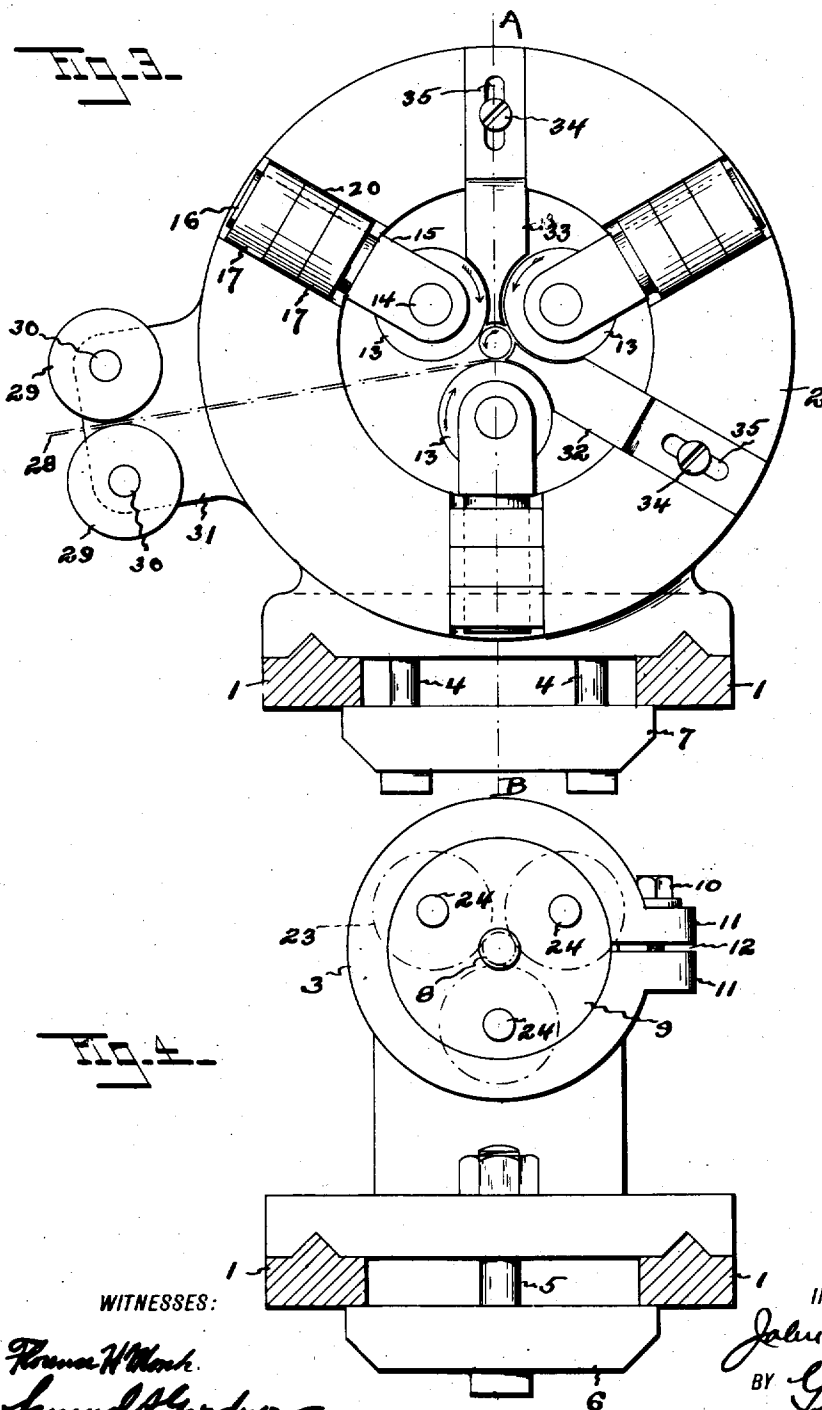
INVENTOR
John W. Wallis
BY George H. Wallis
ATTORNEY

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3 SHEETS-SHEET 3.

Fig. 5-

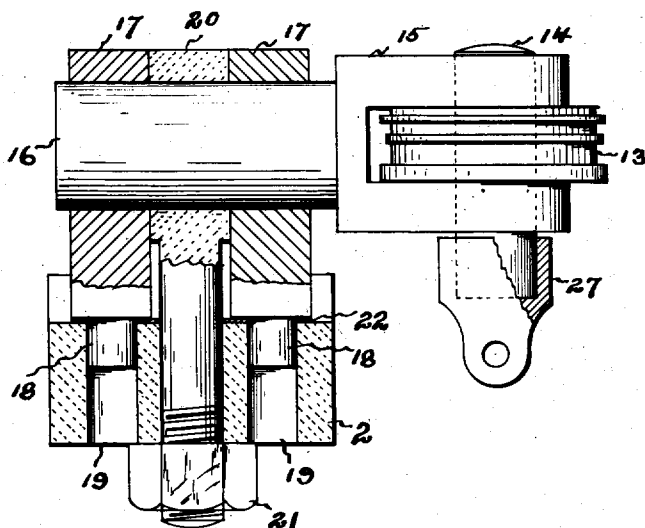
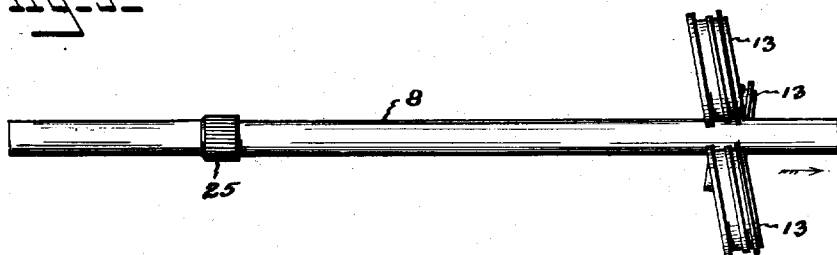


Fig. 6-

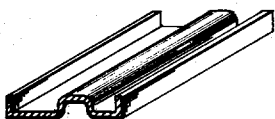


Fig. 7-

Fig. 8-

WITNESSES:

Frances H. Mark.
Samuel S. Gardner

INVENTOR

Julius W. Wallis
 BY *George E. Hays*
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UNITED STATES PATENT OFFICE.

JOHN W. WALLIS, OF WATERBURY, CONNECTICUT.

SPIRAL-TUBE-MAKING MACHINE.

998,214.

Specification of Letters Patent. Patented July 18, 1911.

Application filed July 25, 1910. Serial No. 573,592.

To all whom it may concern:

Be it known that I, JOHN W. WALLIS, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Spiral-Tube-Making Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to new and useful improvements in a spiral tube making machine, referring more particularly to that type of machine wherein a flexible metal hose is formed from a strip of sheet metal. It is the object of my invention, among other things, to provide a machine of this character that will fold the flat metal strip so as to produce the desired construction and coil the same into a flexible hose wherein the winding operation will be continuous and not intermittent, as in some machines; to provide means for positively driving the forming rolls; and in other ways to construct a hose winding machine that will be effective and economical in its operation, and composed of the fewest possible parts, so designed that they may be manufactured at the minimum cost and readily assembled.

To these, and other ends, my invention consists in the spiral tube making machine, having certain details of construction and combinations of parts, as will be hereinafter described and more particularly pointed out in the claims.

Referring to the drawings, in which like numerals of reference designate like parts in the several figures; Figure 1 is a plan view of my improved device partly in section; Fig. 2 is a front elevation thereof; Fig. 3 is an elevation of the forming head; Fig. 4 is an elevation of the gear head; Fig. 5 is a plan view of the winding arbor and forming rolls; Fig. 6 is an enlarged sectional view, upon line A—B of Fig. 3, of the forming head and the mechanism for holding the roll stud; Fig. 7 is a side elevation of a hose wound in my improved machine; and Fig. 8 is an enlarged perspective view of a section of the metal strip before the winding operation.

It has heretofore been the practice in some instances to bend the strip on one machine and then wind it upon another, and in winding, the strip is coiled about the arbor by rolls that rotate entirely by fric-

tion and move parallel with the axis of the arbor until the end of the arbor is reached, when the rolls are returned for another winding operation. By this method two machines are required and it is only possible to wind a length of hose equal to that of the arbor without readjustment of the parts, after each winding operation and the successive winding of arbor lengths.

In my improved machine the rolls do not travel parallel to the arbor, but are driven positively, thereby making an easier operating machine and one that is more effective, in that the rolls do not slip but exert a constant and uniform pressure upon the strip at all times. These rolls are also so arranged in relation to the arbor that any length of hose may be wound without readjustment of any of the parts.

My device is usually attached to the bed of a lathe of any well known type, it being immaterial as to the details of such construction, and therefore in the drawings I have only shown the lathe bed, which is designated by the numeral 1, upon which the forming head 2 and gear head 3 are slidably secured through the bolts 4 and 5 and plates 6 and 7.

Separably secured to the head of the lathe, either by means of a chuck or other well known device, is the winding arbor 8, which is rotatable within the journal block 9, that is frictionally held within the gear head 3 by means of the bolt 10 connected with the ears 11 that are separated by the slot 12. Each of the forming rolls 13 is fixed upon a shaft 14 journaled in the head 15 of the roll stud 16, which is supported in the standards 17, having the tips 18 thereon that project into openings 19 in the said forming head, and between which is the lock bolt 20, the shank of which also passes through the said forming head, and having a nut 21 threaded thereon.

It is apparent that as the standards 17 are stationary manipulation of the nut 21 will cause the lock bolt 20 to either exert a pressure or relieve one upon the shank of the roll stud 16, and thus provide a holding means for it against rotation or releasing it for movement. This method of securing the roll stud permits of the rotation thereof about its axis, so that it may occupy any desired relative position in relation to the axis of the winding arbor, and also permits of the adjustment of the rolls toward and away

from said winding arbor, as may be desired. The relative position of the forming rolls, in relation to the face of the forming head 2, may be varied indefinitely by insertion of filling washers 22 of varying thicknesses under the standards 17.

Rotatable within the journal block 9 are the shafts 24 corresponding in number with the number of forming rolls 13, and having gears 23 thereon which are driven from a pinion 25 upon the arbor 8, the teeth of which mesh into the teeth of all of said gears. Fixed to the inner ends of said shafts 14 and 24 are the universal couplings 27 of any well known type, which are connected by the shafts 26, and through which motion is transmitted to the forming rolls 13 from the arbor 8.

In Figs. 1, 2 and 3 the forming rolls are shown with their axis substantially parallel with the axis of the winding arbor, but in operation they are usually mounted so as to be at an angle thereto, as is illustrated in Fig. 5, the angle being determined largely by the shape of the metal strip and the diameter of the finished hose, the universal coupling 27 providing for the positive rotation of said rolls in any of their positions. To always maintain the axes of the shafts 26 nearly parallel with that of the arbor 8, and thereby minimize the friction, the journal block 9 is rotatably adjustable within the gear head 3, being secured in its adjusted position through the bolt 10, as above described. As all of the shafts 24 are mounted in the block 9, the rotary movement of said block in the head 3 shifts the rotary position of all of the gears 23 and shafts 26 as a unit, all keeping, however, the same relative position in relation to each other. The bending device consists of the companion rolls 29 rotatably mounted upon the shafts 30 connected with the lug 31, and positively driven by mechanism not shown.

In operation the flat metal strip is fed between the rolls 29 and bent into the desired shape in cross section, after which it passes between the arbor and the forming rolls, as shown in Fig. 3, wherein the numeral 28 designates the strip, until it contacts with the adjustable finger 32 and the end turned inwardly into the path of the next roll, after which it contacts with the finger 33 and is again turned inwardly into the path of the next roll, and as it passes around the arbor the forming rolls link the edges of the strip together in the usual manner and form the hose, which moves off the arbor in the direction of the arrow in Fig. 8. The wound hose is only supported by the arbor between the point where it is formed thereon and the end, a comparatively short distance, which permits of the winding of a hose of any desired length without shifting any of the operative parts. Radial adjustment of

the fingers 32 and 33 is provided by means of the screws 34 that pass through the slots 35 and are threaded in the head.

In the drawings I have illustrated, in Fig. 8, a section of one of the many forms of metal strip that are used for forming flexible metal hose, and the rolls shown are shaped for this particular form of strip, but it is obvious that the shape of the face of the roll varies with each form of strip, and hence I do not limit myself to this particular form of metal strip or forming rolls.

There are minor changes and alterations that can be made within the scope of my invention, aside from those herein suggested, and I would therefore have it understood that I do not limit myself to the exact construction herein shown and described, but claim all that falls fairly within the spirit and scope of my invention.

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

1. In a spiral tube making machine, the combination with a forming head; of a plurality of standards connected with said head; a plurality of locking bolts separately secured to said head; a plurality of roll studs mounted in said standards and locking bolts, with their axes substantially parallel with the face of said forming head; a forming roll rotatably mounted in each of said roll studs; and positive means for driving each of said rolls.

2. In a spiral tube making machine, the combination with a forming head; of a plurality of standards connected with said head; a plurality of locking bolts separately secured to said head; a plurality of roll studs mounted in said standards and locking bolts, with their axes substantially parallel with the face of said forming head; a forming roll rotatably mounted in each of said roll studs, with its axis at substantially a right angle to the axis of the roll stud; and positive means for driving each of said rolls.

3. In a spiral tube making machine, the combination with a forming head; of a plurality of standards connected with said head; a plurality of locking bolts separately secured to said head between two of said standards; a plurality of roll studs mounted in said standards and locking bolts, with their axes substantially parallel with the face of said forming head; and a forming roll rotatably mounted in each of said roll studs.

4. In a spiral tube making machine, the combination with a forming head; of a plurality of standards connected with said head and arranged in groups of two; a plurality of locking bolts, separately secured to said forming head, and arranged so that a locking bolt is between each two standards; a roll stud mounted in each group of stand-

ards and the locking bolt therebetween; and a forming roll rotatably mounted in each of said roll studs.

5 In a spiral tube making machine, the combination with the forming head; of forming rolls; means for connecting the same with said forming head so that they may be moved toward and away from each other and rotatable about an axis at substantially a right angle to the axis of the rolls; a gear head; a journal block rotatably mounted therein; friction means for locking said journal block against rotation; a winding arbor journaled in said journal block; 10 a pinion upon said arbor; a plurality of shafts rotatably mounted in said journal block with their axes substantially parallel with the axis of said winding arbor; a gear upon each of said shafts, the teeth of which mesh into the teeth of said pinion; and a shaft and universal joint connection between each of said forming rolls and shafts. 15 20

6. In a spiral tube making machine, the combination with a gear head; of a journal

block rotarily mounted therein; means for locking said journal block against rotation; 25 a winding arbor journaled in said journal block; a forming head having an opening therethrough parallel with the axis of said arbor and of much greater area than a cross section thereof; forming rolls; means for connecting said rolls with said forming head so that each may be adjusted and secured in any desired position toward and away from said winding arbor and rotatable about an axis at substantially a right angle to the axis of said winding-arbor; a pinion on said winding-arbor; a plurality of shafts in said journal block; and a shaft and universal joint connection between each of said shafts and forming rolls, extending through the opening in said forming head. 30 35 40

In testimony whereof I affix my signature in presence of two witnesses.

JOHN W. WALLIS.

Witnesses:

GEORGE E. HAY,

SAMUEL J. NATHANSON.

Correction in Letters Patent No. 998,214.

It is hereby certified that in Letters Patent No. 998,214, granted July 18, 1911, upon the application of John W. Wallis, of Waterbury, Connecticut, for an improvement in "Spiral-Tube-Making Machines," the name of the first-mentioned witness to the signature of the patentee at the end of the specification should read *George E. Hall* instead of "George E. Hay;" and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of August, A. D., 1911.

[SEAL.]

E. B. MOORE,

Commissioner of Patents.

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