No. 803,232. PATENTED OCT. 31, 1905.

J. D. ISAACS & J. B. SPEED.

MACHINE FOR HELICALLY CORRUGATING PIPE.

APPLICATION FILED JUNE 23, 1905.

2 SHEETS—SHEET 1.

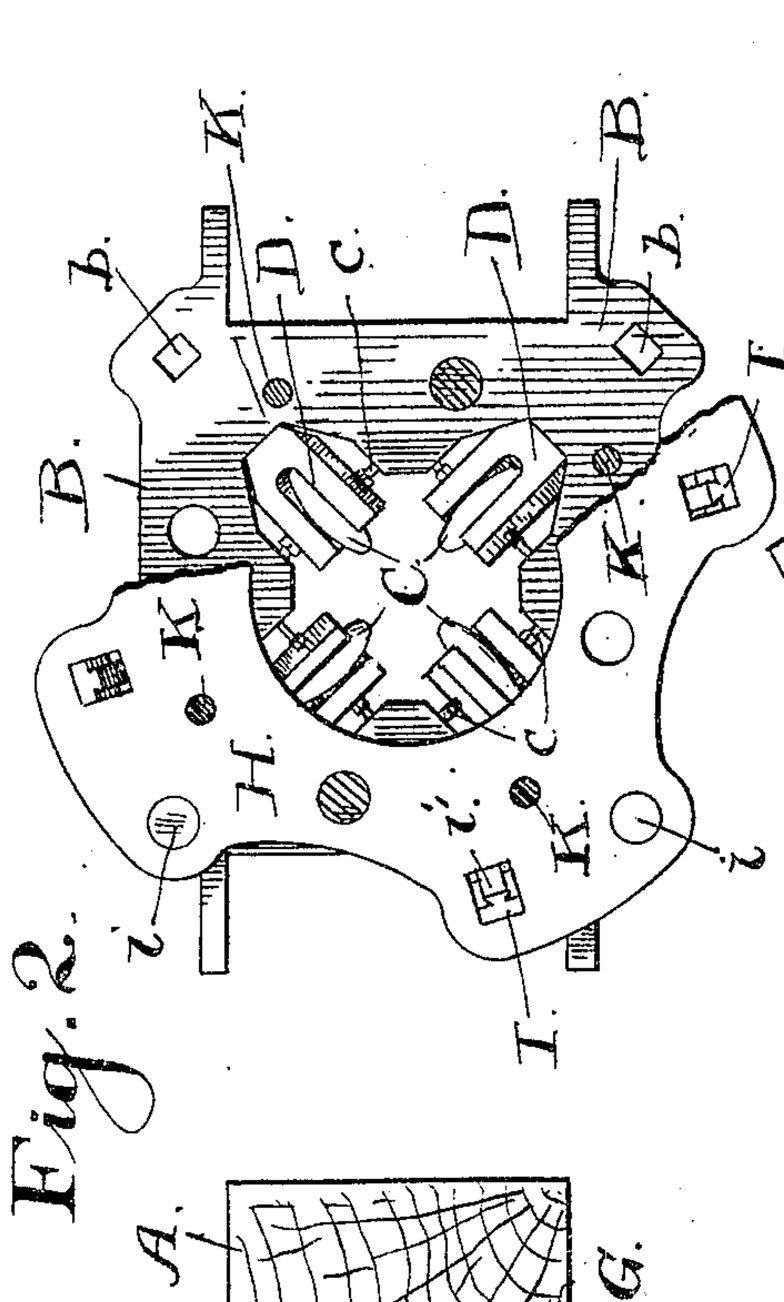

Fig. 2.

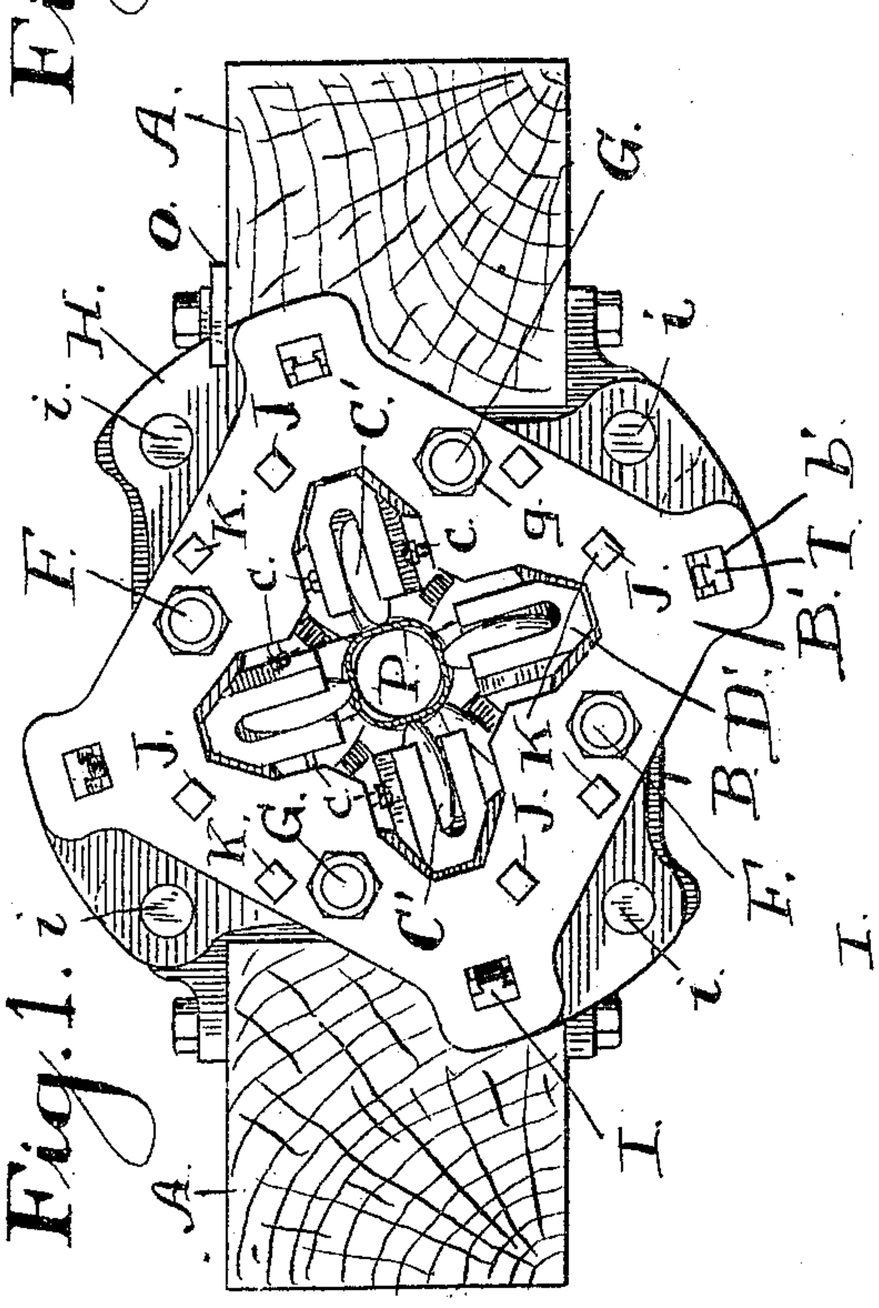

Fig. 1.

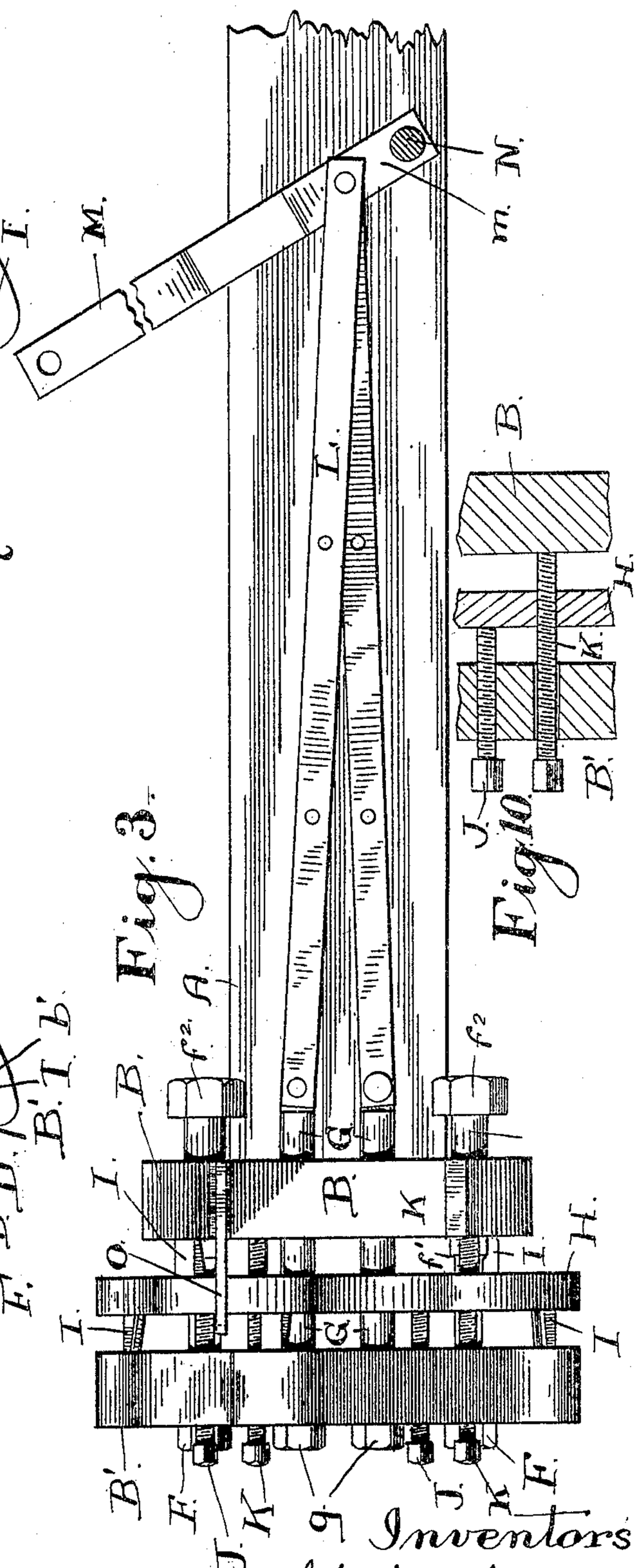

Fig. 3.

Fig. 10.

Witnesses:
Arthur L. Lee.
J. Compton.

Inventors
John Dove Isaacs
James Buckner Speed
by Wm F. Booth
their Attorney.

No. 803,232. PATENTED OCT. 31, 1905.

J. D. ISAACS & J. B. SPEED.

MACHINE FOR HELICALLY CORRUGATING PIPE.

APPLICATION FILED JUNE 23, 1905.

2 SHEETS—SHEET 2.

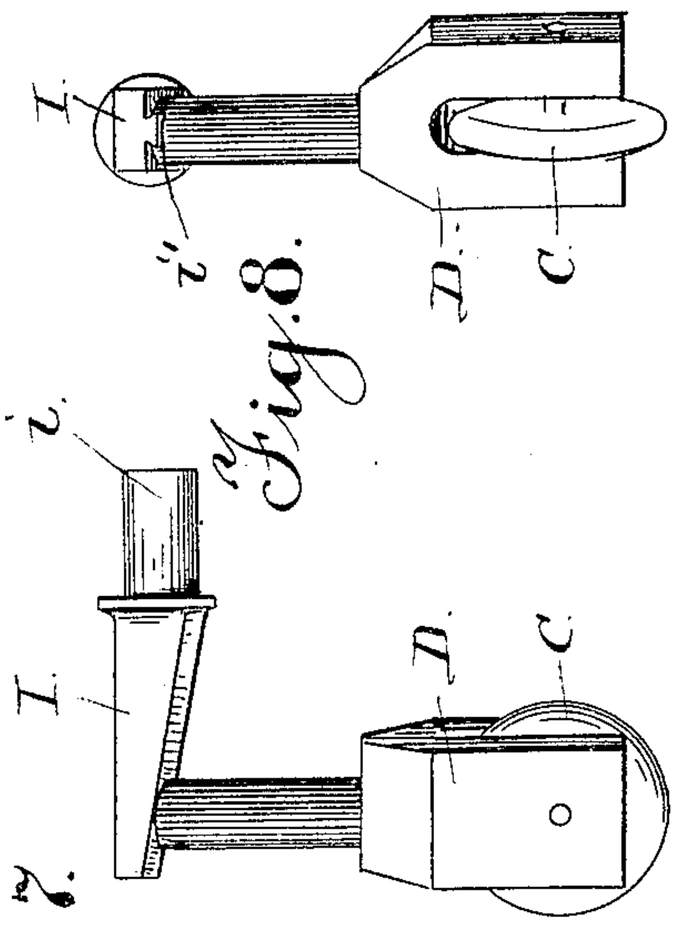

Fig. 8.

Fig. 7.

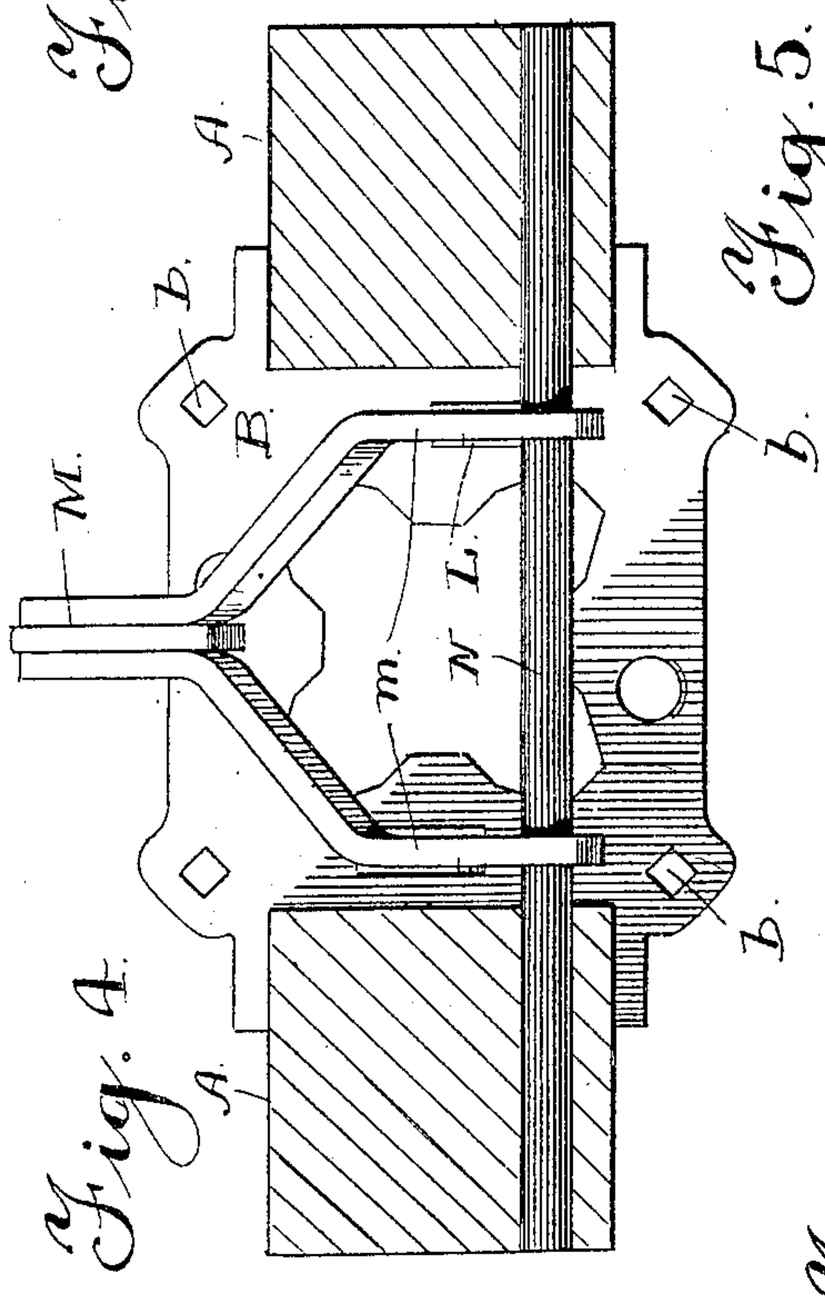

Fig. 4.

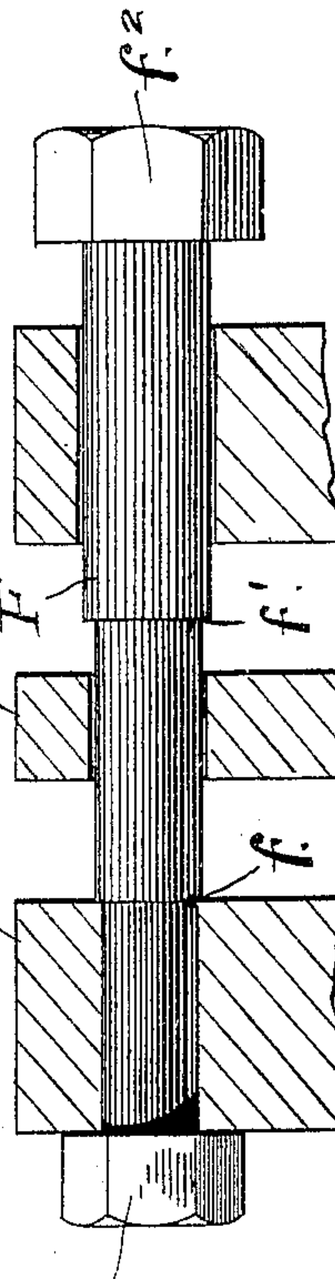

Fig. 5.

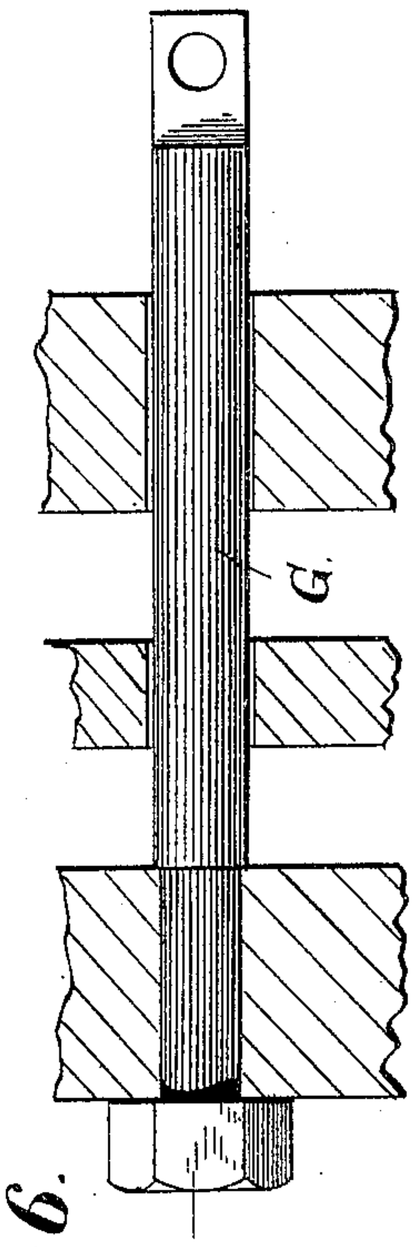

Fig. 6.

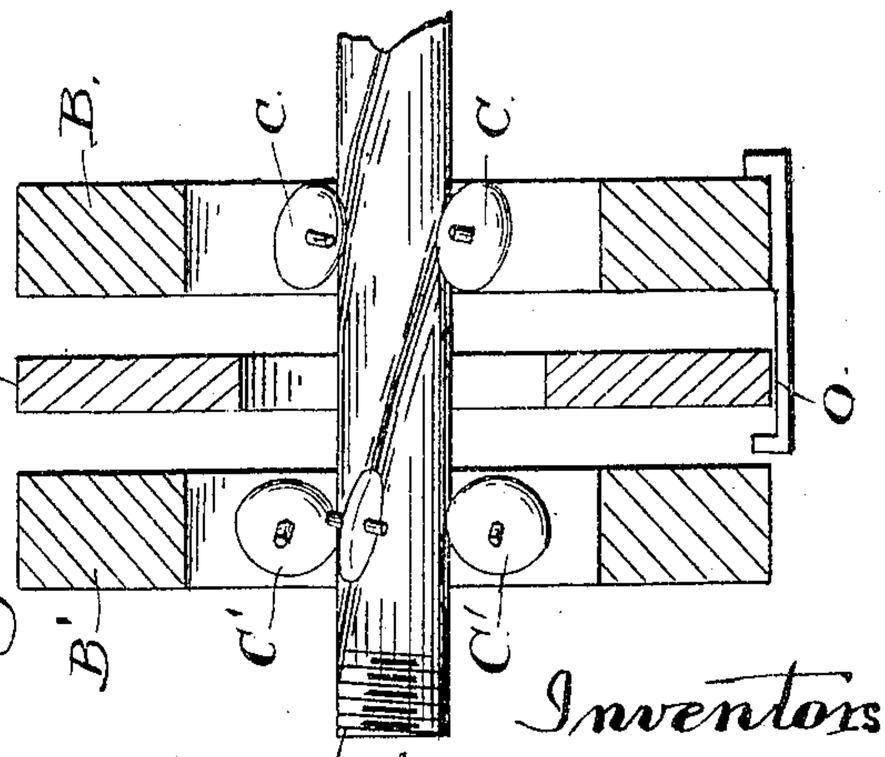

Fig. 9.

Witnesses
Arthur L. Lee
L. Compton.

Inventors
John Dove Isaacs
James Buckner Speed
by Wm. F. Booth
their Attorney.

UNITED STATES PATENT OFFICE.

JOHN DOVE ISAACS, OF OAKLAND, AND JAMES BUCKNER SPEED, OF BERKELEY, CALIFORNIA, ASSIGNORS TO RIFLED PIPE COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

MACHINE FOR HELICALLY CORRUGATING PIPE.

No. 803,232. Specification of Letters Patent. Patented Oct. 31, 1905.

Application filed June 23, 1905. Serial No. 266,577.

To all whom it may concern:

Be it known that we, JOHN DOVE ISAACS, residing at Oakland, and JAMES BUCKNER SPEED, residing at Berkeley, Alameda county, State of California, citizens of the United States, have invented certain new and useful Improvements in Machines for Helically Corrugating Pipe; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to apparatus to be used in connection with that art or method of piping fluid which consists in advancing the fluid, together with a second fluid of greater specific gravity, through a pipe having a helically-directed internal obstruction whereby a helical motion is given to the fluid content about its axis which is sufficient to envelop the lighter fluid with the heavier fluid, and thereby reduce friction against the pipe-walls. This method is fully disclosed in Letters Patent of the United States No. 759,374, granted to us May 10, 1904, and to which reference is hereby made. A form of helically-corrugated pipe which we deem best adapted for use in carrying out this method we disclose in a contemporaneous application, and our present invention relates to a machine for making said pipe.

Our invention consists in the novel machine and in the construction, arrangement, and combinations of its parts, which we shall hereinafter fully describe by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of our machine, showing the pipe P in place to be corrugated. Fig. 2 is an elevation with the outer chuck removed and the wedge-carrier broken. Fig. 3 is a side elevation of the machine, one of the frame-timbers A being removed. Fig. 4 is a rear elevation showing the power-lever M mounted on the frame-timbers. Fig. 5 is a sectional view of the two chucks and intervening wedge-carrier to show the fitting thereto of one of the separation-limiting shafts F. Fig. 6 is a similar view showing the fitting of one of the chuck-operating shafts G. Fig. 7 is a detail side view of the pressure-roller and wedge engagement. Fig. 8 is an end view of the same. Fig. 9 is a diagrammatic sectional view to show the relative arrangement of the pressure-rollers of the two chucks with respect to the pipe P, which they helically corrugate. Fig. 10 is a sectional detail to show the approach-limiting stops J and K as fitted to their respective parts.

A represents two heavy timbers between which at one end is securely bolted the inner chuck B. In this chuck, as shown in Fig. 2, are mounted the corrugating-rollers C, said rollers being borne in the forked shanks D, which are slidably mounted radially in the chuck, their outer ends extending to wedgeways *b*, made through the chuck. There are four of these rollers, though their number is not essential, as there may be a greater or less number, according to the number of corrugations which it may be desired the pipe shall have. Each roller is set at an angle to the axis of the chuck and is consequently at an angle to the axis of the pipe P to be corrugated and which is passed through the chuck, so that the result of the pressure of the roller upon the pipe will be to make a helical indentation on the outside of the pipe, with a corresponding elevation on the inside. (See Figs. 1 and 9.) To adjust the rollers to the proper angle, they are governed by the set-screws *c*, tapped into the chuck.

B′ is the outer chuck. In it are mounted four rollers C′, as shown in Fig. 1, said rollers being mounted in the forked shanks D′, which are slidably mounted radially in the chuck and extend to wedgeways *b*′ made in said chuck, all similar to the construction of the rollers of the inner chuck. These rollers of the outer chuck are also similarly adjustably set at an angle to the axis of the chuck and line of travel of the pipe; but their position relatively to the position of the rollers of the forward chuck is alternating or staggering, whereby the rollers of the outer chuck lie in the helical lines of the rollers of the inner chuck, as seen in Fig. 9.

The outer chuck is carried upon four shafts, which extend between it and the inner chuck. Two of these shafts (represented by F) are the separation-limiting shafts, and two (represented by G) are the operating-shafts, as will be presently described. Between the two chucks is the wedge-carrier H. This carrier is mounted freely upon the four shafts F and G, so that it can slide upon them, as indicated in Figs. 5 and 6, and said shafts can slide in it.

I represents wedges mounted in the wedge-carrier and projecting from each side thereof,

Fig. 3, there being eight in all, four on each side, said wedges being connected with the carrier by means of their shanks *i*, fixed therein by suitable means. These wedges are adapted to operate in the wedgeways *b* and *b'* of the two chucks, and they act against the outer ends of the forked shanks D and D', which carry the pressure-rollers C and C'. The connection between the wedges and the outer ends of the forked shanks is a positive one, as is indicated by the dovetail at *i'* in Figs. 7 and 8, so that as the wedges withdraw they positively withdraw the pressure-rollers.

It will now be seen that if the wedge-carrier be forced toward the inner chuck and at the same time the outer chuck be forced toward the wedge-carrier the wedges of the latter will cause the pressure-rollers of both chucks to be forced in upon the pipe. The means for effecting this operation are as follows: J represents stops in the form of screws which are tapped in the outer chuck and have their inner ends adapted to bear against the wedge-carrier. (See Figs. 3 and 10.) K represents stops in the form of screws which pass freely through the outer chuck and are tapped in the wedge-carrier and have their inner ends adapted to bear againt the inner chuck, as seen in Fig. 10. When, therefore, the outer chuck is drawn toward the inner chuck, the stops J coming in contact with the wedge-carrier will force the latter to move with it toward the inner chuck until the stops K bear against said inner chuck, whereupon the wedge-carrier will be arrested and all its wedges will act to force the pressure-rollers of both chucks upon the pipe. These stops J and K also define the approach of the several parts. To accomplish this approach of parts of the machine, the two operating-shafts G are connected at their outer ends rigidly with the outer chuck D' by means of the nuts *g*. The said shafts pass freely through the wedge-carrier and through the inner chuck, as seen in Fig. 6, and are connected at their inner ends by means of links L, Fig. 3, with the forked end *m* of the lever M, mounted on a shaft N at rear ends of the frame-timbers A, Fig. 4. In order to properly separate the parts of the machine again and overcome the tendency of the wedges to stick, the guide-shafts F are shouldered at *f* and headed tightly in the outer chuck and are shouldered at *f'* to bear against the inner surface of the wedge-carrier, as seen in Fig. 5, and said shafts pass slidably through the carrier and the inner chuck and receive nuts f^2. When the parts are being separated by a pushing force on the shafts G, the outer chuck by being firmly connected to the shafts F will carry said shafts outwardly, which will in due time pick up and move outwardly the wedge-carrier H by their shoulders *f'*. In order to define the separation of the wedge-carrier from the inner chuck, a suitably-headed link O is caused to engage the two, as seen in Figs. 3 and 9.

The operation of the machine is as follows: When the two chucks and the intervening wedge-carrier are separated to their greatest extent, the pipe P is passed through the machine from the outer chuck inwardly. By means of the lever M the parts of the machine are brought together sufficiently to cause the rollers to bear upon the pipe in proper position. A hauling-line being secured to the inner end of the pipe and the lever M being moved to force the chucks together to cause the wedges to force the rollers upon the pipe with sufficient pressure to make the necessary corrugations, the pipe is drawn forcibly through the chucks, and in its passage it turns on its axis by reason of the angling pressure of the rollers, so that the helical corrugation is made in the pipe. To relieve the pipe, the operating-lever is moved, thereby forcing the chucks apart and causing each part of the machine to separate its proper distance and causing the wedges to withdraw the rollers.

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

1. In a machine for helically corrugating pipe, the combination of a chuck, a radially-movable roller carried by the chuck and set at an oblique angle to the axis of the chuck, a wedge-carrier opposite to and parallel with the face of the chuck, a wedge mounted on said carrier and projecting toward the chuck, said wedge being adapted to force the roller on the pipe, and means for effecting the approach of the chuck and carrier to cause the wedge to actuate the roller.

2. In a machine for helically corrugating pipe, the combination of a chuck having a wedgeway, a roller carried by the chuck and set at an oblique angle to the axis of the chuck, a shank carrying the roller and slidably mounted in the chuck with its outer end extending to the wedgeway, a wedge-carrier, a wedge mounted on said carrier and adapted to bear upon the shank of the roller within the wedgeway and means for effecting the approach of the chuck and carrier.

3. In a machine for helically corrugating pipe, the combination of a chuck having a wedgeway, a roller carried by the chuck and set at an angle to the axis of the chuck, a shank carrying the roller and slidably mounted in the chuck, with its outer end extending to the wedgeway, a wedge-carrier, a wedge mounted on said carrier and slidably connected with the shank of the roller within the wedgeway, to project and withdraw said roller and means for effecting the approach and the separation of the chuck and carrier.

4. In a machine for helically corrugating pipe, the combination of a fixed chuck, a movable chuck, a movable pressure-roller in each

chuck set at an angle to the axis of the chuck and positioned with relation to each other in the same helical line, a wedge-carrier between the two chucks, wedges mounted on the carrier and adapted to operate from each side thereof to move the pressure-rollers of the two chucks, and means for causing the approach and separation of the two chucks and intervening wedge-carrier, to operate the wedges and rollers.

5. In a machine for helically corrugating pipe, the combination of a fixed chuck, a movable chuck, a movable pressure-roller in each chuck set at an angle to the axis of the chuck and positioned with relation to each other in the same helical line, a wedge-carrier between the two chucks, wedges mounted on the carrier and adapted to operate from each side thereof to move the pressure-rollers of the two chucks, means for causing the approach and separation of the two chucks and intervening wedge-carrier, to operate the wedges and rollers, and suitable stops to define the limits of said approach and separation.

6. In a machine for helically corrugating pipe, the combination of a fixed chuck, a movable chuck, a movable pressure-roller in each chuck set at an angle to the axis of the chuck and positioned with relation to each other in the same helical line, a wedge-carrier between the two chucks, wedges mounted on the carrier and adapted to operate from each side thereof to move the pressure-rollers of the two chucks, shafts secured to the outer chuck and passing freely through the wedge-carrier and inner chuck, a lever and connections with said shafts to operate them to effect the approach and separation of the outer chuck, stops in the outer chuck bearing against the wedge-carrier, and stops in the wedge-carrier bearing against the inner chuck, to effect the approach of the wedge-carrier and to define the approach of the three parts, shafts mounted slidably in the inner chuck, fast in the outer chuck and shouldered against the inner surface of said carrier to effect the separation of the parts, and define the separation of the outer chuck, and a stop to limit the separation of the wedge-carrier from the inner chuck.

In witness whereof we have hereunto set our hands.

JOHN DOVE ISAACS.
JAMES BUCKNER SPEED.

Witnesses:
J. COMPTON,
D. B. RICHARDS.