(No Model.) 4 Sheets—Sheet 1.

B. HALL.

MACHINE FOR CORRUGATING TUBES.

No. 541,535. Patented June 25, 1895.

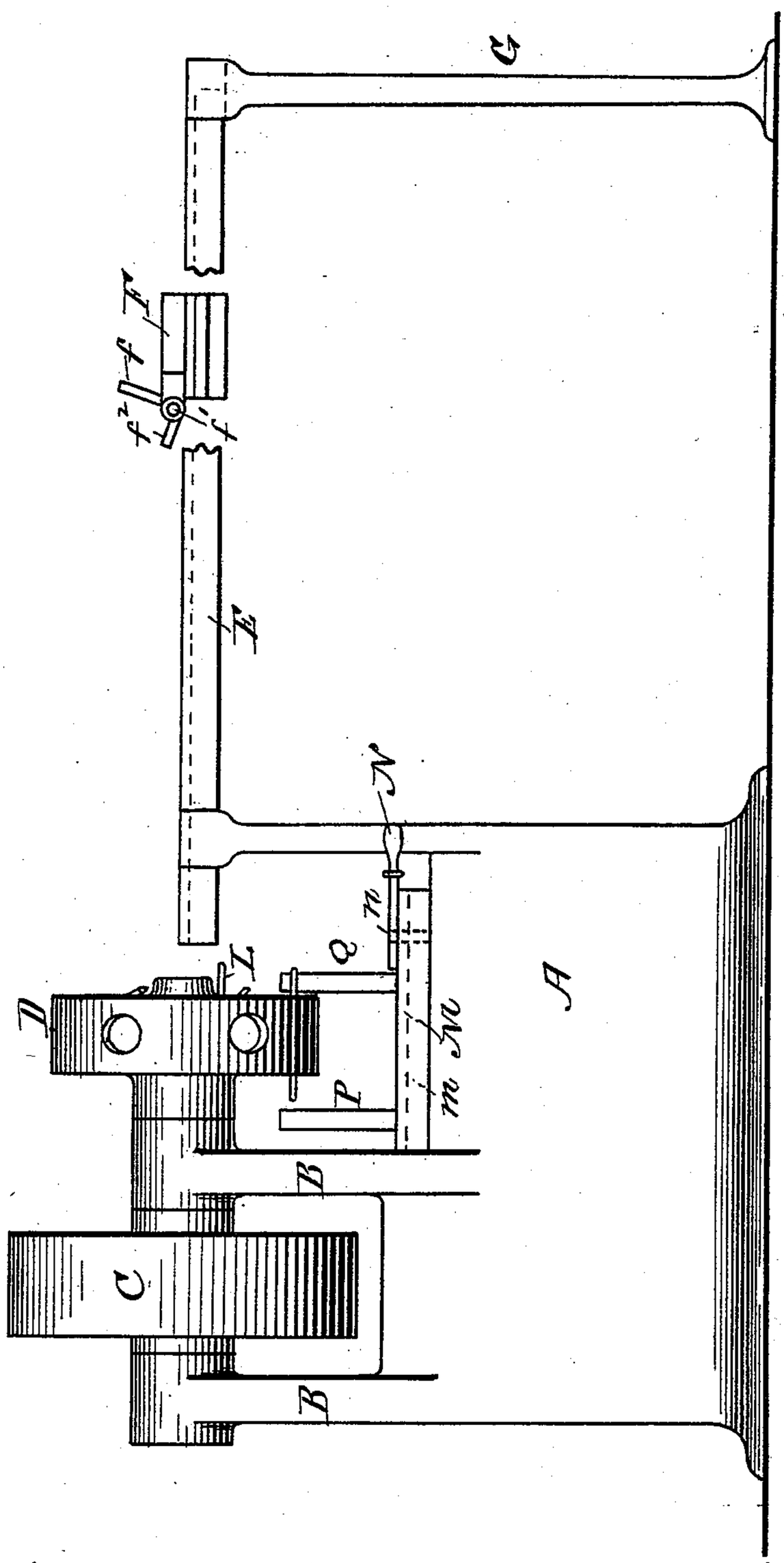

FIG. 1.

WITNESSES

Chas. A. Brady

Eva A. Guild

INVENTOR

Richard Hall

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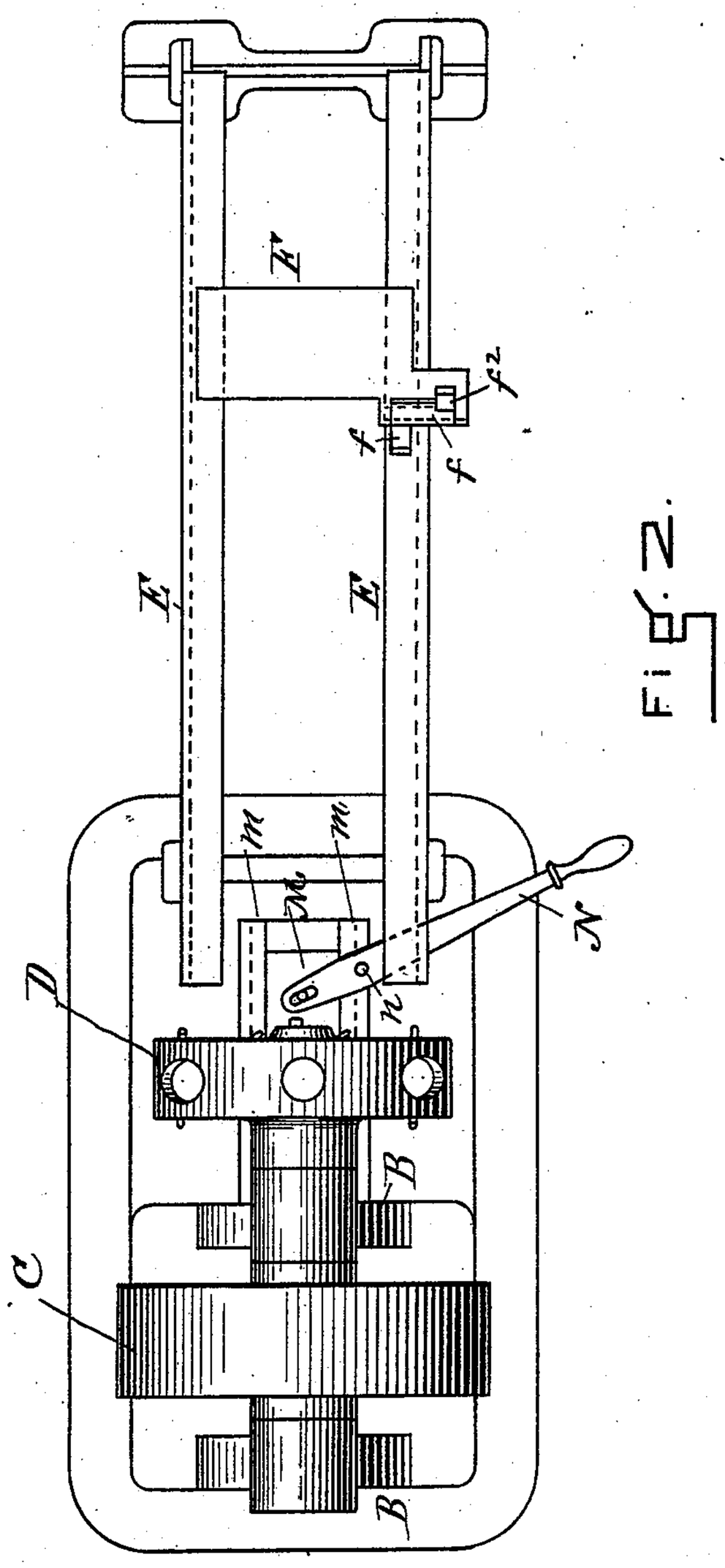

Fig. 2.

WITNESSES

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(No Model.) 4 Sheets—Sheet 3.

B. HALL.

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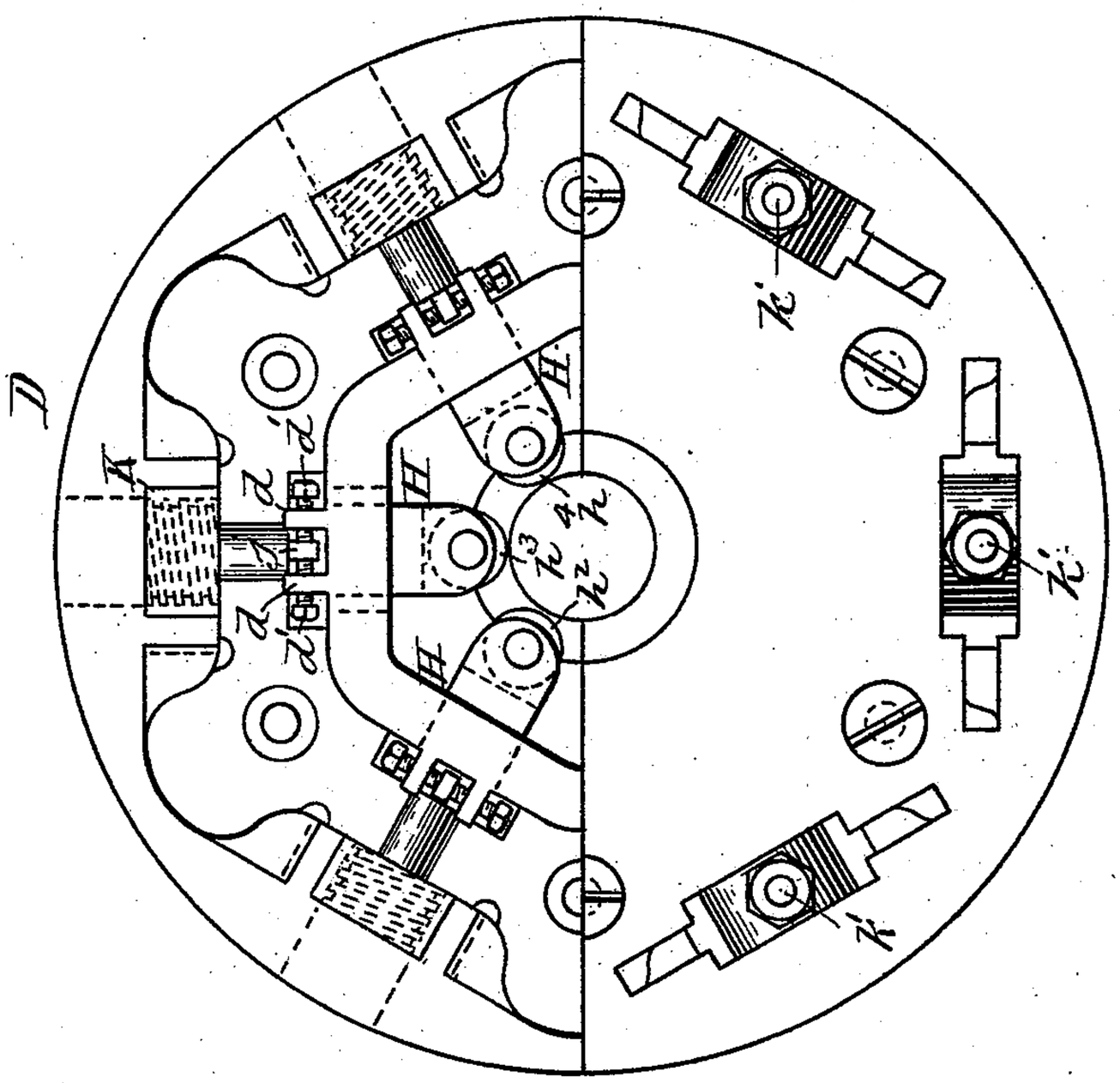

Fig. 3.

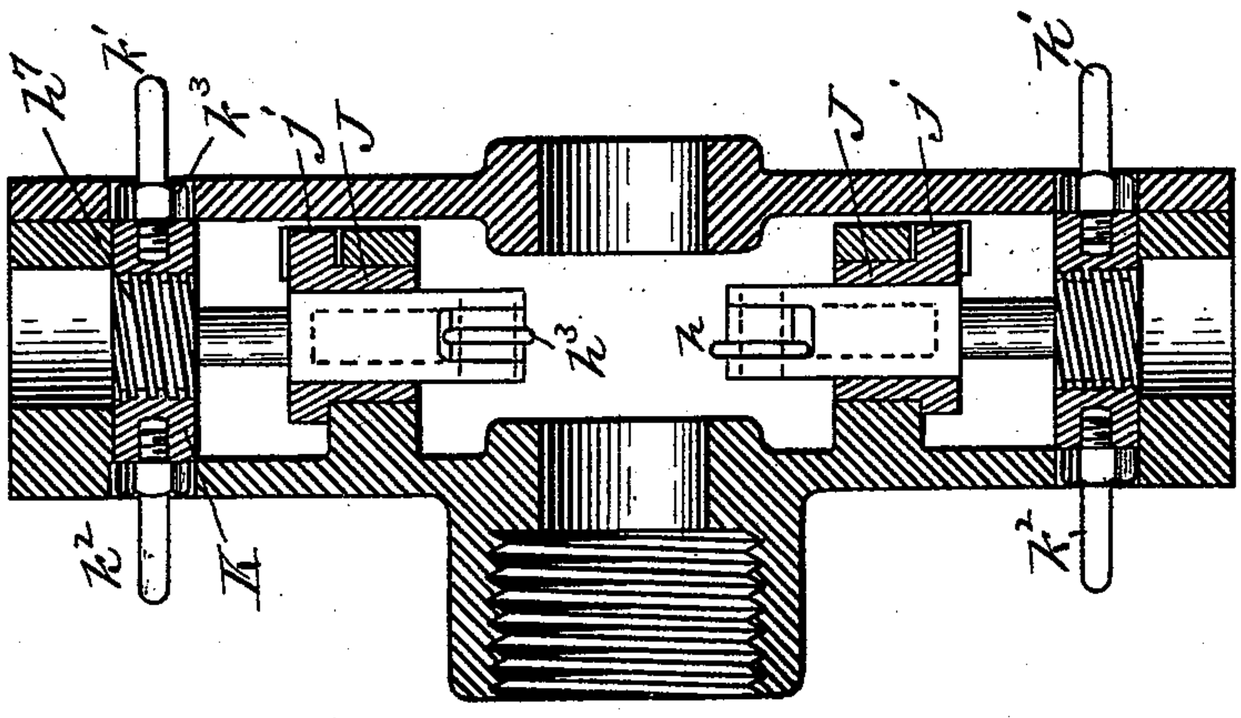

Fig. 4.

WITNESSES

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(No Model.) 4 Sheets—Sheet 4.

B. HALL.

MACHINE FOR CORRUGATING TUBES.

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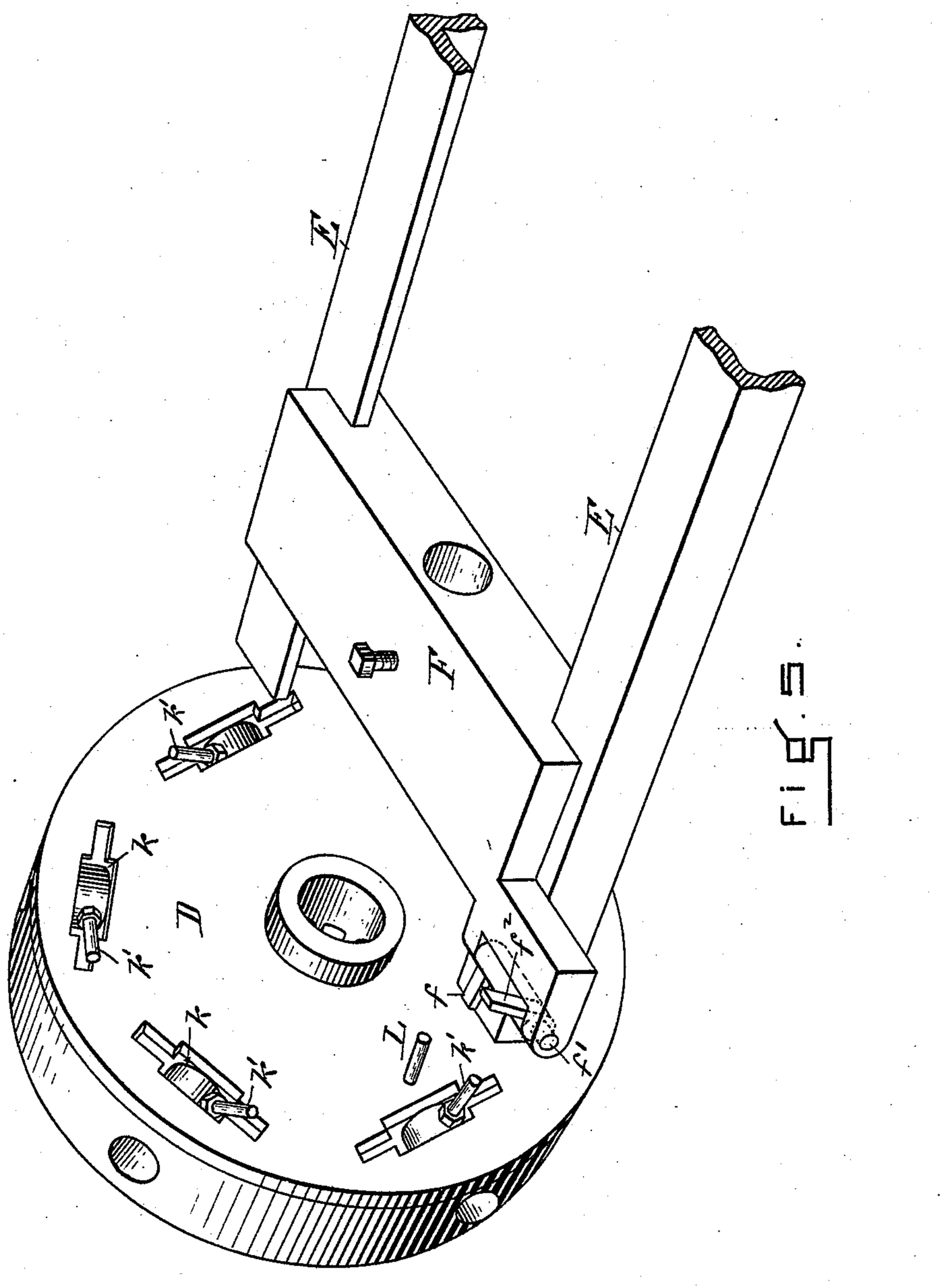

Fig. 5.

WITNESSES

Geo. O. G. Crane

Eva H. Gould

INVENTOR

Bickell Hall

UNITED STATES PATENT OFFICE.

BICKNELL HALL, OF TAUNTON, ASSIGNOR TO THE WAINWRIGHT MANUFACTURING COMPANY OF MASSACHUSETTS, OF BOSTON, MASSACHUSETTS.

MACHINE FOR CORRUGATING TUBES.

SPECIFICATION forming part of Letters Patent No. 541,535, dated June 25, 1895.

Application filed September 4, 1894. Serial No. 522,145. (No model.)

To all whom it may concern:

Be it known that I, BICKNELL HALL, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Machines for Corrugating Tubes, of which the following is a specification.

My improvement relates to that class of machines in which the tools are automatically set and withdrawn in a certain order so that the corrugation will be properly begun and will be concluded at the proper time.

My present invention consists in such a construction and arrangement of parts that the tools will be thrown out of action on the approach of the carriage in which the tube is clamped.

My invention will be understood by reference to the drawings, in which—

Figure 1 is a side elevation, and Fig. 2 a plan, of a corrugating-machine embodying my invention, Fig. 3 being a front elevation, partly in section, of the head-stock, and Fig. 4 a cross-section thereof. Fig. 5 is a perspective view showing the head-stock and carriage about to engage.

A is the frame upon which is carried two journal boxes B. A hollow shaft mounted in these journal boxes carries a pulley C and a head stock D. The shaft is hollow in order that the tube may be fed through it during the corrugating operation.

E, E are ways upon which slides the carriage F. These ways are supported upon suitable legs G. The carriage is of construction ordinary in such machines, and grips the tube and is fed with it.

The head stock or tool carrier D consists of a casting in which are mounted a number of tool holders H, &c. The tool carrier shown in Figs. 3 and 4 is intended to have a series of six tools h, h^2, &c., three only of which are shown. Each of these tools h, h^2 is carried on a suitable axis, but the location of each tool upon its axis depends upon its number in the series, the first tool being in the position, say shown at h in Fig. 4 and the sixth or last tool in the series being at the other extremity of the axis of its tool holder, the intermediate tools being located at intermediate positions on their axes so that when the tools lie in position about a piece of tube, they altogether will indicate a spiral line about it. This will be readily understood by those skilled in the art.

The lower part of each tool holder H, &c., is square in cross section and lies in a square opening through a circular bushing J, so that by turning the bushing, the tool may be set at any angle. For this purpose the bushing is provided with an ear j which lies between two corresponding ears d, d on the head stock. d', d' are adjusting screws which bind the ear j of the bushing J between them. By turning these two screws d', d', the bushing, and consequently the tool may be set as desired and clamped at any angle to the axis of the tube.

The upper part of the tool holder is round and is threaded as shown at h^7 and passes into a nut K capable of a rotary but not of an advancing movement. Suitable slots k are provided in the walls of the head stock and each nut is provided with holes in its periphery in which pins k', k^2 may be inserted to turn the nut. By turning each nut its tool will be advanced or withdrawn from its work. These nuts K are operated automatically as follows: Upon the carriage is mounted a part which engages with the pins k', when such a length of tube has been corrugated that the carriage is close to the head stock. Thus as the head stock rotates each pin projecting from the front of the head stock, strikes this part, which may be called a finger, and is held back while the head stock rotates past it and the pin as it wipes past the finger, turns the nut, thus withdrawing the tool.

I prefer to construct the finger as shown at f in the drawings. It is there mounted at one end of the short shaft f' mounted on the carriage. At the other end of this shaft is a second finger f^2 at about right angles to the finger f, the two fingers normally lying in the position shown in Figs. 1 and 2.

A pin L projects from the face of the head stock in such position that when it reaches a certain point in its rotation, should the finger f^2 be within reach, it will engage with the finger f^2 and throw it into the position shown in Fig. 5 so that the pin f will lie in position to strike each one of the pins k' in turn as

the head stock rotates, turning at the same time the nuts K, the back of the finger f^2 lying against the carriage so as to hold the finger f in place. Each pin k' wipes against the finger f as the head stock turns and is moved by it so as to turn its nut K. The pin L is so placed in the tool carrier that the first nut K to be turned, and consequently the first tool to be withdrawn, will be the leading tool of the six which are making the corrugation.

In order to withdraw the tools at other times and to throw them in at all times, I prefer to use a slide M which runs in ways m on the bed of the machine. On this slide are mounted two uprights P, Q so placed that by moving the slide M one way or the other one of these uprights will be wiped by one of the sets of pins k', k^2 and will turn them so that these nuts will be turned one way or the other so as to throw in or withdraw the tools. The upright P is the starting upright and the upright Q the withdrawing upright. For example, to start up the machine the slide is so moved that the upright P will stand in the path of the pins k^2, which when the tools are out of action, will project in the direction of the motion of the tool carrier. These pins k^2 project from the back side of the head stock, and when the head stock is started, each pin will strike the upright P and will be pushed round nearly flush with the back side of the head stock again, as it passes the upright, so that each nut will be turned say one quarter of a revolution and will advance its tool a given amount. The slide is preferably moved by a hand lever N pivoted at n on one of the ways and connected to the slide by a slotted connection m'.

It is necessary that each tool should be advanced a little nearer the axis of the tube to be corrugated than the tool in front of it in series so that each tool may do its own part of the corrugating operation. While this may be done by giving each nut K a little greater turn than the nut in front of it in series, I prefer to accomplish the same result by giving each tool shank and its nut a thread of a different pitch from all the others so that while, for example, a quarter of a revolution will advance the first tool h say one-sixteenth of an inch, a corresponding turn will advance the second tool three thirty-seconds of an inch, the third tool two-sixteenths of an inch, &c. When the tool shanks are so constructed it will be seen that the turn which is given to each shank by the uprights P, Q or by the finger f will be sufficient to throw its tool way in or withdraw it, no matter which tool in the series it may be. When still further adjustment is required, it may be had by causing the pins or either of them to project more or less. For this purpose each pin is threaded and screwed into its nut K, being held in place by the set nut k^8.

The operation of this mechanism will now be described. Each tool is adjusted by its screws d', d' so that all will lie in such relation to each other that they will track a thread of the proper pitch about the tube, each tool following in the path of its leader. They are then adjusted to the diameter of the tube to be corrugated so that upon turning the nuts to bring the tools into action, the tools will be in position to make the desired corrugation, each corrugating the tube somewhat more than the tool which has gone in front. In practice the first tool is adjusted so that when in place it will rest lightly on the tube and track it. The next tool is intended to run in the track made by the first tool and make its corrugation slightly deeper and so on. The tube is put in place and fastened in the carriage and the machine is started up to rotate the head stock. The upright P is moved into position to be struck by the pins k^2, at such a time that it will be first wiped by the pin k^2 belonging to the tool h. As the head stock rotates, each pin k^2 engages in turn with the upright P and each tool is brought into engagement with the tube. The slide is then moved into an inoperative position. The tube will be fed by the tools in a way now well known in the art to draw the carriage and tool carrier together. When they are in the position shown in Fig. 5, the desired length having been corrugated, the pin L coming around, will strike the lever f throwing it into the position shown in Fig. 6 so that it will immediately be wiped by the pin k' belonging to the first tool in the series, and will turn it so that the parts will lie in the position in which they were before the pins k^2 engaged with the upright P, thus turning the nut K, for example, nearly a quarter of a revolution. This will withdraw the tool h so that it will not engage any longer with the tube. The same thing happens with the pin k' on the next nut, and so on, until all the tools have been withdrawn and the tube is free to be removed, or after being relocated in the carriage, to be pushed along so that another portion of it may be corrugated.

The machine above described is an improvement upon other machines for doing similar work, in that the element which in fact causes the withdrawal of each tool is located directly upon the tube carriage, and each tool is provided with a part which, under certain conditions, engages with this element on the tube carriage. Thus when the tube carriage comes in close proximity with the tool holder or head stock, the part located on the tube carriage comes in direct contact with the withdrawing element of each tool in turn without the intervention of any other mechanism. Moreover by using two screws d', d' to adjust the bushing in the manner shown, the adjustment may be made with great accuracy.

What I claim as my invention is—

1. In a tube corrugating machine having a tool carrier and a tube holder, one adapted to be moved toward and from the other, one or more tools located in said tool carrier and

each provided with means whereby it may be withdrawn from the axis of the tool carrier independent of all the others, and an arm located upon said tube holder and adapted to engage with the withdrawing means of each tool in turn when said tool carrier and tube holder are in close proximity, all as set forth.

2. In a tube corrugating machine a tool carrier carrying one or more tools each provided with a withdrawing mechanism, and a tube holder, the one adapted to be moved toward and from the other, in combination with mechanism located upon said tube holder adapted to be thrown to engage with and operate the withdrawing mechanism of each tool when the tube holder and head stock are in close proximity, and a pin located upon said tool carrier adapted to engage with and throw said mechanism upon the tool holder into engaging position, all as and for the purposes set forth.

3. In a tube corrugating machine, a headstock one or more corrugating tools mounted on the end of a square shaft adapted to slide in a bushing toward and from the axis of the head stock, said bushing being provided with an ear located between two set screws suitably mounted in said head stock whereby it may be adjusted about its axis, as set forth.

4. In a tube corrugating machine, a tool carrier carrying one or more tools, the outer end of the shank of each of which is threaded, and mechanism whereby each of said tools may be adjusted toward and from the aixs of the head stock, said mechanism consisting of a nut adapted to rotate but prevented from moving otherwise and provided with one or more pins, each adjustable therein, as described.

5. In a tube corrugating machine a tool carrier carrying a series of corrugating tools, the shank of each of which is threaded and provided with a nut adapted to rotate but prevented from moving otherwise, the threads of each shank differing in pitch from the threads of all the other shanks, all as and for the purposes set forth.

6. In a tube corrugating machine having a tool carrier carrying one or more corrugating tools, the shank of each of which is threaded and provided with a nut adapted to rotate but prevented from advancing, means for adjusting the advance of such a tool consisting of a pin projecting from its nut and adjustable therein, and a part adapted to engage with said pin and cause it to turn said nut, as and for the purposes set forth.

7. In a tube corrugating machine a tool holder and a tube holder, one of which is movable toward and from the other, and one of which rotates, one or more tools carried by said tool holder having threaded shanks provided with nuts which rotate but do not advance; pins projecting from said nuts and a part adapted to come in contact with said pins and thereby turn the nuts, substantially as described.

In testimony whereof I have hereunto set my hand this 9th day of August, 1894.

BICKNELL HALL.

Witnesses:
GEORGE O. G. COALE,
EVA A. GUILD.