

No. 695,942.

Patented Mar. 25, 1902.

W. W. McCALLIP.
WIRE WEAVING MACHINE.

(Application filed June 8, 1901.)

(No Model.)

4 Sheets—Sheet I.

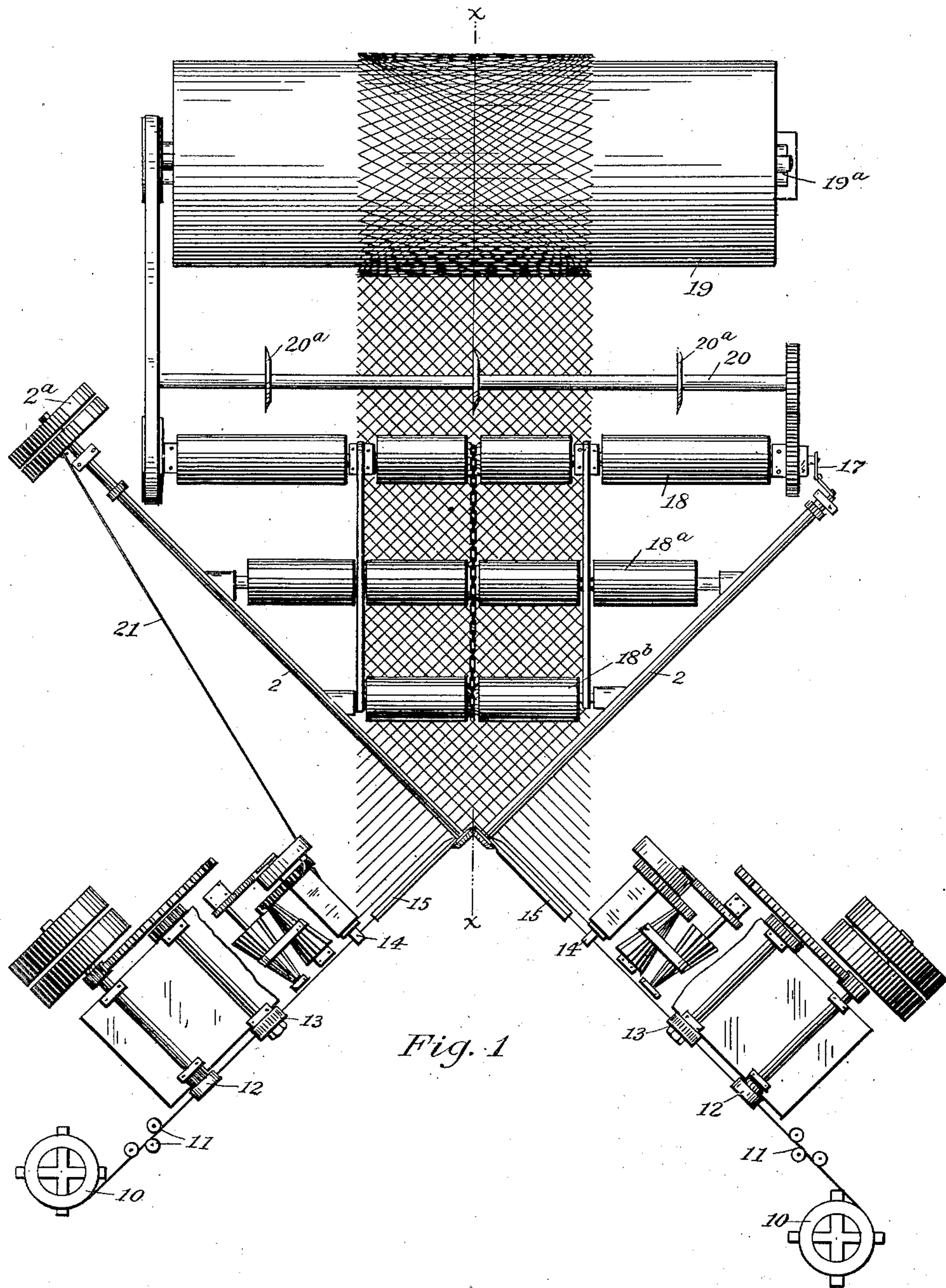


Fig. 1

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(No Model.)

4 Sheets—Sheet 2.

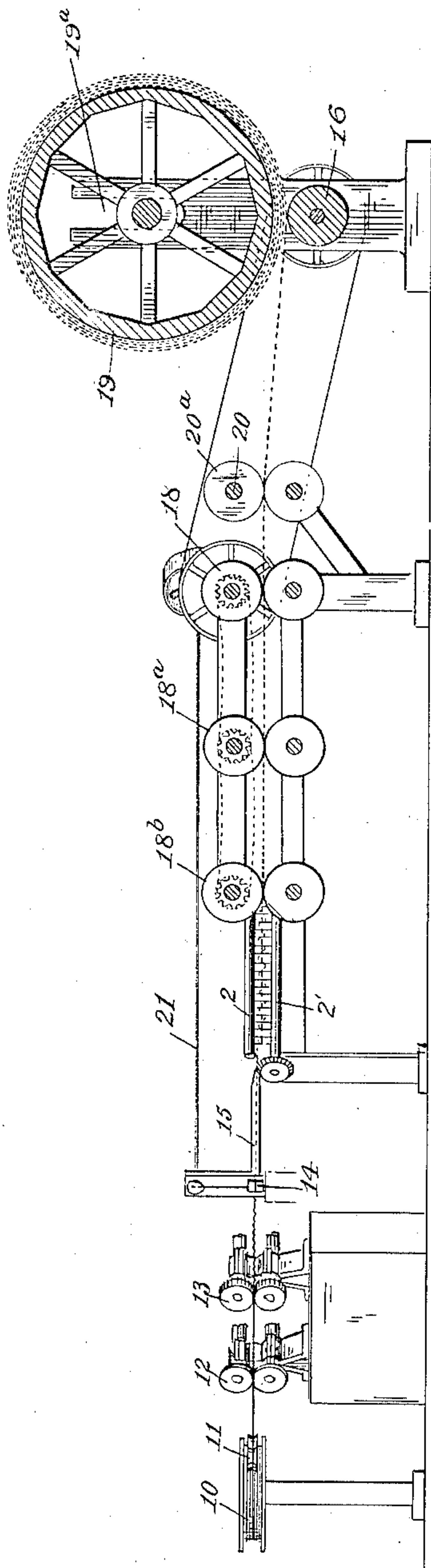


Fig. 2

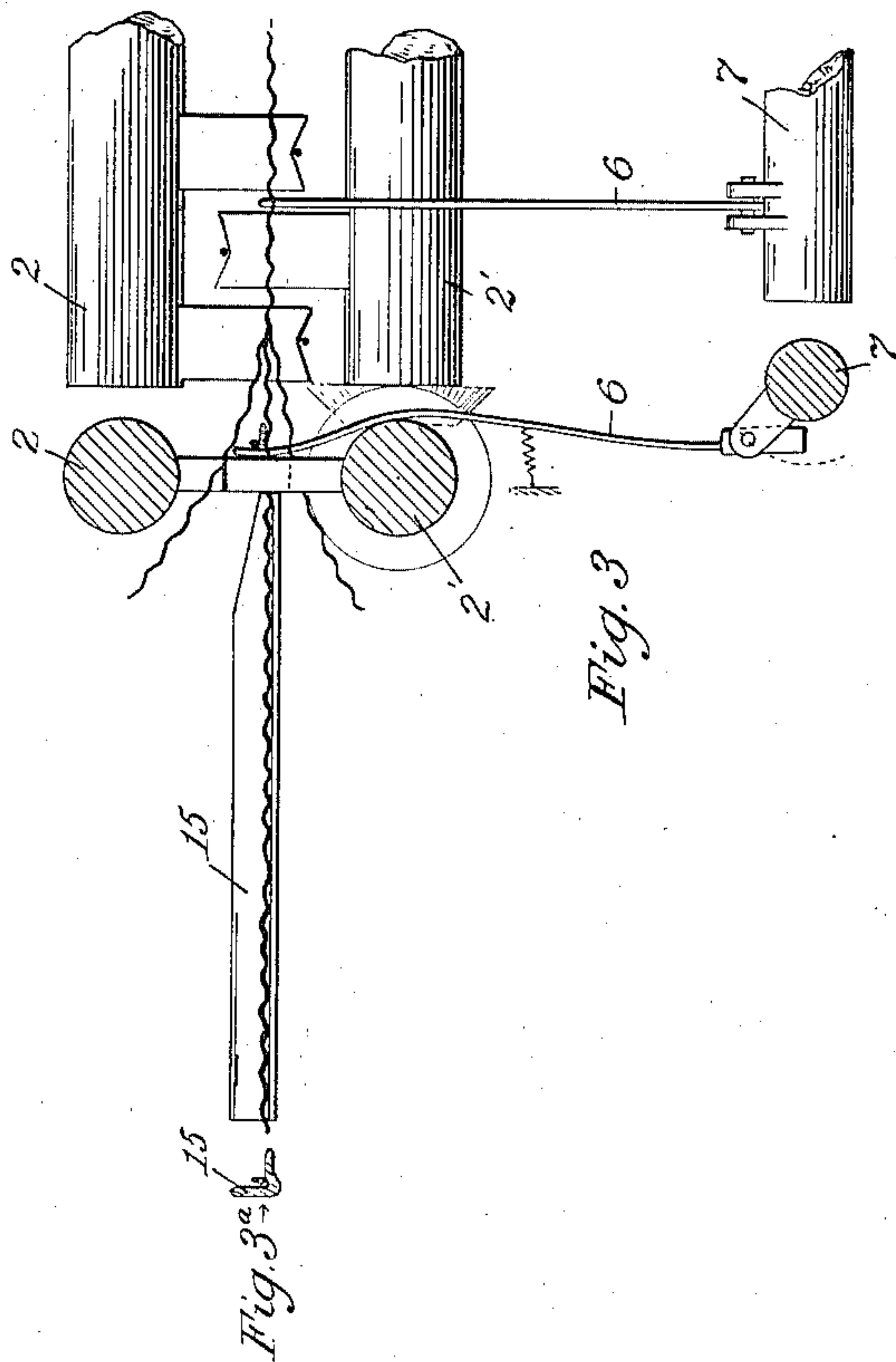


Fig. 3

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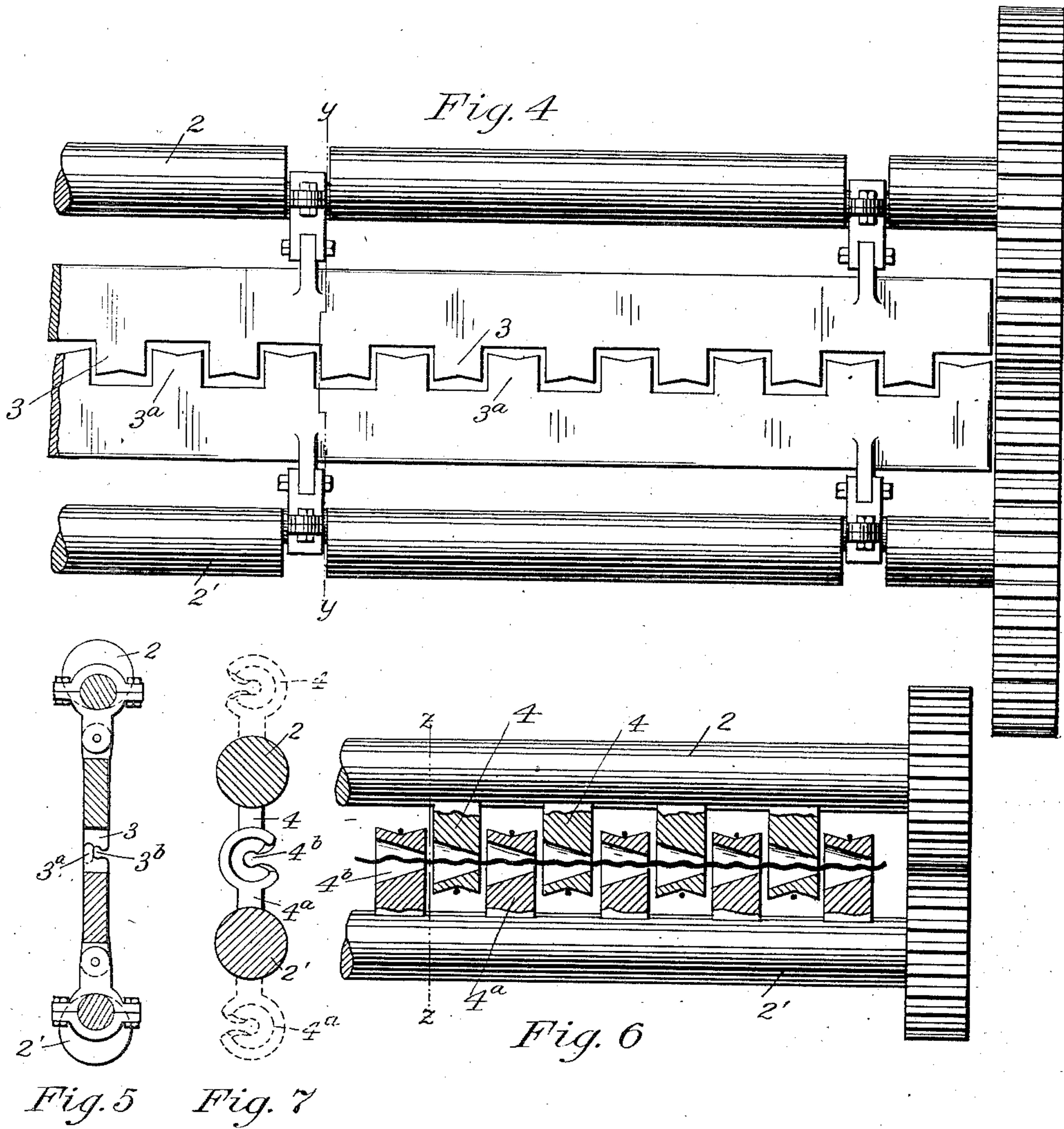
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4 Sheets—Sheet 3.



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4 Sheets—Sheet 4.

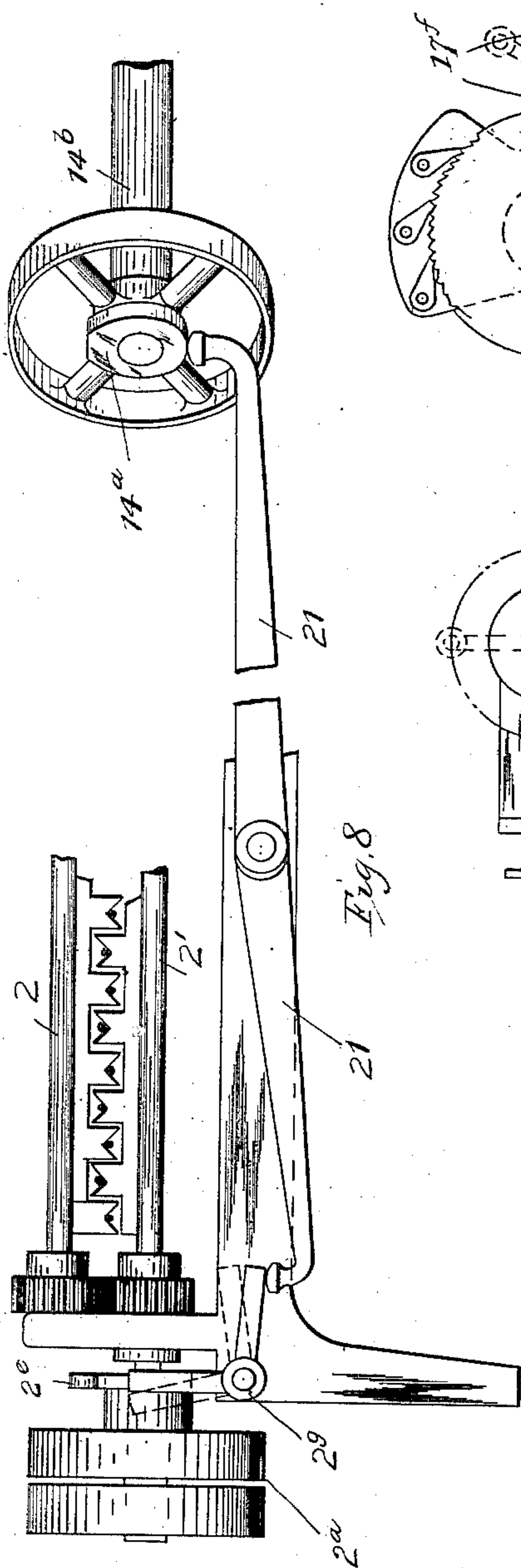


Fig. 8

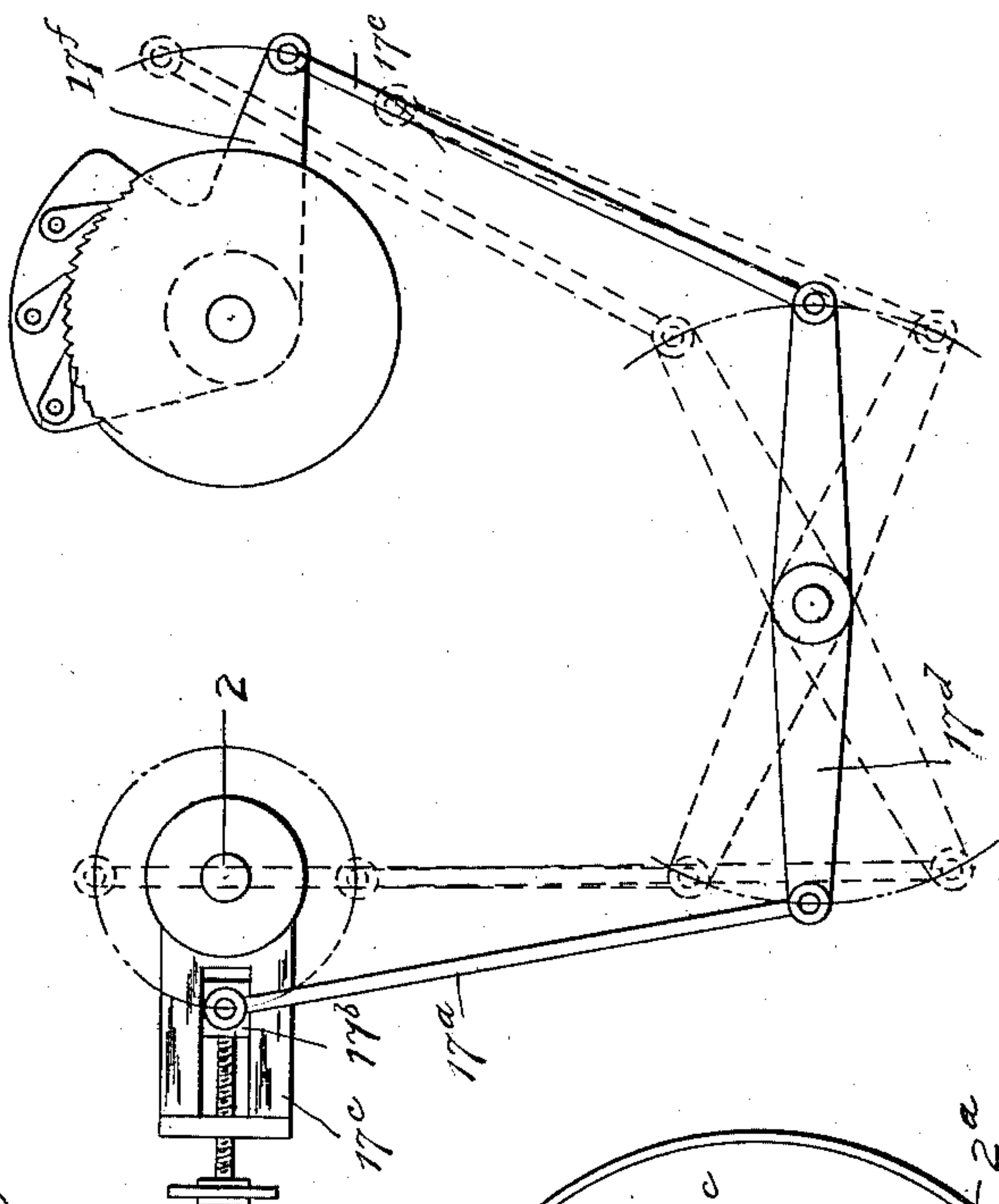


Fig. 11

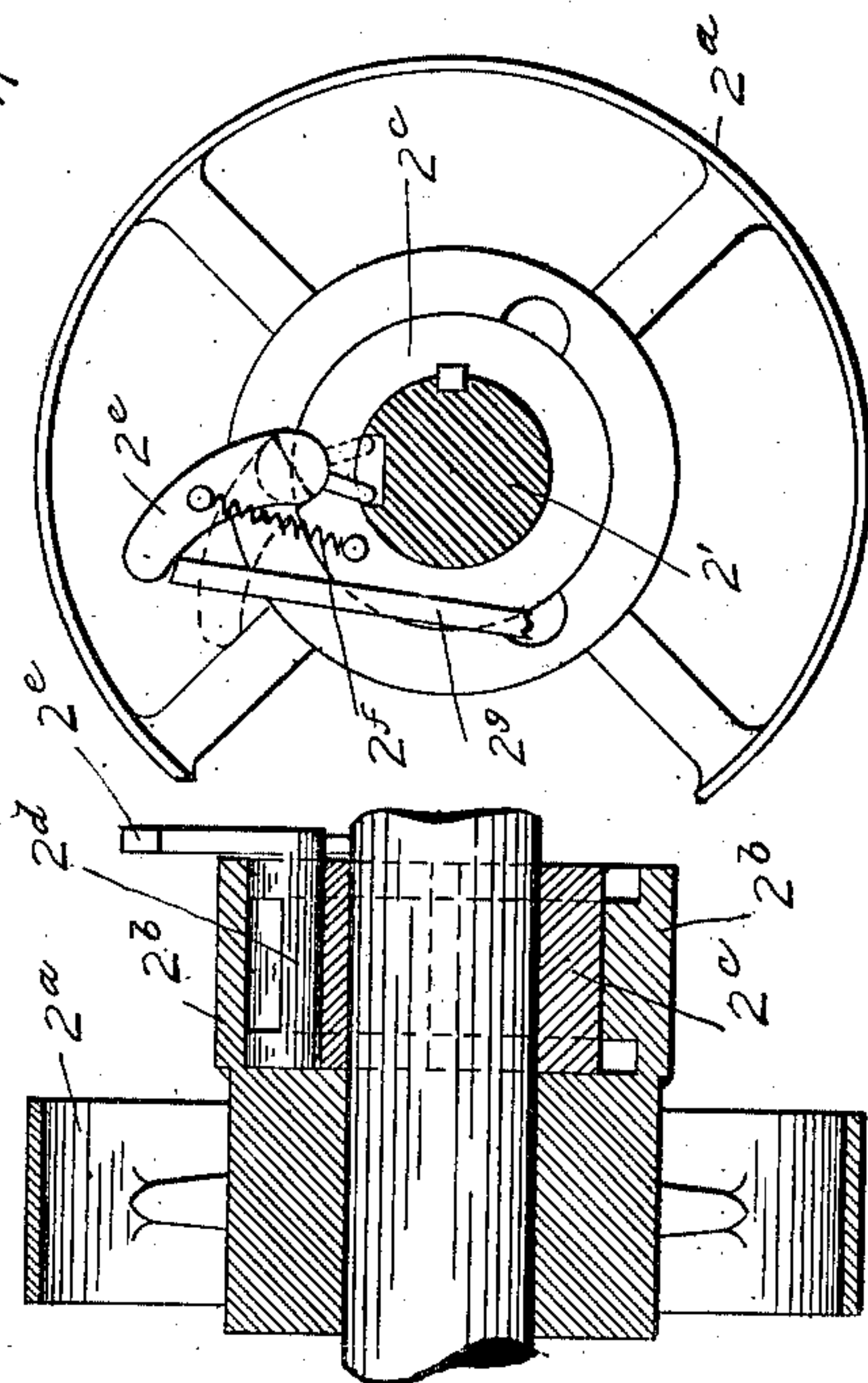


Fig. 9

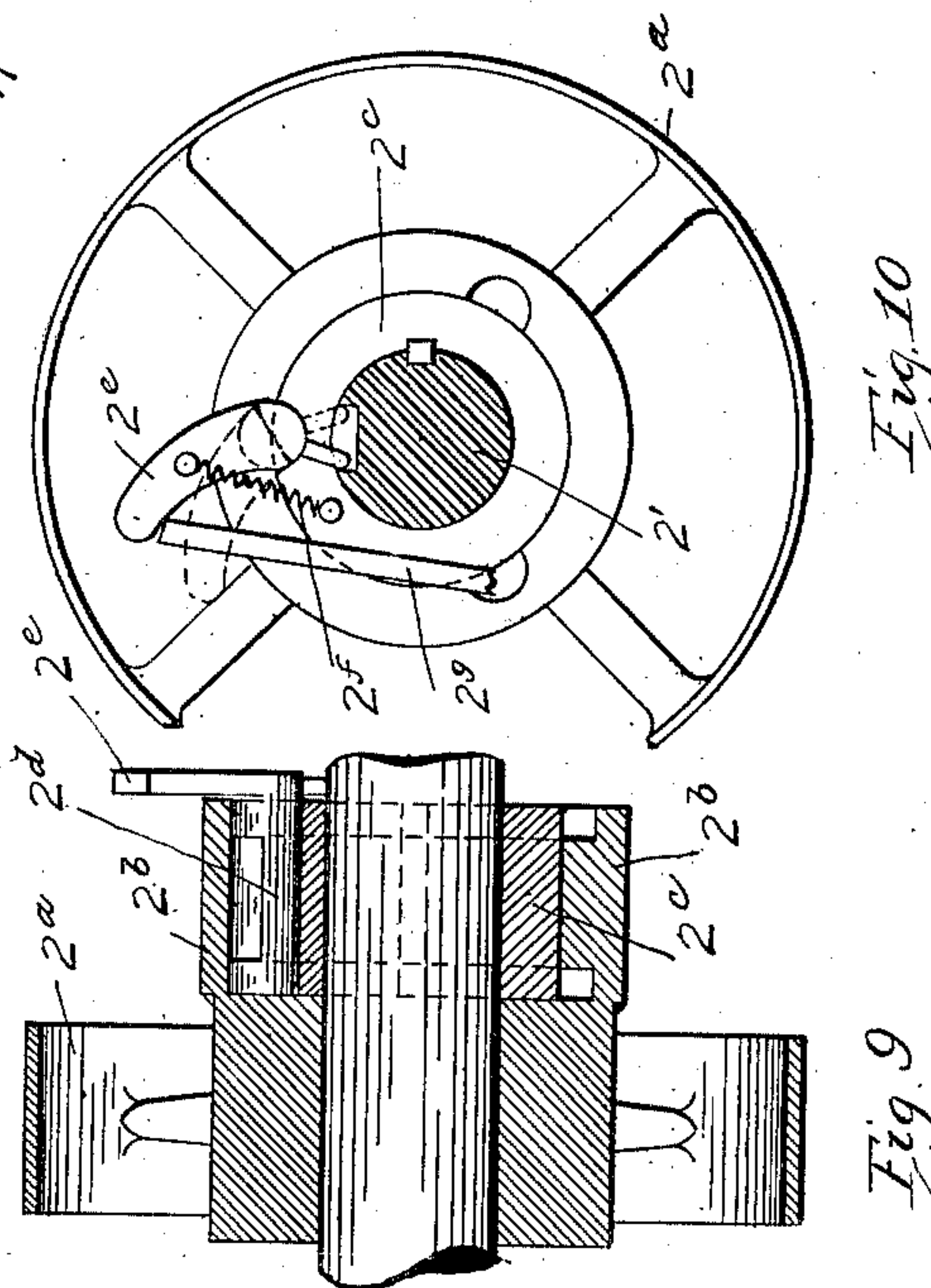


Fig. 10

WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM W. MCCALLIP, OF COLUMBUS, OHIO.

WIRE-WEAVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 695,942, dated March 25, 1902.

Application filed June 3, 1901. Serial No. 62,938. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. MCCALLIP, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Wire-Weaving Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates more particularly to machines for weaving what is termed "diamond-mesh" fabric—that is, fabric in which the wires lie diagonally to the direction of the length of the fabric, whether the mesh be, in fact, of square or rhombus form. In Letters Patent of the United States granted to me June 23, 1896, No. 562,641, I have shown and described a machine for weaving this sort of fabric in which the strands can be inserted by hand.

The object of the present invention is to provide mechanism for inserting the wires automatically.

The present invention also contemplates important improvements in the details of such machine, better adapting it not only for hand-weaving, but also for automatic weaving.

The invention consists, therefore, first, in the combination, with mechanism for forming the shed in the fabric, of mechanism for automatically inserting the wire strands; secondly, in guides for directing the wire through the shed, and, thirdly, in combinations and details of construction set forth in my claims appended hereto.

In the accompanying drawings, illustrating one embodiment of my improvements, Figure 1 is a top plan view of the machine. Fig. 2 is a sectional view taken on a vertical plane indicated by the line $x x$, Fig. 1. Fig. 3 is a detail view illustrating the construction of the machine where the wire enters the fabric. Fig. 3^a is a transverse sectional view of the wire-guiding trough. Fig. 4 is a side view, on a larger scale, of a portion of one construction of wire elevators and depressors—in other words, the shed-forming devices. Fig. 5 is a transverse view in section, taken on the line $y y$, Fig. 4. Fig. 6 is a side view of another form of shed-forming devices, showing in sec-

tional view guideways for facilitating the insertion of the wire. Fig. 7 is a transverse sectional view of the same shed-forming devices as are shown in Fig. 6, taken on the line $z z$ of that figure. Fig. 8 is a detail view illustrating, on a larger scale, a clutch and mechanism for operating such clutch, said clutch connecting and disconnecting the power with the shafts containing the wire elevating and depressing fingers. Figs. 9 and 10 are sectional and side views, respectively, of the clutching mechanism. Fig. 11 is an illustration, on a larger scale, of a means for communicating the motion of a shaft containing wire elevating or depressing fingers with the rolls for feeding the fabric.

As in my former patent, hereinbefore referred to, the upper shafts 2 2 contain or operate the wire-depressing fingers and the lower shafts 2' 2' contain or operate the wire-elevating fingers. These shafts are shown to be arranged one above the other and the two pairs of shafts arranged at angles to each other and geared together, so as to be rotated synchronously.

Arranged at each side and in front of the fabric-feeding part of the machine is shown the mechanism for inserting the strands automatically into the fabric. This mechanism is shown to comprise a reel or spool 10, straightening-rolls 11, wire-feeding rolls 12, wire-crimping rolls 13, and a cutter or shear 14, the operation of which shear or cutter is timed to cut off definite lengths of the wire. Arranged in line with each shed is a guiding-trough 15, designed to direct the wire through the shed. The exit end of one trough 15 is located slightly above the other, so that one ingoing wire shall not interfere with the insertion of the other. To promote the speed of the weaving process, I contemplate that two wires shall be inserted at the same time. After a pair of wires is inserted the main fabric is fed so as to take alternate wires thereof from the depressors to the elevators, or vice versa, as in the machine described in my aforesaid patent. In the present machine this is effected by means of a suitable coupling at 17, whereby the fabric-feeding rolls 18 are revolved with the revolution of the shaft containing the depressors or elevators.

The coupling shown at 17, Fig. 1, can, as

seen in detail, Fig. 11, comprise a rod 17^a, having one end hingedly attached to an adjustable block 17^b in an arm 17^c on the shaft 2, (or 2'), a rocking beam 17^d, to one end of which the said rod 17^a is attached, and a rod 17^e, having one end attached to the opposite end of the beam 17^d and its other end attached to one member or arm of a bell-crank carrying pawls to engage teeth on the shaft containing rolls 18. By adjusting the block 17^b out or in the throw of the bell-crank carrying the pawls can be made greater or less, and hence the feeding of the fabric accord with the size of the mesh to be woven; but mechanism for effecting this end other than that particularly shown can be employed.

As fast as completed the fabric can be wound upon a drum or spool 19, supported in a slotted bearing 19^a and turned by frictional contact with a roll 16, driven by a belt on the shaft of roll 18.

It may sometimes be economical to weave the fabric of greater width than that required for ordinary use and to divide the fabric into strips of the required width. In this event I provide a shaft 20 with cutters 20^a, properly spaced thereon, to cut the fabric as fast as it is fed through the machine.

In order to keep the fabric flat and prevent it from drawing or buckling in its progress through the machine, I provide any appropriate means for this purpose. I have shown supplemental rolls 18^a and 18^b, driven, if need be, by the roll 18.

The shafts containing the elevators and depressors are shown to be geared together as in my former patent referred to, and these shafts can be operated by power applied to a loose band-pulley 2^a and a rod 21, extending from the wire-cutter 14 to a clutch, so as to operate said clutch to couple the shaft to the pulley at the proper moment.

In Figs. 8, 9, and 10 I have shown in detail one form of clutch and operating mechanism. In these views the band-pulley 2^a has a laterally-projecting flange 2^b. The shaft 2' has keyed to it a collar 2^c, fitting within the flange, and seated normally in a semicylindrical seat in the collar between the flange and the collar is a rockable key 2^d, adapted to be turned to occupy both this seat and a seat in the flange. When the key is turned to occupy both seats, the pulley is temporarily keyed or "clutched" with the shaft, and when the key occupies the seat in the collar only the pulley runs "loose" on the shaft. The key 2^d has at its outer extremity a finger 2^e, between which and the collar is a spring 2^f, tending to turn the key 2^d into clutching position; but the finger is held normally in the unclutched position of the key by the end of one arm of a bell-crank lever 2^g, which at the proper moment is actuated by the rod or lever 21. The rod 21 is actuated by a cam 14^a on the shaft 14^b of the wire-cutting mech-

anism 14. A clutching mechanism other than that shown, however, adapted to accomplish the purpose can be employed.

In Figs. 4 and 5 I have shown the shafts 2 and 2' as crank-shafts having attached thereto bars provided with wire-depressing teeth 3 and wire-elevating teeth 3^a. In Fig. 4 the teeth are shown as being slightly reentrant at their ends to insure their taking and holding the wire, and in Fig. 5 these same teeth are shown as cut out laterally, as indicated at 3^b, to form a directing-guideway for the inserted wire.

In Figs. 6 and 7 the elevating and depressing teeth 4 and 4^a are of a rotary kind, (shown in my former patent referred to;) but in the present instance I provide them with lateral conically-shaped guideways 4^b, forming collectively a sort of guiding-tube for the inserted wire. The guideways are all open at the sides, so as to permit the exit laterally of the woven wire when the fabric is fed by the rolls.

I shall prefer to insert the wires in the fabric at the place where they are to remain and to avoid what is known in the art of weaving as the "beating-up" operation; but if this should in any case prove inexpedient I can provide beater-arms 6, attached to a shaft 7, operated so as to press the beater-arms inward and force the inserted wire to its desired position in the fabric and retract the arms when this has been done.

It will be understood, of course, that all the parts herein shown and described can be modified and some parts omitted or parts added without departing from the scope of my invention. For one example, it is not necessary that the rolls for crimping the wire be used, because uncrimped pieces can be woven in the machine, although this will not make so desirable a fabric unless a binder or some device for holding the fabric in position be employed. Ready-cut wires can be inserted into the fabric. Other forms of devices for feeding the fabric after it is woven or for holding it in position in the machine can be used.

What I claim, and desire to secure by Letters Patent, is—

1. In a machine for weaving diamond-mesh wire fabric, devices for elevating and depressing alternate wires to form a shed, combined with means for automatically inserting separate strands diagonally into said shed at angles to one another, substantially as described.

2. In a machine for weaving diamond-mesh wire fabric, devices at opposite sides of the fabric for elevating and depressing alternate wires to form sheds, combined with means for automatically inserting separate strands diagonally into said sheds at angles to one another, substantially as described.

3. In a machine for weaving diamond-mesh wire fabric, devices for elevating and depressing alternate wires to form a shed, combined

with mechanism for crimping and automatically inserting separate strands diagonally into said shed, substantially as described.

4. In a machine for weaving diamond-mesh wire fabric, devices at opposite sides of the machine for elevating and depressing alternate wires to form sheds, means for moving the fabric so that the strands shall be carried laterally from the elevators to the depressors, guiding-channels for directing wires into said sheds having their exit ends lying in different planes, substantially as described.

5. In a machine for weaving wire fabric, a series of alternating wire elevating and depressing fingers provided with wire-guiding openings, substantially as described.

6. In a machine for weaving wire fabric, a series of alternating wire elevating and depressing fingers provided with wire-guiding openings located in said fingers beyond the ends thereof, substantially as described.

7. In a machine for weaving wire fabric, a series of alternating wire elevating and depressing fingers provided with conical wire-guiding openings, substantially as described.

8. In a machine for weaving diamond-mesh wire fabric, a pair of rotary shafts carrying wire elevating and depressing fingers adapted to form a shed in the fabric, means for automatically inserting wire into said shed, means for moving the fabric laterally from the elevators to the depressors, mechanism for cutting the wire into definite lengths, and means for automatically operating the wire elevators and depressors upon the operation of the cutting mechanism, substantially as described.

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

WILLIAM W. McCALLIP.

Witnesses:

GEORGE M. FINCKEL,
GEORGE W. ALFRED.