

No. 654,975.

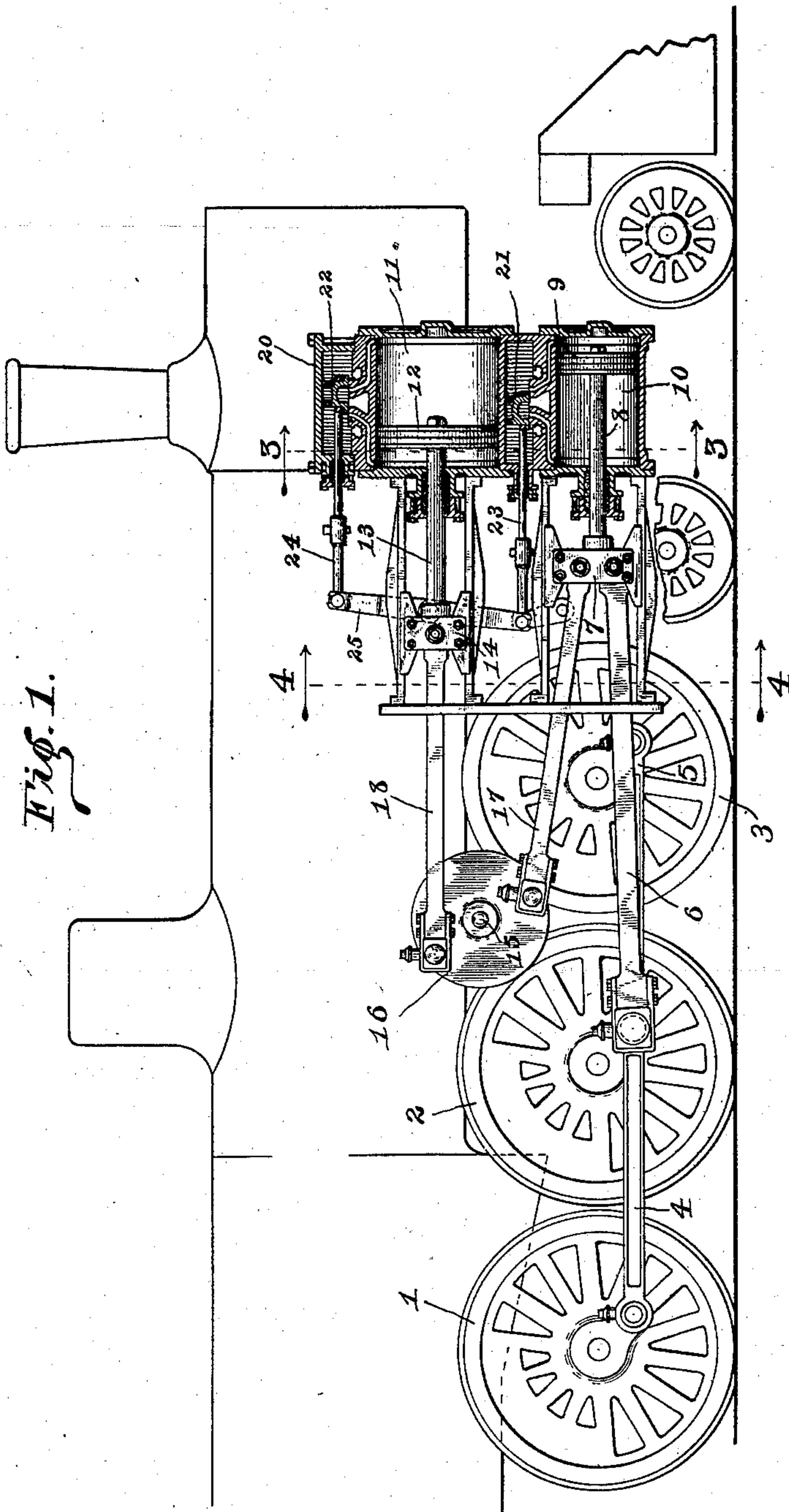
Patented July 31, 1900.

W. T. HARRIS.
COMPOUND ENGINE.

(Application filed Apr. 17, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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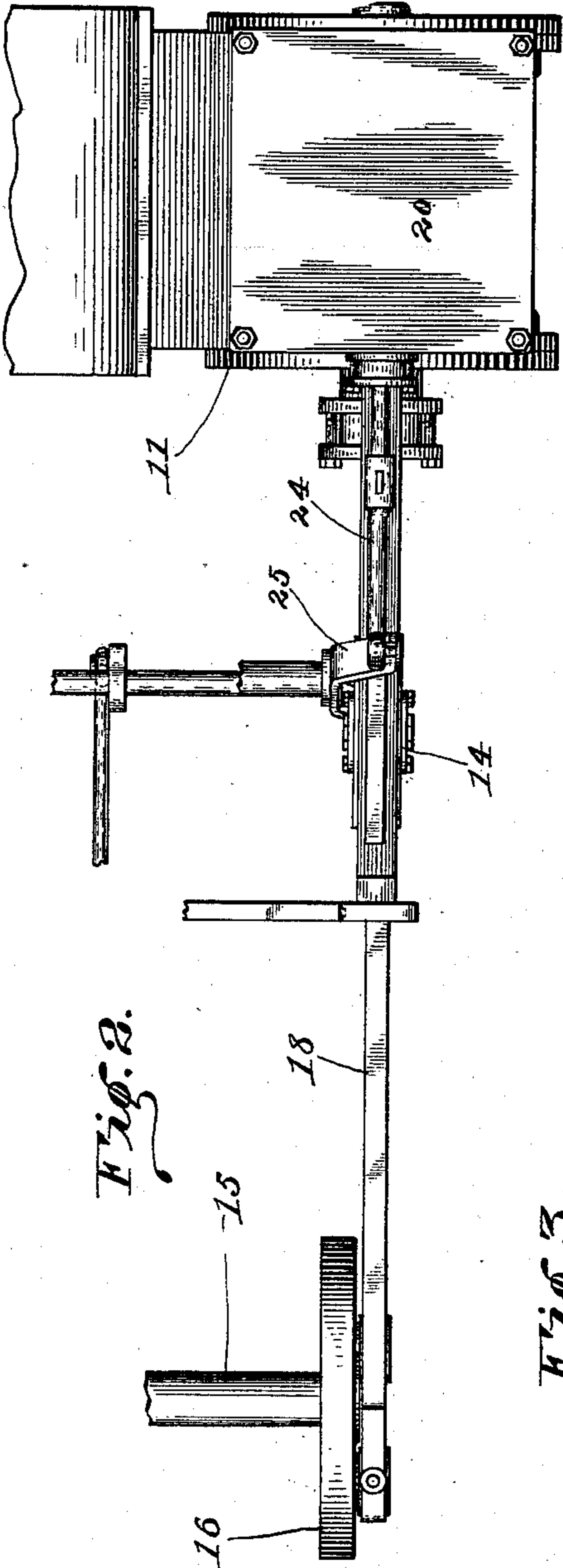


Fig. 2.

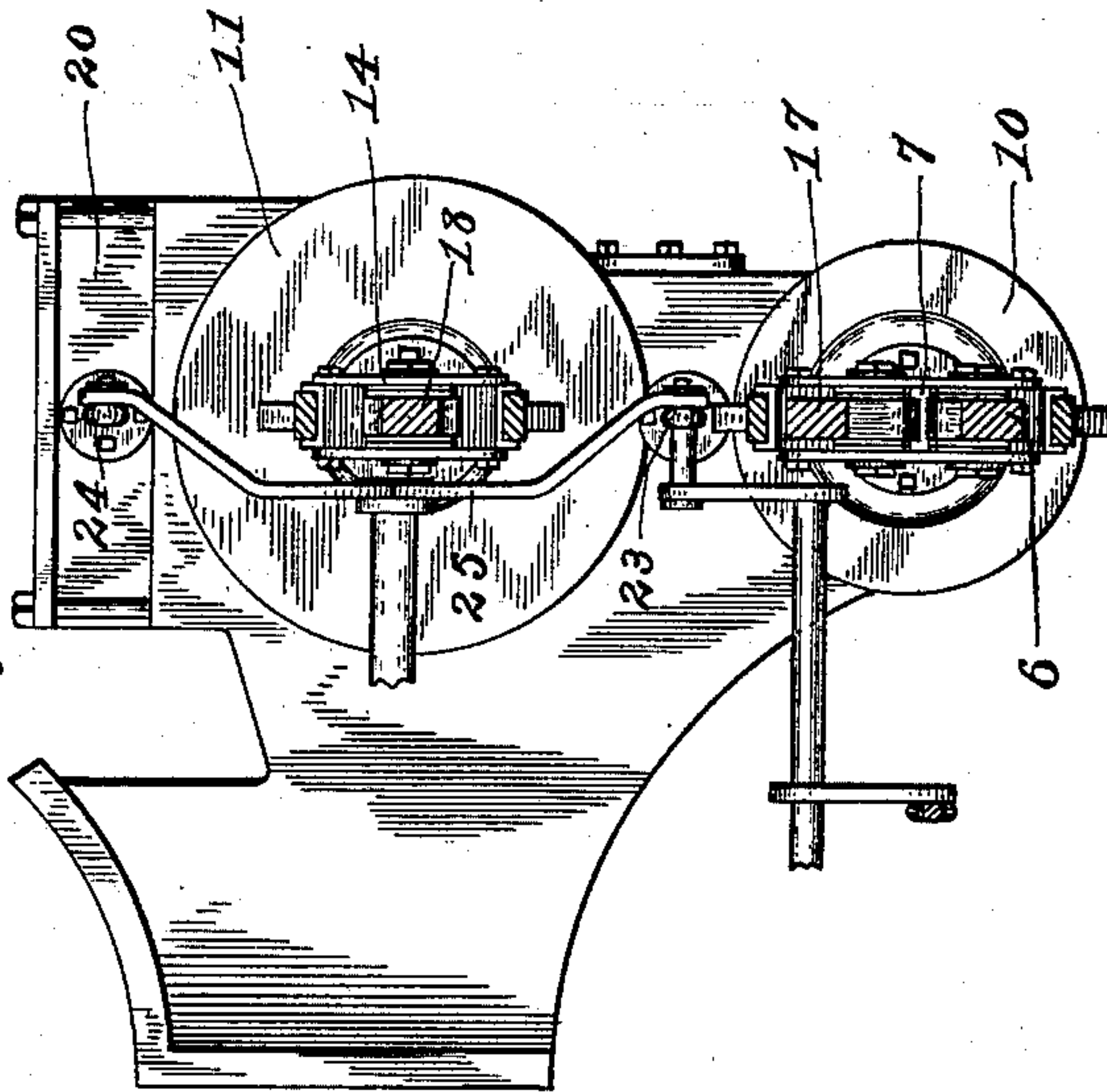
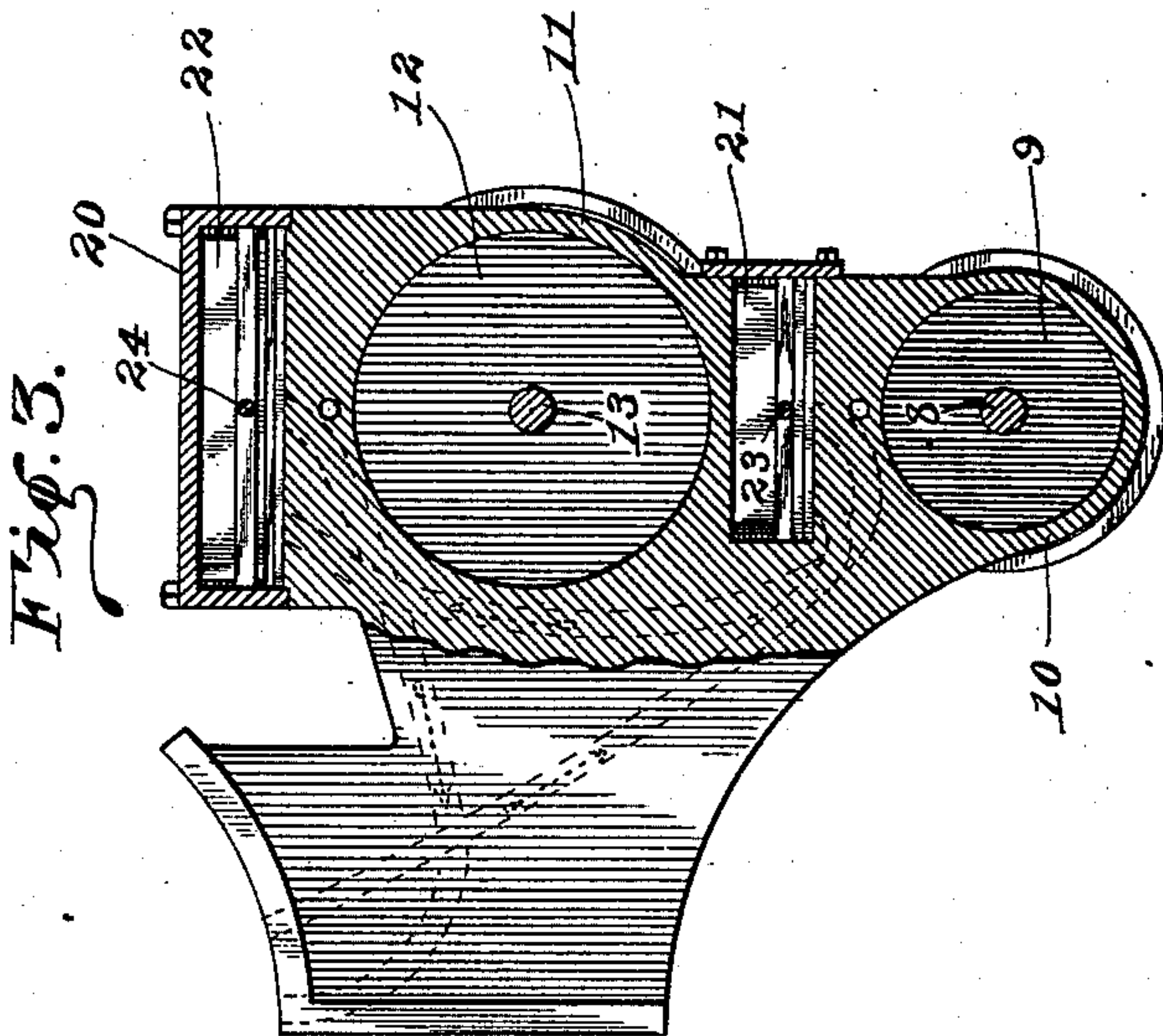


Fig. 4.



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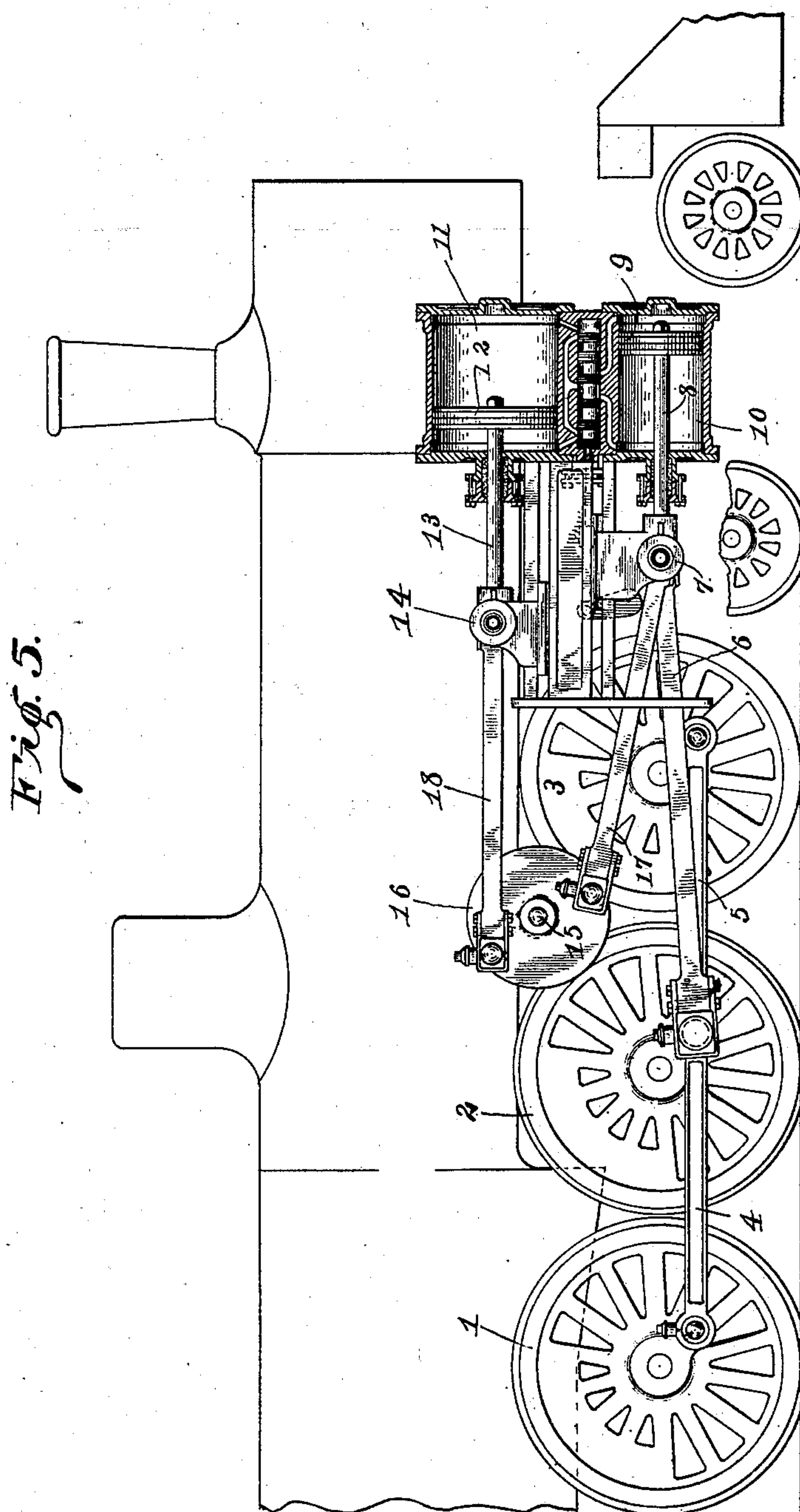
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UNITED STATES PATENT OFFICE.

WILLIAM T. HARRIS, OF LOUISVILLE, KENTUCKY.

COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 654,975, dated July 31, 1900.

Application filed April 17, 1899. Serial No. 713,311. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. HARRIS, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Compound Engines, of which the following is a specification.

The object of my present invention is to provide in double-cylinder steam-engines in which one of the cylinders is arranged to be worked under expansion by the exhaust-steam from the other an arrangement whereby the two cylinders may be positioned parallel with and alongside each other, in combination with means by which the force of both may be transmitted to the crank of the machine to be driven.

I have designed this invention especially for use with locomotives, to which it is peculiarly adapted, and I will illustrate and describe the apparatus as so used, although obviously it is applicable to steam-engines of other varieties.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a view of the driving-wheels, steam-cylinders, pitmen, and connecting-rods of a locomotive, the boiler thereof being also shown in outline, the steam-cylinders and valve-chests being shown in section; Fig. 2, a plan view thereof, omitting the boiler and such other parts as do not especially relate to my invention; Fig. 3, a transverse sectional view on the dotted line 3 3 in Fig. 1; Fig. 4, a transverse sectional view as seen from the dotted line 4 4 in Fig. 1; and Fig. 5, a view similar to Fig. 1, but showing the arrangement when a cylindrical valve is used instead of the ordinary slide-valve.

The locomotive shown is of the "ten-wheel" variety. I will omit all reference to the boiler, trucks, and such like parts which have no immediate connection with my present invention. I will also confine my description to the mechanism on one side, as that upon the other side is, as usual, substantially a duplication.

The driving-wheels 1, 2, and 3 are connected by connecting-rods 4 and 5, which are suitably mounted upon their wrists, and from the wrist of the wheel 2 the pitman 6 extends back to a cross-head 7, which in turn is connected

to the piston-rod 8, carrying a piston-head 9, which travels back and forth in the steam-cylinder 10 as it is impelled by the steam, all in the ordinary and well-known manner. Arranged above the steam-cylinder 10 is a second and larger cylinder 11, in which travels a piston-head 12, secured in the usual manner to a piston-rod 13, which is connected to a cross-head 14. Upon a rock-shaft 15 is a disk or rocker-arm 16, and from suitable wrists on opposite sides of this disk or arm connecting-rods 17 and 18 run, respectively, to the cross-heads 7 and 14. As will be observed, the piston-heads are arranged to travel oppositely to each other, so that the force which is exerted through the rock-shaft and its attachments is added to the force which is applied directly to the cross-head 7 and connected parts from the piston-head 9. The steam as it exhausts from the steam-cylinder 10 passes to the steam-chest 20 of the steam-cylinder 11 and thence into said cylinder 11, where it operates under expansion upon the piston-head 12 therein. As will be understood, the shaft 15 extends through to the other side of the engine and has a similar mechanism rigidly fixed to its other end. By this arrangement the power of three cylinders is at all times exerted upon the driving-gear.

In the principal views, as above stated, I have shown the ordinary steam-chests and an ordinary variety of slide-valves therein. These slide-valves 21 and 22 are operated by the valve-rods 23 and 24, which are connected at their outer ends by a rocker-arm 25, and this is impelled, as usual, by a suitable connection with an appropriate moving part. This, however, as it is or may be of a substantially ordinary and well-known form, need not be further described herein.

In Fig. 5 I have shown, instead of the ordinary slide-valves each having its own steam-chest, a cylindrical steam-chest in which a piston-valve having six heads operates, and the valve connections are modified accordingly. This piston-valve construction is more compact than the other and is in some respects to be preferred; but the variety of steam-chest and valve is not material to my invention so long as some variety is employed by means of which the steam may be conducted first into the smaller steam-cylinder

and after it has done its work therein thence to the larger, where it may do further work, my invention consisting wholly of the peculiar arrangement described, by means of which, without undue prolongation of the structure, the advantage of a double-cylinder engine working under expansion may be secured in the class of steam-engines to which this arrangement of apparatus is applicable.

10 Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

15 The combination, in a locomotive, of the driving-wheels, the connecting-rods connected to the wrists thereof, a connecting-rod running from one of said wrists to a cross-head, suitable ways for said cross-head, a piston connected to said cross-head, a steam-cylinder in which said piston operates, a suitable valve whereby steam is admitted to and permitted to escape from said cylinder, a second steam-cylinder to which the steam as it

escapes from the first steam-cylinder is conducted, a piston in said second cylinder, a cross-head to which said piston is connected, 25 suitable ways for said cross-head, a rock-shaft extending through from one side to the other of the engine, a disk or rock-arm on each end of said rock-shaft, and connecting-rods running from wrists on each of said 30 disks or rock-arms to the cross-heads connected with the duplicate cylinders on each side of the engine, whereby the force from the two sets of steam-cylinders is transmitted to and exerted upon said driving-wheels, substantially as shown and described. 35

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 12th day of April, A. D. 1899.

WILLIAM T. HARRIS. [L. S.]

Witnesses:

CHESTER BRADFORD,
JAMES A. WALSH.