No. 629,504. Patented July 25, 1899.

# A. B. HERRICK & W. M. BROCK.

## MOTOR APPARATUS FOR LOOMS.

(No Model.) (Application filed Aug. 23, 1898.)

3 Sheets—Sheet 1.

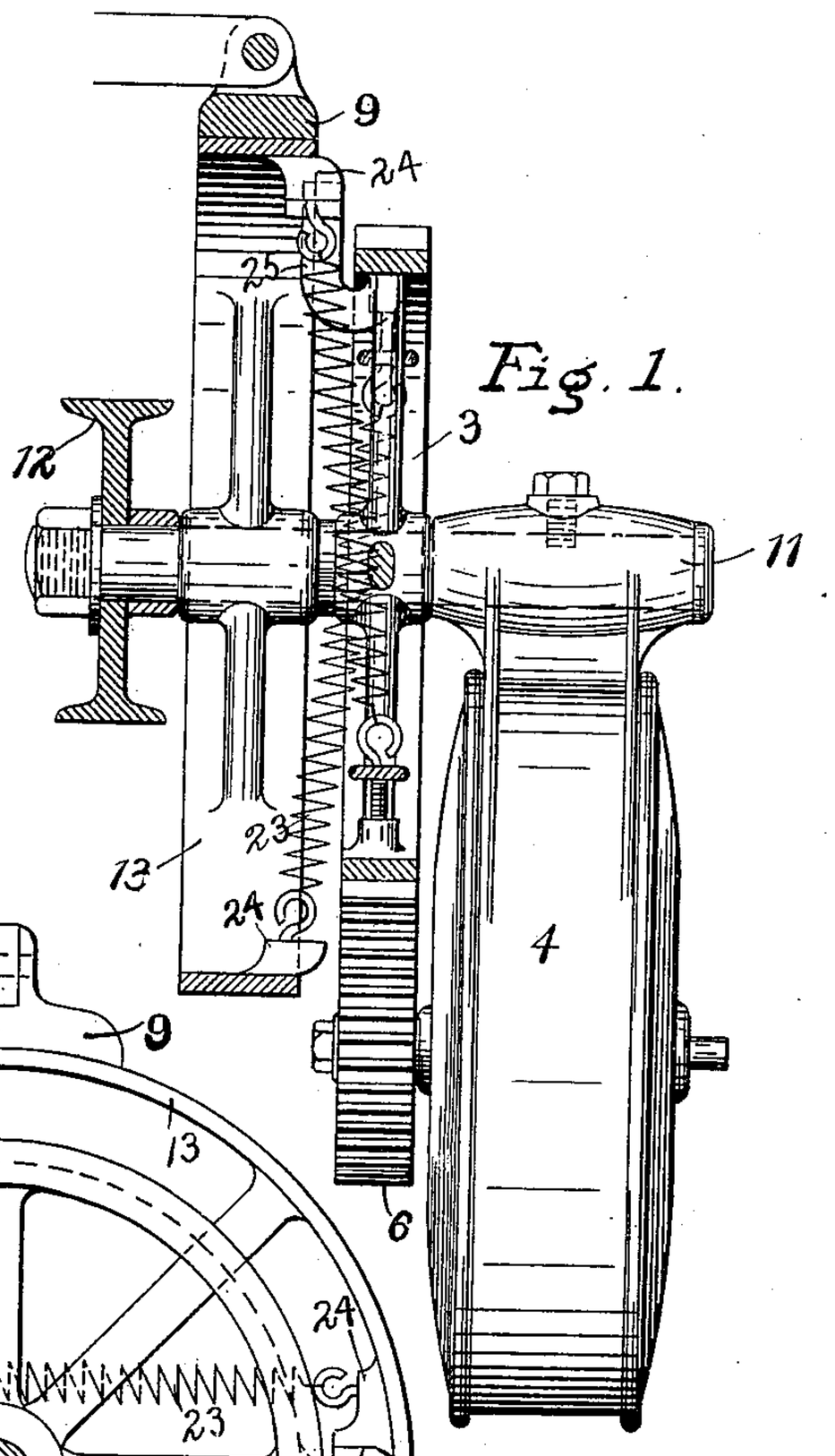


Fig. 1.

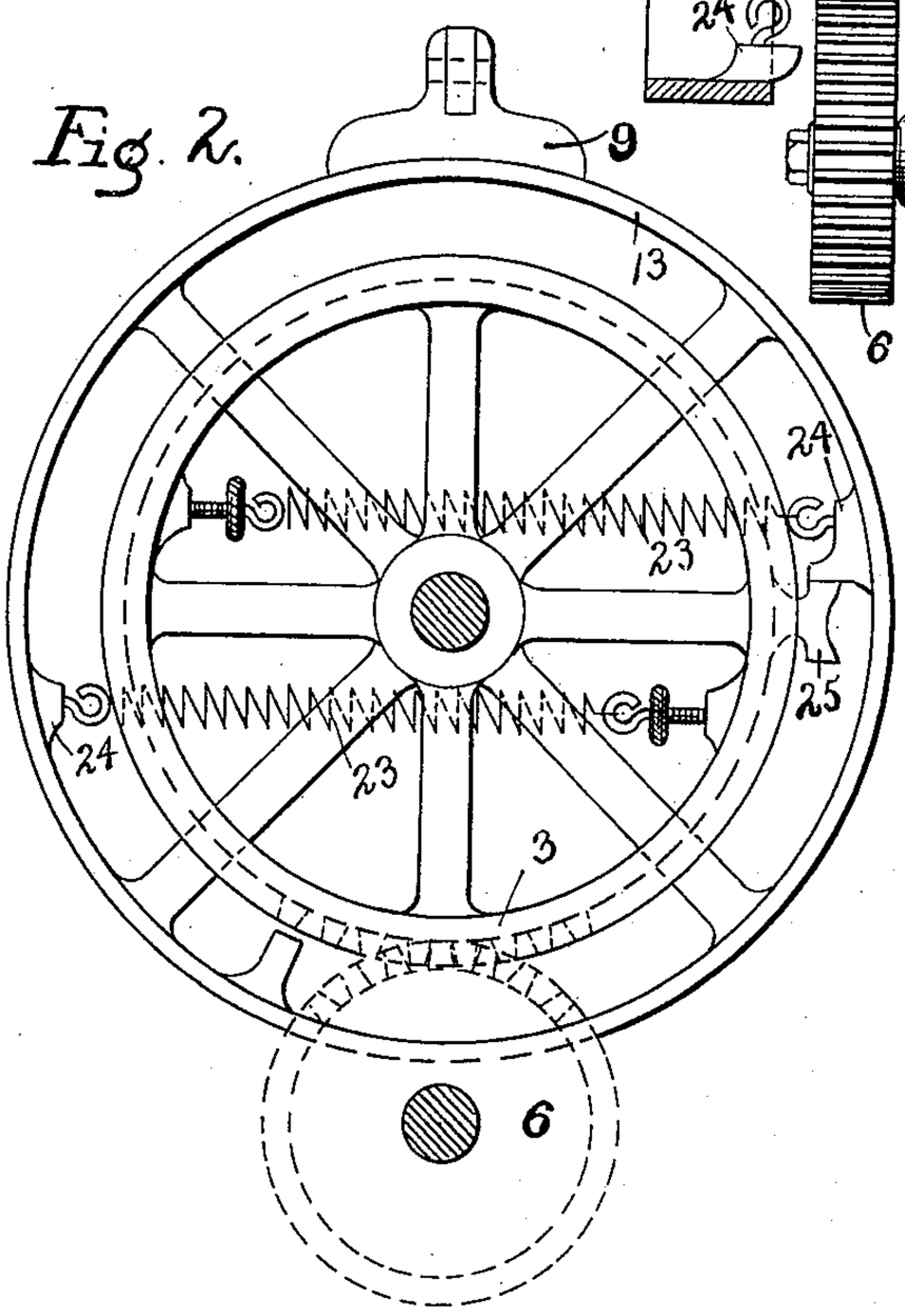


Fig. 2.

Witnesses
J. E. Crafton
Geo. H. Graves.

Albert B. Herrick and
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By their Attorney C. V. Edwards.

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Fig. 3.

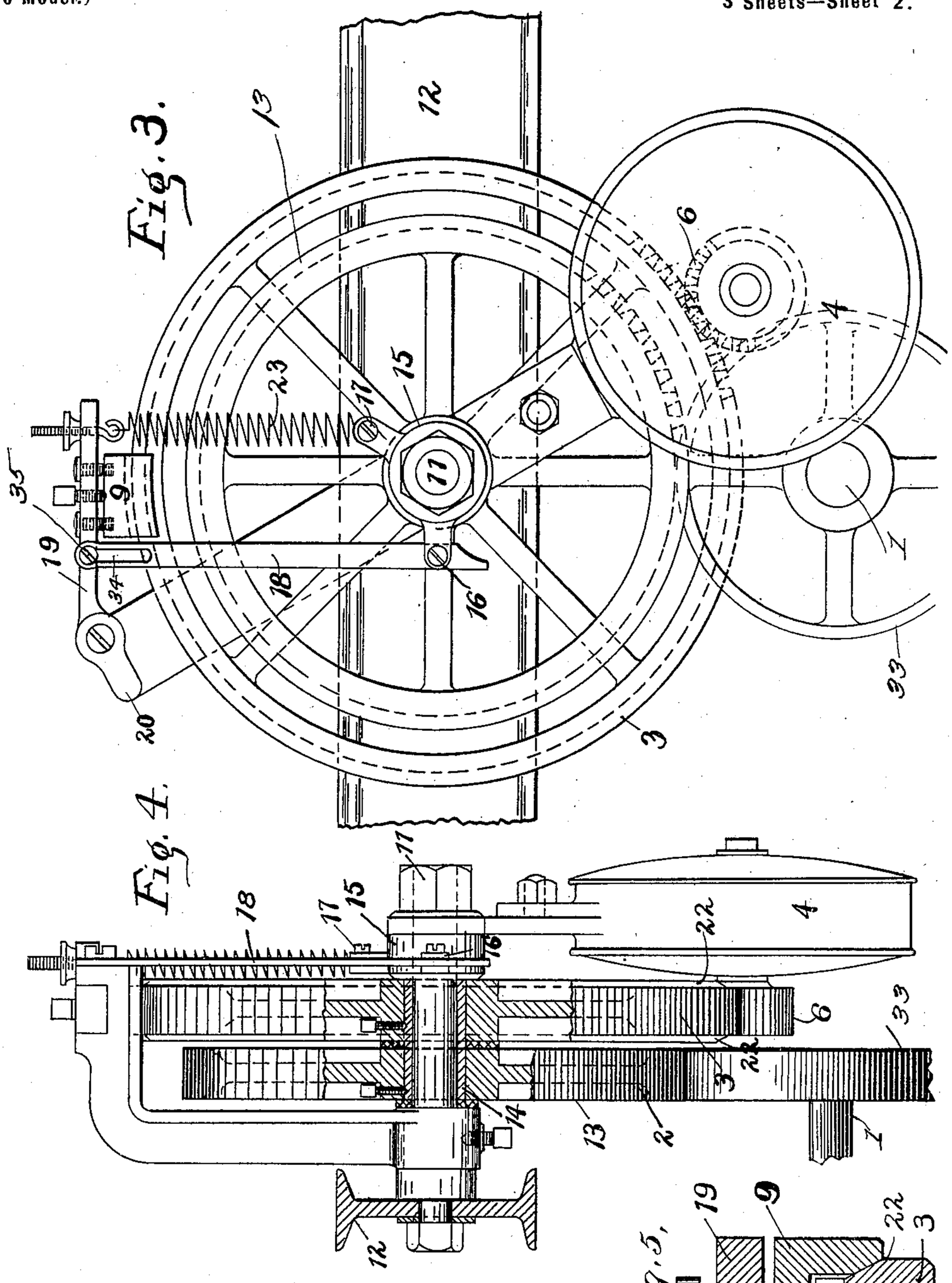
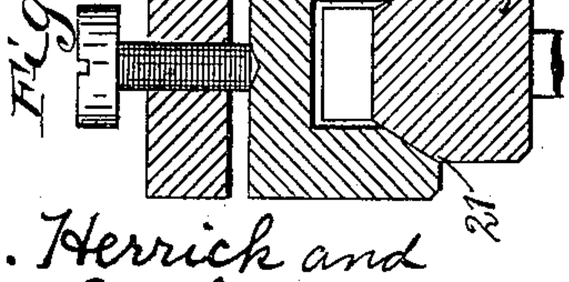



Fig. 4.




Fig. 5.




Witnesses
F. E. Crafton
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(No Model.) 3 Sheets—Sheet 3.

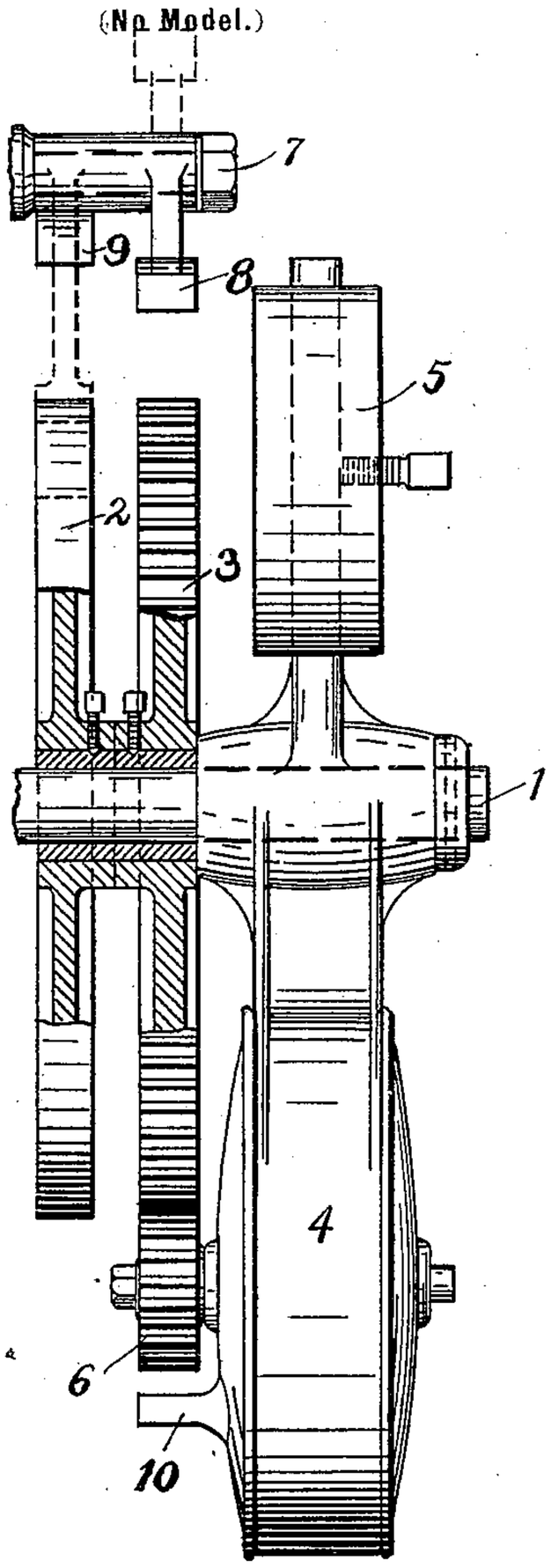


Fig. 6.

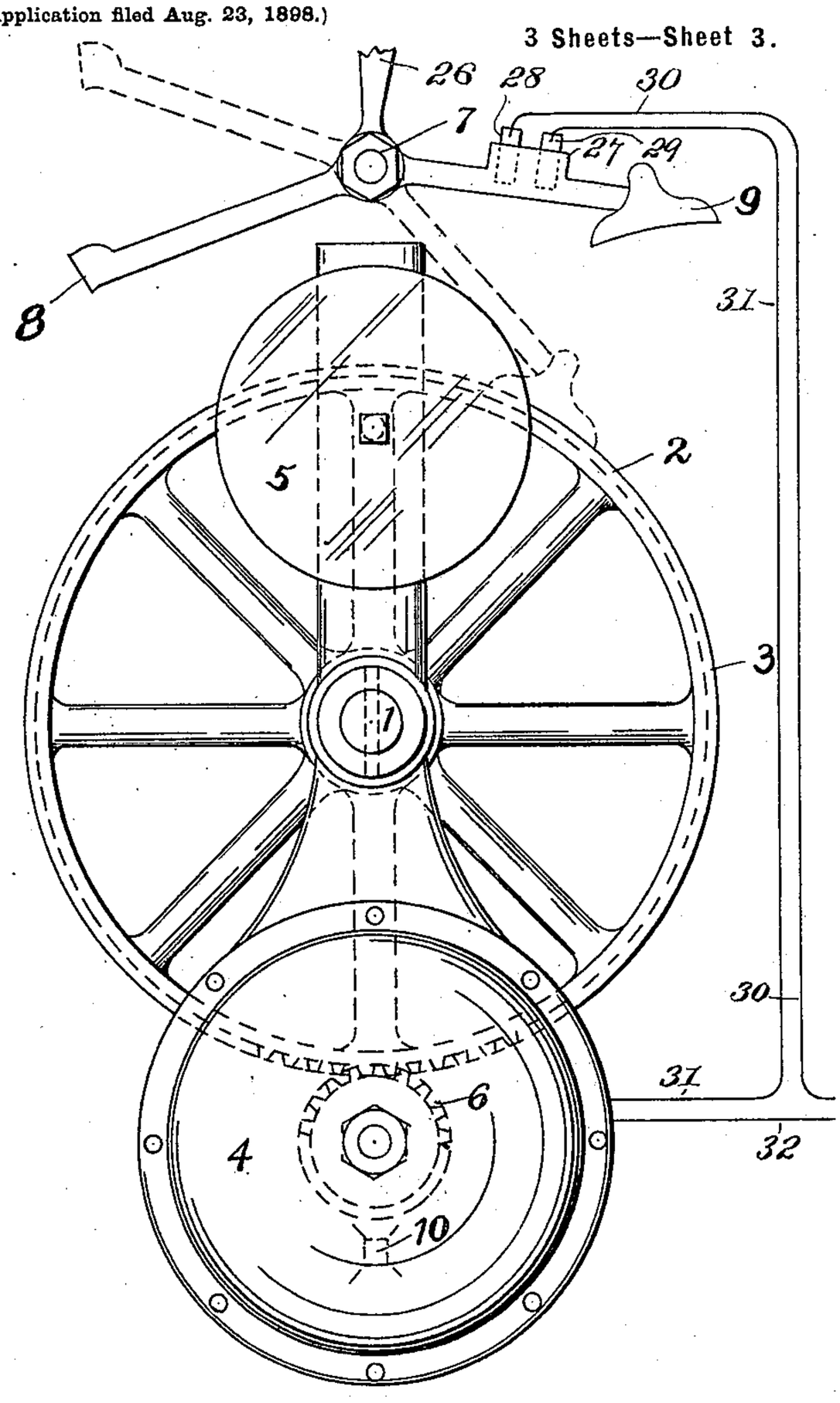


Fig. 7.

Witnesses
C. E. Griffith
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By their Attorney C. V. Edwards.

# UNITED STATES PATENT OFFICE.

ALBERT B. HERRICK, OF RIDGEWOOD, AND WILLIAM M. BROCK, OF PATERSON, NEW JERSEY.

## MOTOR APPARATUS FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 629,504, dated July 25, 1899.

Application filed August 23, 1898. Serial No. 689,284. (No model.)

*To all whom it may concern:*

Be it known that we, ALBERT B. HERRICK, residing at Ridgewood, in the county of Bergen, and WILLIAM M. BROCK, residing at Paterson, in the county of Passaic, State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Motor Apparatus for Looms, of which the following is a full, clear, and exact specification.

Our invention relates to apparatus for starting and running loom machinery; and its object is to construct a motor apparatus which shall start the loom at full speed when started from rest, shall operate the same smoothly and evenly, and which shall be capable of operating a loom with a motor of sufficient power to perform the work after a start has been accomplished, but which would under ordinary conditions be too weak to start the loom from rest.

At the present time most of the looms in practical use are operated either by steam-power or by electric motors of more than the requisite power to start and operate them belted to the loom-shaft, the motor or steam-engine being kept in constant operation and the loom being started and stopped by shifting the belts. By such arrangement a great deal of power is wasted, the loom operates unevenly, and it is almost impossible to make an instantaneous stop of the apparatus.

Our invention therefore primarily consists of means for starting the motor without load and running it in this condition to the necessary speed to accumulate sufficient inertia to overcome the static inertia of the loom and means for effecting a connection of the motor after this speed has been attained to the driving-shaft of the loom.

The invention further comprehends the introduction of a flexible connection between the motor and the loom and other features of advantage, which will more fully hereinafter appear.

By reference to the accompanying drawings, in which certain forms and modifications of the invention are shown, the accompanying description will be more fully understood.

In the drawings, Figure 1 is a side view, partly in section, illustrating a motor connected with a loom-shaft in accordance with our invention. Fig. 2 is a sectional end view of Fig. 1. Fig 3 is a sectional end view of a modification of the invention. Fig. 4 is a side view, partly in section, of the device shown in Fig. 3. Fig. 5 is a detail sectional view of the brake-shoe. Fig. 6 is a side view, partly in section, of a still further modification of the device; and Fig. 7 is a sectional end view of Fig. 6.

Referring more particularly to the drawings, Fig. 6, 1 represents the driving-shaft of the loom. Rigidly mounted on this is a brake-wheel 2 and a gear-wheel 3. The motor 4, which in this instance is represented as an electric motor of any suitable construction, is loosely mounted upon shaft 1 and is counterbalanced by a weight 5. The motor and its counterbalance being thus free to revolve upon the shaft 1, the pinion 6, fixed to the armature-shaft of the motor, which shaft is mounted in the motor casing or frame, will travel around gear-wheel 3, thus swinging the motor around the shaft 1. Upon a fixed stud 7 is mounted a stop 8 and a brake 9, the two latter preferably comprising a single bar, pivoted at its middle to the stud and carrying at one end the stop and at the other end the brake, the lever having a limited range of movement, whereby in one position the stop will be in the path of movement of a lug 10 on the motor-casing and the brake elevated out of said path, as shown in Fig. 7, and in the other position the stop will be elevated out of said path and the brake depressed and applied to the brake-wheel 2. Suitable connections should be made between the stop and the brake and the switch controlling the motor, whereby when the stop is in the path of lug 10 and the brake released the motor will start and when the stop is removed and the brake applied the power will be cut off. In Fig. 7 I have illustrated one of the many ways in which this may be accomplished. In this instance 26 represents a handle by which the stop and brake are moved simultaneously, the one into and the other out of operative position. Upon the brake-arm is carried a connecting-bar 27 of conductive material adapted to connect two contacts 28 and 29,

the latter being connected, respectively, by wires 30 and 31 to a source of current-supply and to the motor. When the brake-arm carrying the connecting-bar 27 is moved away from the contacts 28 and 29, the motor-circuit will be broken. 32 represents a conductor between the motor and the source of current-supply to complete the circuit.

In the operation of the above-described device, the machine being at rest and the brake applied, the motor will be in the position shown in Fig. 7, it being preferably made sufficiently heavier than the counterbalance to cause it to assume the position shown. The bar carrying stop 8 and brake 9 is moved to release the brake and move stop 8 into the path of lug 10. This movement turns on the current for the motor and starts the latter. There is at this time no load upon the motor, and it being counterbalanced the pinion 6, in mesh with gear-wheel 2, will cause the motor to rotate about shaft 1. By the time it has traveled far enough for the lug 10 to strike the stop 8 it will have attained the desired speed to operate the loom and will possess sufficient inertia to overcome the static inertia of the loom, and thus start the same. When lug 10 strikes stop 8, the further travel of the motor about shaft 1 must cease and its inertia will be reflected upon gear-wheel 2 through pinion 6, causing the gear-wheel and the loom-shaft to commence rotation at full speed. When the stop 8 is removed from the path of the lug 10 on the motor-case and simultaneously the brake is applied and current turned off the motor, the inertia of the motor will be spent in simply causing the latter to travel about the shaft 1 and will not in any way interfere with the braking of the loom by the brake 9.

In the practical operation of the machine above described we have found that a rigid connection between the driving and driven parts is not always desirable, owing to the tendency of the inertia of the driving part to at times drive the loom-shaft forward too quickly, and thus cause a somewhat jerking and uneven motion of the apparatus. We have therefore devised the flexible connection illustrated in Figs. 1 to 4. In Figs. 3 and 4 we have shown the motor 4 mounted upon a stud 11, bolted to the frame 12 of the loom, the motor being free to travel around the stud, but not being counterbalanced. A wheel 13, which is geared to a gear-wheel 33, fixed to the loom-shaft 1, and gear-wheel 3 are both rigidly mounted upon a sleeve 14, the latter being free to turn upon the stud 11. On the opposite side of the hub 15, to which the motor is attached, are lugs 16 and 17. A thrust-rod 18 is pivoted at one end to lug 16 and at its other end to a lever 19, pivoted in the loom-frame 20, which latter lever carries at its outer end the brake-shoe 9, adapted to impinge against the gear-wheel 3. The connection between rod 18 and lever 19 is such as to permit the rod to be raised a certain distance before it raises lever 19. This may be done by cutting a slot 34 in the end of the rod, the slot embracing a projection 35 on lever 19 and being of such length that when the motor has traveled the required length, as hereinafter described, the rod will be lifted, so that the end of the slot will strike against and raise the projection 35. The gear-wheel 3 has on opposite sides bearing-surfaces 21 and 22, and the brake-shoe 9 is made hollow, with sides to embrace said surfaces, as illustrated in detail in Fig. 5. To lug 17 is attached a spring 23, the latter being also attached to the lever 19. In this instance, when current is introduced to the motor the latter will begin to travel around stud 11, gradually extending spring 23 and tightening the brake and at the same time moving rod 18 vertically until the motor has traveled without load a sufficient distance, which will have been previously determined, to start the same, when the rod 18 will lift the brake against the pressure of spring 23, and at the same time that part of the rod 18 below lug 16 will strike against the hub upon which the motor-casing is mounted and will prevent further travel by the motor-casing, thus serving to hold the motor in a stationary position. During the operation of the apparatus the connection of the parts will thus be flexible and the spring 23 will take up any uneven motion of the loom. The strength of spring 23 may be varied to suit the conditions under which the motor is to work.

An efficient construction and one which we prefer in practice is that shown in Figs. 1 and 2, in which 11 is the stud mounted in frame 12 and to which the motor 4 is rigidly fixed. 3 is the gear-wheel meshing with pinion 6 on the shaft of the motor, and 13 is the wheel geared to the loom-shaft and to which the brake 9 is applied. Wheels 3 and 13 are loosely mounted upon stud 11. One or more stops 24 24 are formed on wheel 13, and one or more projections 25 25, adapted to engage said stops, are formed on wheel 3. Springs 23 23 of suitable strength connect wheels 3 and 13. When the brake 9 is released and the motor started, it will start without load, except the tension of the springs, and run until sufficient inertia is attained, when (the distance having been previously determined) the lugs 25 will strike against the stops 24 24. In this case the pull of the wheel 3 upon wheel 13 and the loom-shaft will be through springs 23 23 and against the rigid stops 24, and therefore the operation of the device will not be uneven. When the brake is applied, the tension of the springs will react to reverse the motor, and thus cause it to come to rest without interfering with the braking of the loom.

It is to be understood that we do not limit ourselves to the precise construction and arrangement of parts herein shown and described, as obviously the same may be varied or altered to suit individual conditions.

Having thus described our invention, we de-

clare that what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a driving-shaft, of a motor, means for starting the motor without load to a speed sufficient to overcome the static inertia of the driving-shaft, and means actuated by the motor for connecting said motor with the driving-shaft, said means being actuated by the motor when said speed has been attained, substantially as described.

2. The combination with a driving-shaft, of a motor, means for starting the motor without load to a speed sufficient to overcome the static inertia of the driving-shaft, and means actuated by the motor for automatically connecting said motor with the shaft, said means being actuated by the motor when said speed has been attained, substantially as described.

3. The combination with a driving-shaft, of a motor, means for starting the motor without load to a speed sufficient to overcome the static inertia of the driving-shaft, and means actuated by the motor for elastically connecting said motor with the driving-shaft, said means being actuated by the motor when said speed has been attained, substantially as described.

4. The combination with a driving-shaft, of a motor, a brake for said shaft, an automatic connection between said motor and brake whereby when the brake is released the motor will start and when applied the motor will stop, means for starting said motor without load to a speed sufficient to overcome the static inertia of the driving-shaft, and means for automatically connecting said motor, after said start has been made, with the driving-shaft, substantially as described.

5. The combination with a driving-shaft, of a motor, two rotary devices mounted upon the same shaft, one of said devices being geared to the driving-shaft and the other being geared to the motor, means for limiting the movement of said devices with respect to each other, and means for holding said motor in fixed position, substantially as described.

6. The combination with a driving-shaft, of a motor in fixed position, two rotary devices loosely mounted upon the same shaft, one of said devices being connected with said driving-shaft and the other of said devices being connected with the motor, one or more stops on one of said devices, and one or more projections adapted to engage said stops, on the other of said devices, substantially as described.

7. The combination with a driving-shaft, of a motor in fixed position, two rotary devices loosely mounted upon the same shaft, one of said devices being connected with said shaft and the other of said devices being connected with the motor, one or more stops on one of said devices, one or more projections on the other of said devices adapted to engage said stops, and one or more springs adapted to connect said devices with each other, substantially as described.

8. The combination with a driving-shaft, of a motor and its controlling-switch, a brake for said driving-shaft, two rotary devices loosely mounted upon the same shaft, one of said devices being connected with said loom-shaft and the other of said devices being connected with the motor, one or more stops on one of said devices, one or more projections on the other of said devices adapted to engage said stops, one or more springs adapted to connect said devices with each other, and connections between said brake and said motor-switch whereby when the brake is released the motor will be started, substantially as described.

9. The combination with a driving-shaft, of a motor, a wheel geared to the motor-shaft and adapted to be rotated a determined distance by said motor before being brought into operative connection with said driving-shaft, and means for bringing said wheel into operative connection with said shaft, said means being made operative by the motor when the wheel has rotated said determined distance, substantially as described.

10. The combination with a driving-shaft, of a motor therefor, means whereby a limited free rotation of the motor-shaft is permitted, and means whereby when said limit is reached the motor-shaft will be operatively connected with the driving-shaft, said means being actuated by said motor, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ALBERT B. HERRICK.
WM. M. BROCK.

Witnesses:
WILLIAM H. H. STRYKER,
GEO. R. WOODWARD.