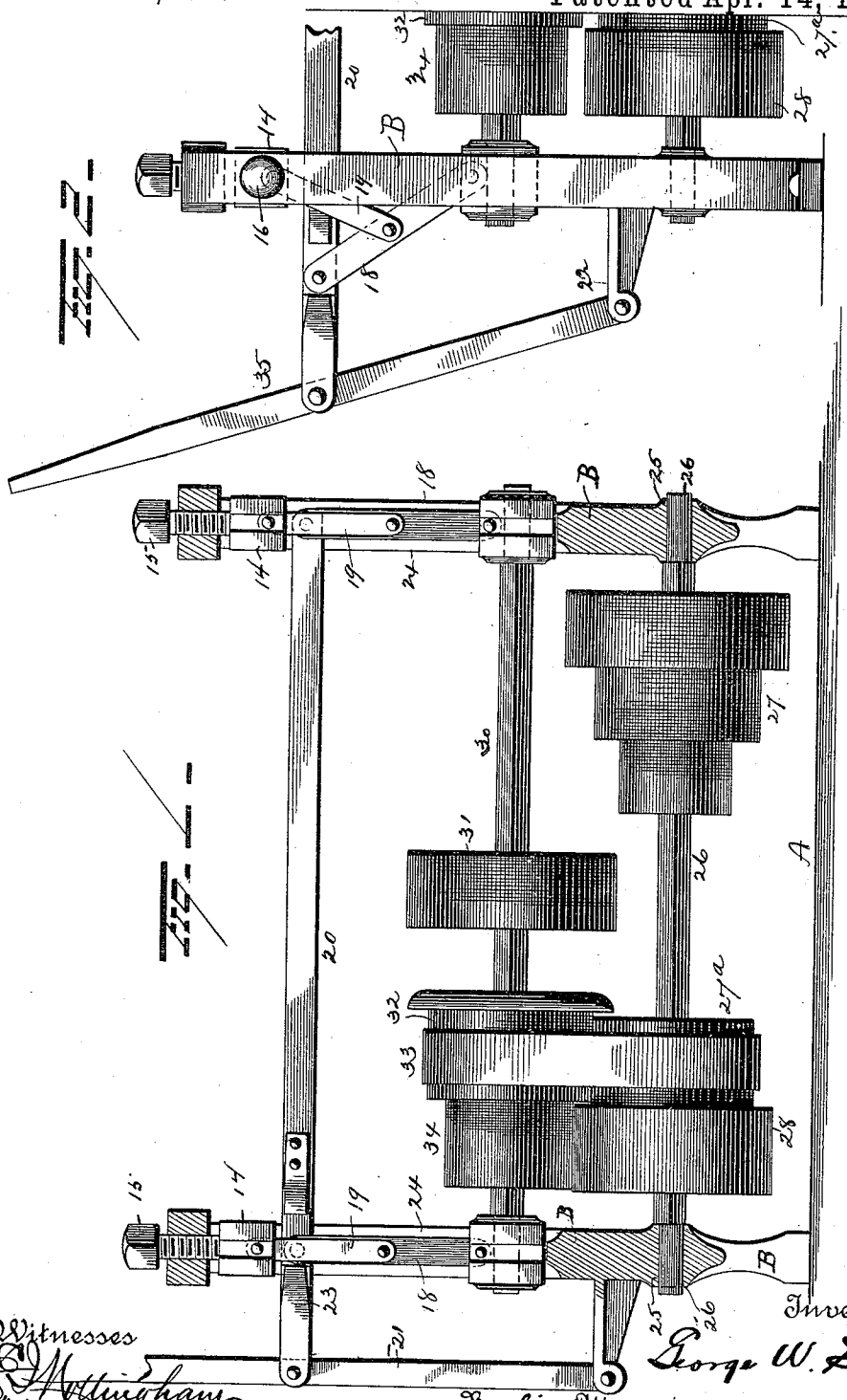
(No Model.) 2 Sheets—Sheet 1.

# G. W. SOULÉ.

## FRICTIONAL GEARING.

No. 450,302. Patented Apr. 14, 1891.




Witnesses
C. Mottinghame
G. F. Downing.

Inventor
George W. Soulé
By his Attorneys
H. A. Seymour

THE NORRIS-PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

# G. W. SOULÉ.

## FRICTIONAL GEARING.

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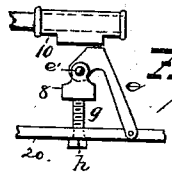


Fig. 1.



Fig. 3.

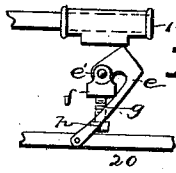
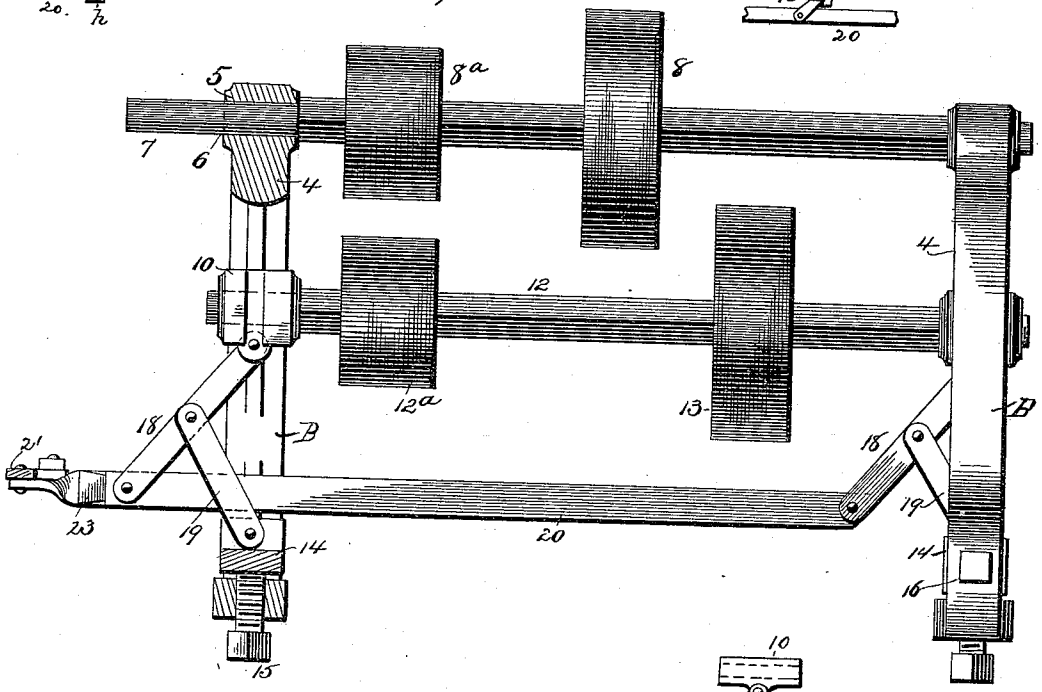


Fig. 9.



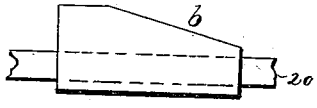


Fig. 6.

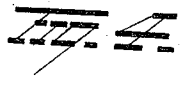


Fig. 4.

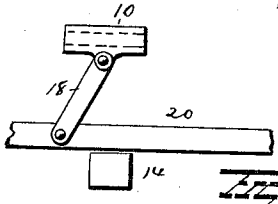


Fig. 5.

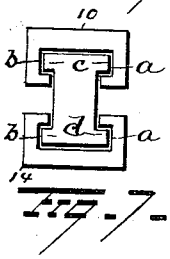
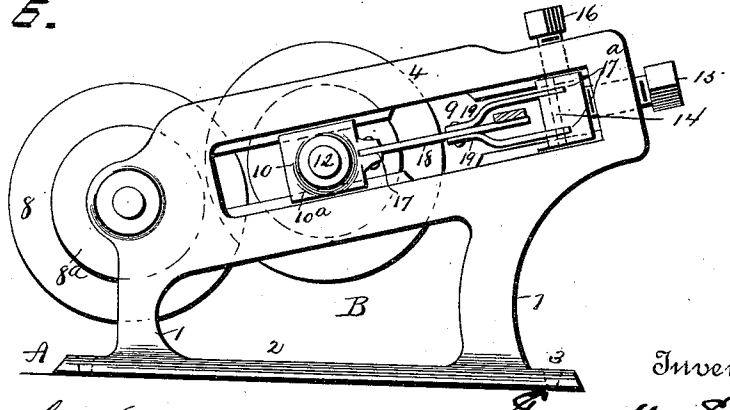


Fig. 7.



Witnesses
R. H. Whitehead
G. F. Dobbing.

Inventor
George W. Soulé
By his Attorney
H. A. Seymour

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

GEORGE W. SOULÉ, OF MERIDIAN, MISSISSIPPI.

## FRICTIONAL GEARING.

SPECIFICATION forming part of Letters Patent No. 450,302, dated April 14, 1891.

Application filed December 26, 1889. Renewed October 6, 1890. Serial No. 367,277. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. SOULÉ, a citizen of Meridian, in the county of Lauderdale and State of Mississippi, have invented certain new and useful Improvements in Frictional Gearing; 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.

My invention relates to an improvement in frictional gearing, and has for its object to provide simple and effective means for the division of power from a main or line shaft without the employment of tight and loose pulleys and frictional or other clutches.

A further object is to so construct the gearing that when the power is removed from the main shaft said shaft shall be perfectly free, thus avoiding the unnecessary wear and tear occasioned by fast and loose pulleys and friction-clutches.

With these objects in view my invention consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of the reversible gear with the friction-wheels in contact and the band loose. Fig. 2 is an elevation of a portion of the same, showing the band-wheels separated. Fig. 3 is a plan view, partly in section, of the single gear. Fig. 4 is an end view of the same. Figs. 5, 6, 7, 8, and 9 represent modifications.

It is evident that the hangers or standards for supporting the gearing, &c., may be secured either to the ceiling or to the floor of a room; but for convenience of illustration and description I will refer to them as being secured to the floor of a room or to timbers constituting such floor.

A represents the floor of a room, and B one form of standard secured thereto in any approved manner, two of such standards being shown in the drawings, and both standards B being identical in construction a description of one will suffice for both.

The standard B comprises legs 1, connected by a web 2, perforated ears 3, projecting beyond the legs by which the standard is secured in place, and frames 4, made integral with the lower ends of the legs. In one end of the frame 4 of each standard a transverse opening 5 is made, which opening serves as a bearing for the journal 6 of a main or line shaft 7. The line-shaft may be provided with a band-wheel 8, (one or more,) by means of which motion may be transmitted to other shafts or sets of shafts, and with a friction-wheel $8^a$, (one or more,) by means of which motion may be transmitted to a counter-shaft, as hereinafter explained. The frame 4 is made with elongated openings 9 for the reception of sliding bearing-blocks 10, which latter are made with grooves $10^a$ to receive the walls of the opening 9. The bearing-blocks 10 have transverse perforations, which form bearings for the journals of a counter-shaft 12. Keyed upon the counter-shaft 12 is a friction-wheel $12^a$, adapted to be rotated by frictional contact with the wheel $8^a$ on the line-shaft. A band-wheel 13 (one or more) is also keyed on the counter-shaft 12, through the medium of which motion may be imparted to a piece of machinery by means of belts, &c.

Located in the opening 9 at the opposite end thereof from the bearing-block 10 is a block 14, having grooves to receive the walls of the opening. A screw-threaded perforation is made in the end of the frame 4 for the reception of a screw 15, by means of which the block 14 may be adjusted in the opening 9, and in the top of the frame 4 another screw-threaded perforation is made for the reception of a screw 16, by means of which the block 14 may be secured at any desired adjustment. The purpose of such adjustment of the block will be made clear hereinafter. The bearing-block 10 is provided with a slot 17, in which a lever 18 is pivoted. The block 14 is provided with two slots $17^a$, in each of which one end of a link 19 is pivoted. The opposite ends of the links 19 are pivotally connected to the lever 18 at a point at or near the center of said lever. Thus it will be seen that a toggle is produced, which connects the bearing-block 10 with the fixed block 14, so that when the free end of the lever 18 in each standard is operated the bearing-blocks 10 will be moved in the opening 9, and the friction-wheel $12^a$ on the counter-shaft 12 will be brought into contact with or moved away

from the friction-wheel $8^a$ on the line-shaft 7, the amount of pressure exerted upon the friction-wheel $8^a$ by the friction-wheel $12^a$ being regulated by the adjustment of the block 14.

In order to manipulate the toggles of both standards simultaneously, and thus move both ends of the counter-shaft, the free ends of the levers 18 are pivotally connected by a rod 20, one end of said rod extending beyond its pivotal connection with the lever 18 and pivotally connected with an operating-lever 21. The lever 21 may be pivoted in a suitable bracket 22.

In order to prevent the connecting-rod 20 being moved too far, and thus operating the toggle-levers in the reverse direction and separate the friction-wheels, a stop 23 is secured to or formed with the connecting-rod 20, which stop is adapted to engage one of the links 19, the block 14, or some stationary part of the standard, and thus limit the movement of the connecting-rod. The stop on the rod 20 is so placed that the center of pivotal connection of links 19 and lever 18 will be carried slightly beyond a line passing centrally through the blocks 10 and 14, so that it may not work back and thus free the contact of the frictional gearing, as it would be liable to do if brought only in line with the pivots of lever 18 and link 19 and the blocks 10 and 14 unless continuous pressure be maintained on lever 21.

It will be observed that by means of the devices above described the driven machines are under perfect control, that when stopped the belt and counter-shaft are also stopped and the line-shaft runs perfectly free, whereas in the use of a tight and loose pulley for the same purpose the belt is constantly running, its weight is on the line-shaft, and the loose pulley and counter-shaft are subject to constant wear. In the use of a friction-clutch, when the machine is stopped the line-shaft turns in the hub of the clutch-pulley and the entire pressure of the belt is on it, causing considerable wear.

Thus far I have described the invention as applicable to gearing running in a single direction; but the invention is equally as applicable to reversible gearing, in which case the devices for moving one shaft toward or away from the other remain unchanged.

In Figs. 1 and 2 the invention is shown as applied to reversible gearing and vertical instead of horizontal standards 24, as shown. Near the bottom of each standard a perforated boss 25 is formed to serve as journal-bearings for a shaft 26. Keyed upon the shaft 26 is a band-wheel or series of band-wheels 27 for the reception of a strap, by means of which motion may be imparted from the shaft 26 to any desired machinery. Also secured upon the shaft 26 are a band-wheel $27^a$ and a friction-wheel 28, the purpose of which will presently appear. Mounted above the shaft 26, in sliding bearings, (which bearings are similar in all respects to the bearing-blocks 10,) is a shaft 30, carrying a band-wheel 31, over which a band is adapted to pass and transmit motion to shaft 30 from a source of power. Another band-wheel 32 is keyed to the shaft 30 in line with the band-wheel $27^a$ of shaft 26, and passing over and connecting the band-wheels $27^a$ and 32 is a band 33. Made integral with or separate from the band-wheel 32, as desired, is a friction-wheel 34 in line with the friction-wheel 28 of shaft 26. The bearing-blocks of shaft 30 are connected by toggles and a connecting-rod with an operating-lever 35 in precisely the same manner as the bearing-blocks of the counter-shaft 12, above described. Now, when the friction-wheels 28 34 are out of contact and the shaft 30 at the upper extremity of its movement, the band 33 will be tight, and motion imparted to shaft 30 in one direction will cause the shaft 26 to rotate in the same direction. When it is desired to cause the shaft 26 to rotate in the reverse direction, the lever 35 is operated to lower the shaft 30 and bring the friction-wheels 28 34 into contact with each other. The shaft 30 will now be driven in the reverse direction, the band-wheel 33 having been loosened when the shaft 30 was lowered.

Instead of the toggle-joints above described, the modification shown in Fig. 5 may be employed, in which case the link 19 will be dispensed with and the rod 20 made to have a sliding bearing on the block 14. Thus when said rod is operated the sliding bearing-block 10 will be moved through the medium of the lever 18.

In Figs. 6 and 7 another modification is shown. In this form of the invention the blocks 10 and 14 are provided with grooves $a\ a'$, and a block $b$ is secured to the rod 20, one edge of said block being made inclined and both edges provided with flanges $c\ d$, adapted to move in the grooves or recesses $a$ $b$ of the blocks 10 and 14. Thus it will be seen that when the rod 20 is operated the movable bearing-blocks 10 14 will be moved in their bearings.

In Figs. 8 and 9 still another modification of the device for operating the sliding bearing-blocks is shown. In this form a cam-lever $e$ is pivoted at $e'$, and adapted to bear on the sliding bearing-block 10. One end of the cam-lever is pivoted to the operating-rod 20, and to the other end of said cam-lever a block $f$ is pivoted and provided with a screw-threaded recess for the reception of a threaded rod $g$, said rod being provided at its free end with a head $h$. Thus it will be seen that when the rod 20 is operated the cam-surface of lever $e$ will engage the bearing-block 20 and slide the same.

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

1. In a frictional gearing, the combination, with standards, of two shafts mounted there-

in, one in movable and the other in fixed bearings, a band-wheel on each shaft, a band connecting said band-wheels, a friction-wheel on each shaft adapted to have contact with each other, and devices for moving the shaft in movable bearings toward and away from the shaft in fixed bearings, substantially as set forth.

2. In a frictional gearing, the combination, with standards, of fixed bearings and sliding bearings carried by the standards, friction-wheels on the shafts adapted to have contact with each other, a toggle connected with each sliding bearing, and means for operating said toggle to cause the sliding bearings to move simultaneously toward or away from the fixed bearings, substantially as set forth.

3. In a frictional gearing, the combination, with standards, of fixed bearings and sliding bearings carried by said standards, friction-wheels on the shafts adapted to have contact with each other, toggles connected with the sliding bearings, a rod connecting said toggles, and means for manipulating said rod, whereby the toggles of both standards will be simultaneously operated forward or backward to cause the sliding bearings to move toward or away from the fixed bearings, substantially as set forth.

4. The combination, with standards carrying fixed bearings and sliding bearings, and shafts mounted in said bearings, of a toggle connected to the sliding bearings of each standard and also to the standard, and means for operating all the toggles simultaneously, whereby the sliding bearings will be moved simultaneously toward or away from the fixed bearings, substantially as set forth.

5. The combination, with standards carrying fixed and sliding bearings, and shafts mounted in said bearings, of toggles connected to the sliding bearings of each standard and also to the standard, a rod pivotally connecting all the toggles, and a lever for reciprocating said rod, whereby the toggles are operated and whereby the movable bearings are shifted simultaneously in the same direction, substantially as set forth.

6. The combination, with standards carrying fixed and sliding bearings, and shafts mounted in said bearings, of toggles pivotally connected to the sliding bearings of each standard and to a block carried by each standard, a rod pivotally connecting all the toggles, and means for reciprocating said rod, whereby the toggles are operated and whereby the movable bearings are shifted simultaneously in the same direction, substantially as set forth.

7. The combination, with standards carrying fixed and sliding bearings, and shafts mounted in said bearings, of toggles pivotally connected to the sliding bearings of each standard and to an adjustable block carried by each hanger, a rod pivotally connecting all the toggles, and means for reciprocating said rod, whereby the toggles are operated and whereby the movable bearings are shifted simultaneously in the same direction, substantially as set forth.

8. The combination, with standards carrying fixed and sliding bearings, and shafts mounted in said bearings, of toggles pivotally connected to the sliding bearings of each standard and to the standards, a rod pivotally connecting the toggles, a stop on the rod for limiting its movement, and means for reciprocating said rod, substantially as set forth.

9. The combination, with a shaft mounted in fixed bearings, a shaft mounted in sliding bearings, a band-wheel on each shaft, a band connecting said band-wheels, and a friction-wheel on each shaft adapted to have contact with each other, of toggles attached to the sliding bearings and to the standards, and means for manipulating all of said toggles simultaneously, whereby the shaft in sliding bearings will be moved toward or away from the shaft in fixed bearings, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE W. SOULÉ.

Witnesses:
J. J. McMAHON,
W. B. INGE.