(No Model.)

C. F. CLIFF.

DIFFERENTIAL HOISTING MACHINE.

No. 487,994. Patented Dec. 13, 1892.

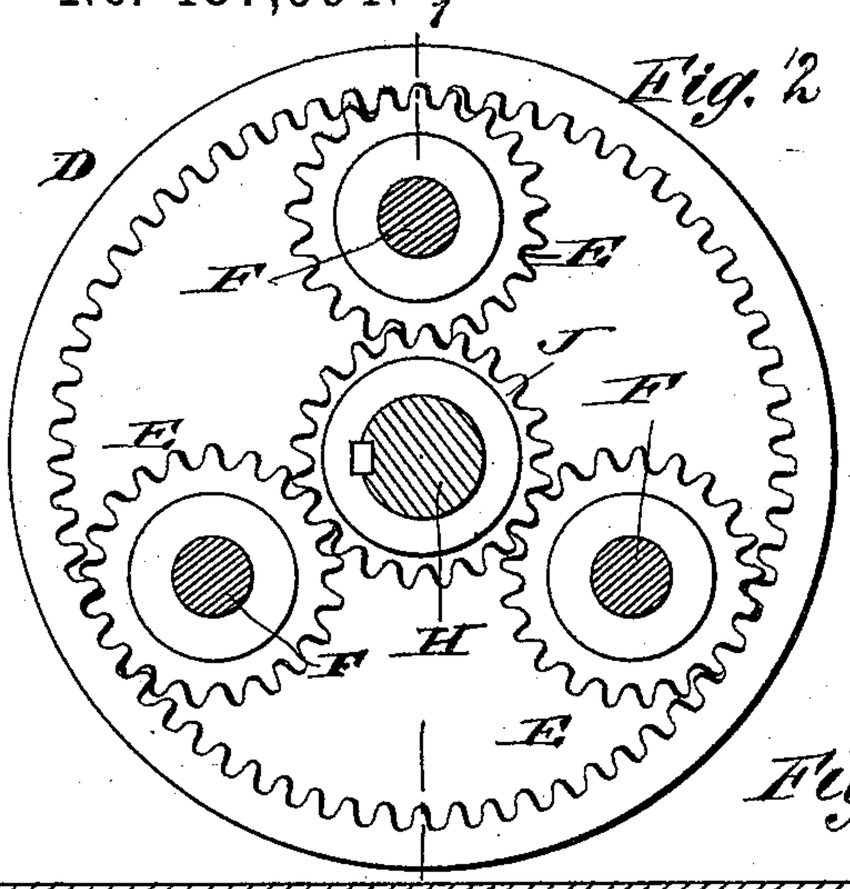


Fig. 2

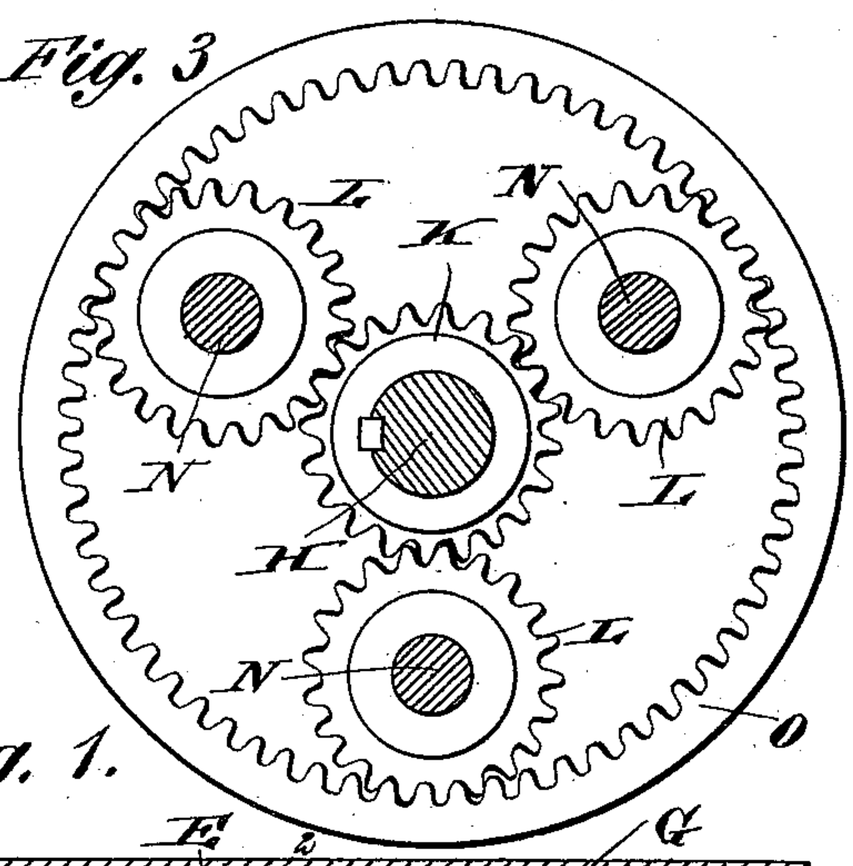


Fig. 3

Fig. 1.

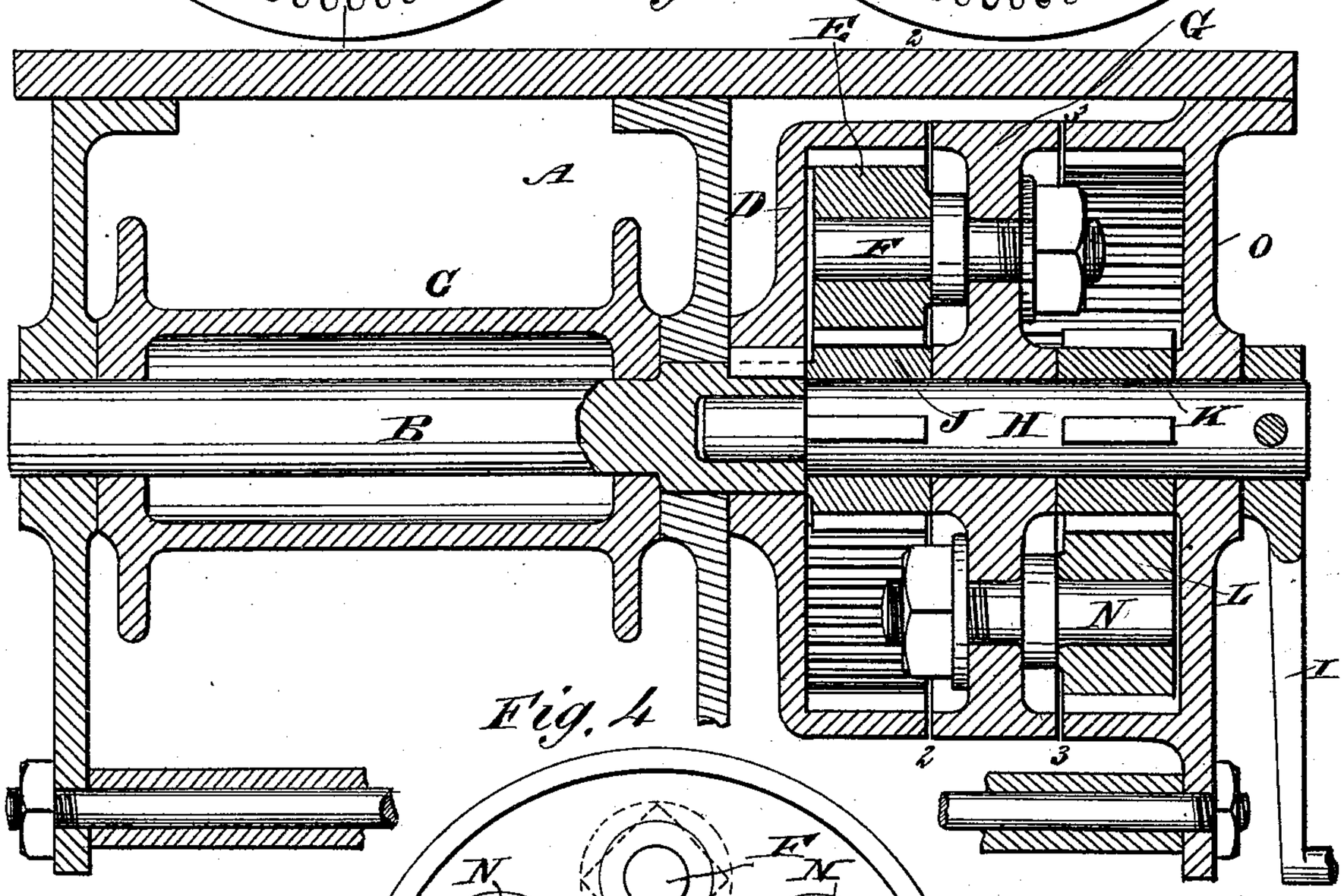
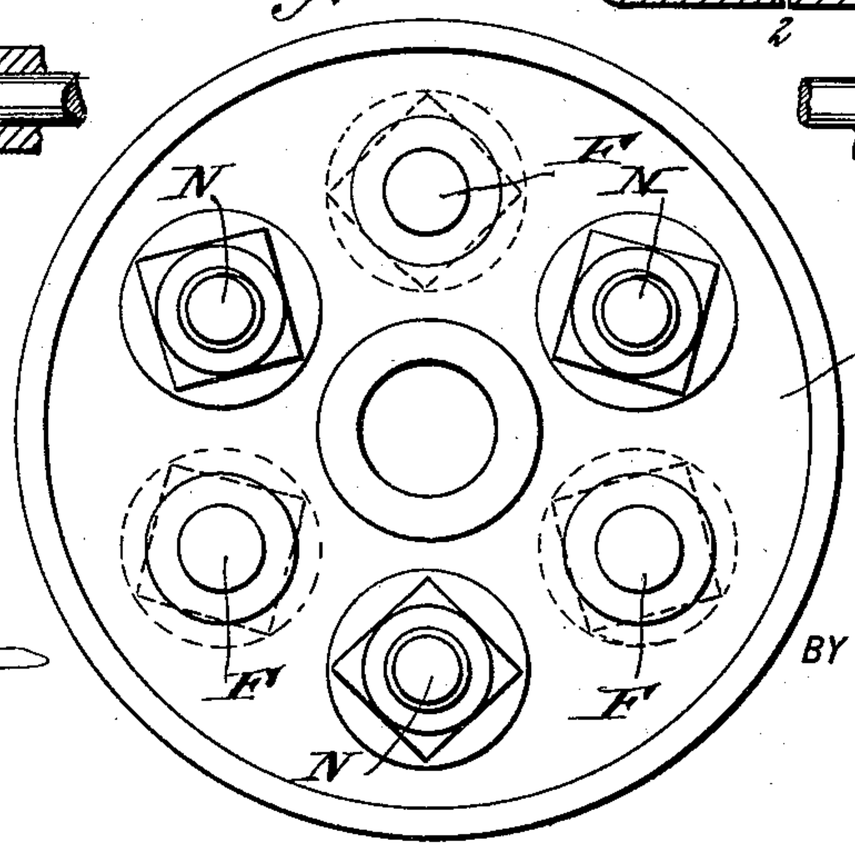


Fig. 4



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CHARLES F. CLIFF, OF DURHAM, CANADA.

DIFFERENTIAL HOISTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 487,994, dated December 13, 1892.

Application filed April 15, 1892. Serial No. 429,285. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FREDERICK CLIFF, of Durham, in the Province of Ontario and Dominion of Canada, have invented a new and Improved Differential Hoisting-Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved differential hoisting-machine which is simple, durable, and compact in construction, very effective in operation, and not liable to accidentally run backward when a load is applied.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement on the line 1 1 of Fig. 2. Fig. 2 is a transverse section of the same on the line 2 2 of Fig. 1. Fig. 3 is a similar view of the same on the line 3 3 of Fig. 1, and Fig. 4 is a face view of the loose wheel carrying the studs.

The improved hoisting-machine is provided with a suitably-constructed frame A, in which is journaled the drum-shaft B, carrying the drum C, on which winds the hoisting-rope. On one end of the drum-shaft B is secured by key or otherwise an internal gear-wheel D in mesh with a series of pinions E, mounted to turn loosely on studs F, attached to the web of a wheel G, mounted to rotate loosely on a shaft H, one end of which has its bearing in the drum-shaft B. The studs F are arranged in a circle and preferably placed equal distances apart, as is plainly shown in Fig. 2, so that the pinions E on the said studs mesh nicely into a pinion J, keyed or otherwise secured on the shaft H. Thus the said pinions E are at the same time in mesh with the central pinion J and with the internal gear-wheel D.

On the shaft H is secured a crank-arm I for turning the said shaft H, and on the latter is secured a second pinion K in mesh with a series of pinions L, journaled on studs N, also secured to the web of the wheel G, but projecting from the opposite side thereof, as will be readily understood by reference to Figs. 1 and 4. The studs N are arranged in a circle and placed equal distances apart, so that the said pinions L can mesh at their outer ends into an internal gear-wheel O, fixed on the frame A. The fixed internal gear-wheel O forms a bearing for the outer end of the shaft H, it being understood that the latter is arranged in line with the shaft B, and the internal gear-wheels D and O, as well as the loose wheel G, are concentric. The internal gear-wheel O, as shown in the drawings, has sixty-four teeth, while the other internal gear-wheel D has one tooth less—that is, sixty-three.

The pinions L in mesh with the internal gear-wheel O and the pinions E in mesh with the internal gear-wheel D have each twenty-one teeth, the pinions J and K being arranged correspondingly, so that a differential motion is obtained in the following manner: When the shaft H is rotated by turning the crank-arm I, then the pinions J and K impart a rotary motion to the pinions E and L, respectively, journaled on the studs F and N, respectively. As the pinions L are in mesh with the fixed internal gear-wheel O, the said pinions roll off on the said fixed internal gear-wheel O, and consequently impart a rotary motion to the loose wheel G. As the latter travels forward it carries the studs F along, carrying the pinions E, and as the latter are in mesh with the internal gear-wheel D the latter is rotated very slowly on account of the difference in the speed given to the said internal gear-wheel D by the pinions E, which are held on the traveling loose wheel or pulley G. The rotary motion imparted to the internal gear-wheel D is transmitted to the shaft B, to which it is connected, so that the hoisting-drum C is rotated at a very slow rate of speed.

As shown in the drawings, it requires two hundred and fifty-six revolutions of the shaft H to impart one single revolution to the hoisting-drum shaft B, and consequently to the drum C.

I do not limit myself to the exact proportion of the several gear-wheels shown and described, as the same can be varied according to the dimensions, power, or speed of the machine to be built. It is, however, necessary

that the internal gear-wheel D shall travel at a different rate of speed to the pinions E, so that a slow upward motion is imparted to the internal gear-wheel D.

By making the rim of the loose wheel G of the same size as the rims of the internal gear-wheels D and O and fitting the several wheels close together, as shown in Fig. 1, no dust, dirt, or other impurities can pass into the gearing contained in the said wheel, as above described. It will further be seen that the differential gearing is very simple and compact in construction and prevents any accidental backward motion of the shaft B when the drum C is heavily loaded.

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

1. In a device of the class described, the combination, with a fixed internal gear-wheel and a revoluble internal gear-wheel, of a wheel receiving a rotary motion from the said fixed internal gear-wheel and imparting a motion to the other revoluble internal gear-wheel, intermediate gearing for connecting the said fixed internal gear-wheel with the said wheel, a second intermediate gearing for connecting the wheel with the revoluble internal gear-wheel, and a driving-shaft connected with the said intermediate gearings, substantially as shown and described.

2. In a device of the class described, the combination, with a driving-shaft carrying two pinions, of a wheel held loosely on the said shaft and carrying sets of studs projecting from opposite faces of the said wheel, sets of pinions held on the said sets of studs and in mesh with the said pinions on the driving-shaft, a fixed internal gear-wheel in mesh with one of the said sets of pinions, and a second internal gear-wheel in mesh with the second set of said pinions, substantially as shown and described.

3. In a device of the class described, the combination, with a driving-shaft carrying two pinions, of a wheel held loosely on the said shaft and carrying sets of studs projecting from opposite faces of the said wheel, sets of pinions held on the said sets of studs and in mesh with the said pinions on the driving-shaft, a fixed internal gear-wheel in mesh with one of the said sets of pinions, a second internal gear-wheel in mesh with the second set of said pinions, and a driven shaft carrying the hoisting-drum and the said second internal gear-wheel, substantially as shown and described.

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Witnesses:
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