(No Model.) 2 Sheets—Sheet 1.

A. G. PAGE.

POWER STORAGE APPARATUS.

No. 521,768. Patented June 19, 1894.

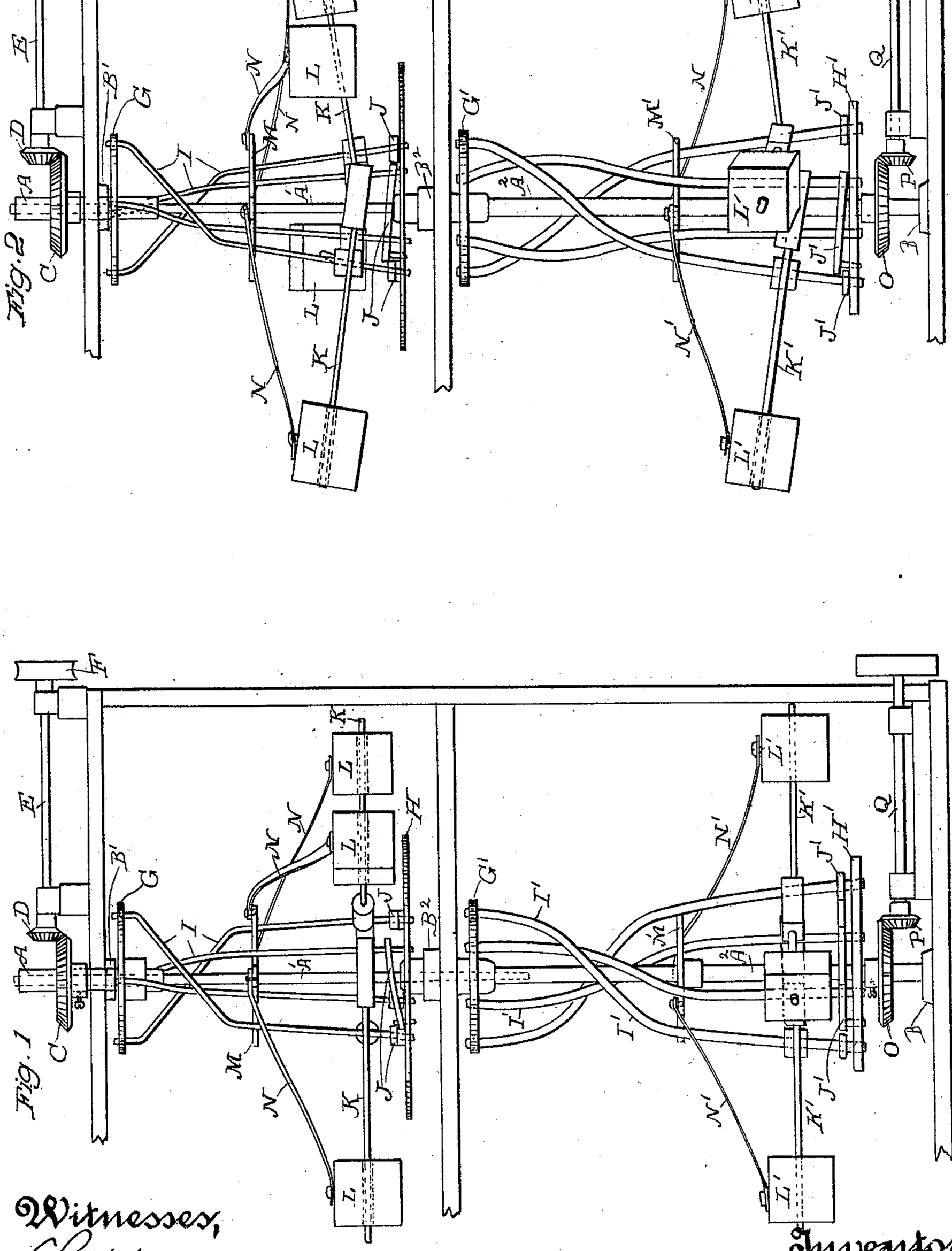

Fig. 2

Fig. 1

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J. A. Bayless

Inventor,
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(No Model.) 2 Sheets—Sheet 2.

A. G. PAGE.

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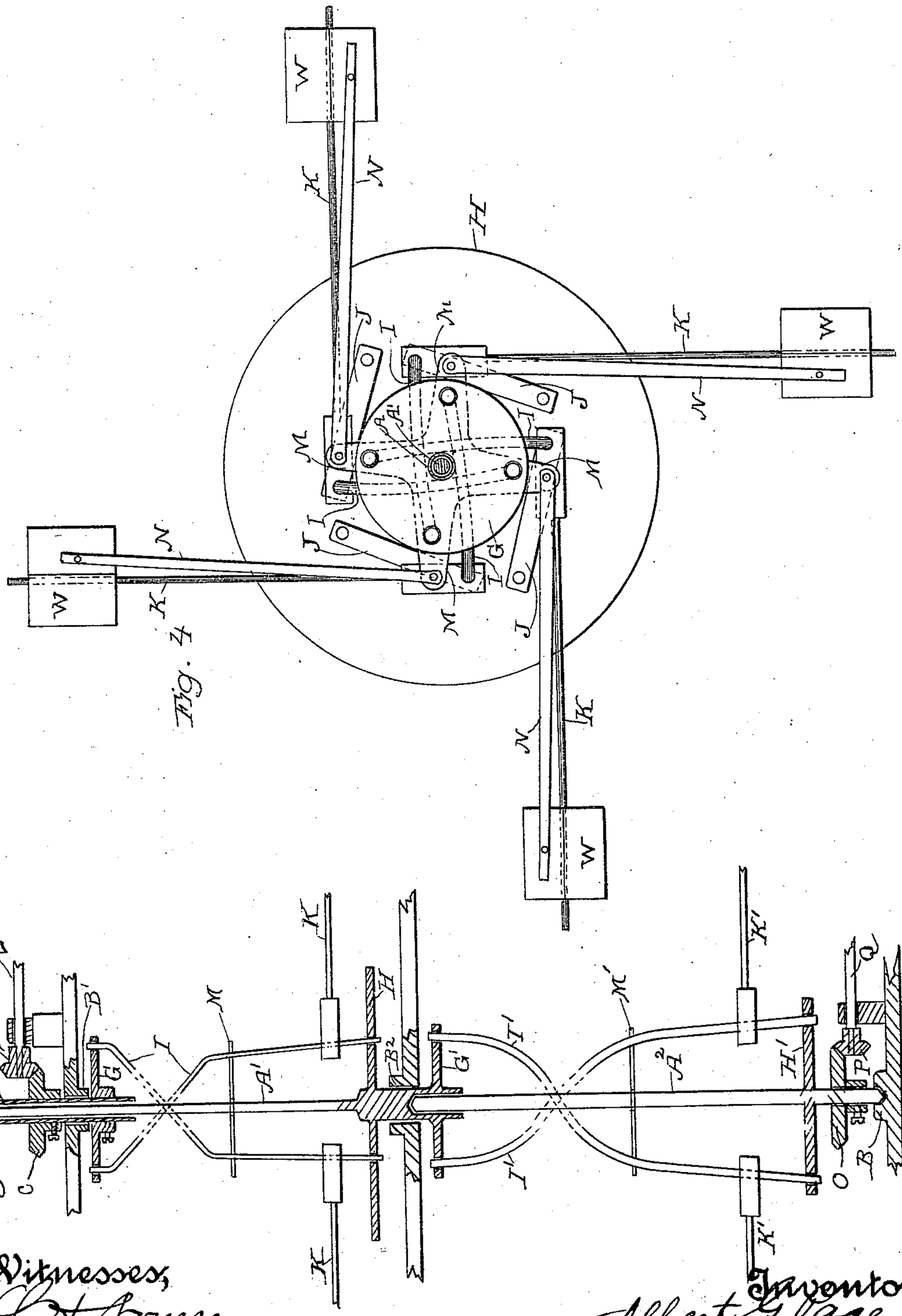

Fig. 4

Fig. 3

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THE NATIONAL LITHOGRAPHING COMPANY,
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UNITED STATES PATENT OFFICE.

ALBERT G. PAGE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE TWENTY-FOURTH TO FRANK H. JOHNSON, OF SAME PLACE.

POWER-STORAGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 521,768, dated June 19, 1894.

Application filed August 3, 1893. Serial No. 488,290. (No model.)

To all whom it may concern:

Be it known that I, ALBERT G. PAGE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Power-Storage Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus which is designed to store and utilize power, which is transmitted through it to drive other machinery.

It consists in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side view of my apparatus, showing the arms down. Fig. 2 is a side view of my apparatus, showing the arms raised. Fig. 3 is a vertical section showing the division of the shaft. Fig. 4 is a horizontal section.

The object of my invention is to provide an apparatus through which power is transmitted from any suitable source and by which said power is stored and utilized so as to increase the effective force which is applied to the driven machinery.

In carrying out my invention, I employ a series of weights supported upon levers projecting outwardly from central, vertical and sectional shafts, and connections by which said weights are raised and thrown outwardly by the action of the power which rotates them, and the tendency of the weights thus raised to fall by gravitation, acts upon the shaft and mechanism through which the power is transmitted.

A, A′, A^2 is a vertical shaft made in independent sections, and connected together so that the parts stand in line with each other. The upper section A of the shaft has a sleeve formed upon its lower end which slips over the upper end of the section A′, and the section A′ in like manner has a sleeve at its lower end which fits loosely over the upper end of the section A^2. The section A^2 has its lower end adapted to turn in a step B fixed upon a suitable support and journal-boxes B′ and B^2 support the connecting ends of the sections A′ and A^2 and also the upper section A of the shaft. Upon the upper section A is a beveled gear, pulley, or other means for transmitting power, as shown at C.

In the present case I have shown it as being a beveled gear which is engaged by a beveled pinion D upon the driving shaft E. This shaft is driven by a pulley F or other suitable connection through which power is transmitted to it from the electro-motor or other source. Upon the lower end of the shaft or sleeve A is fixed a horizontal disk G, and upon the lower end of the section A′ is fixed a corresponding disk G′. Above the disk G′, and above the central journal-box which steadies the sectional shaft is a disk H which is secured to the section A′ of the shaft.

I I are lever rods bent as shown in the drawings, having the upper ends adapted to pass vertically through holes made in the upper disk G. A short distance below the disk the arms are bent so as to extend angularly downward and across beneath the disk, the four arms as here shown, crossing each other close to the vertical shaft A′, and extending outward to a considerable distance where they are again bent and extend vertically downward, with the lower ends passing loosely through holes in the disk H. Stays J are attached at one end to the lever rods I, and at the opposite end are loosely attached to the plate or disk H to allow them to move a little with the twisting movement of the said lever rods, and as these lever rods are loose in the disks at top and bottom, the inertia of the weights would tend to twist the rods, but the stays serve as braces to prevent this. Upon the lever rods I above the stays, are rigidly secured the lever arms K, each of which projects outwardly in a horizontal plane a considerable distance beyond the periphery of the disk; and upon the outer ends of these lever arms the weights L are placed. If the weights are very heavy they may be connected with a cross M upon the vertical shaft by means of braces N. In this case the weights may have a slight sliding movement to allow the lever arms to be raised, but the amount of such movement is small, being proportioned to the lifting of the lever arms, and the sliding action is effected by the braces meeting the weights at an angle.

The braces and cross are not essential to the working of the device and may be omitted, but if used suitable provision must be made so that the braces will not affect the inertia of the weights.

Upon the lower end of the shaft A^2 is fixed a horizontal disk or plate H′ which corresponds with the disk H upon the shaft A′. From the disk G′ which is fixed to the lower end of the shaft A′, bent lever rods I′ extend to the disk H′. These levers are shaped in the same manner as described for the lever rods I, and have their upper ends loosely connected with the disk G′ and their lower ends loosely movable in the disk H′. Stays J′ have each one end fixed to one of the lever rods I′, and the opposite end loosely attached to the disk H′ in the same manner as described for the stays J. Lever arms K′ corresponding with the lever arms K of the upper series, extend outwardly from the rods I′ and carry the slidable weights L, and these may be connected by links N′ with the arms of a cross M′ which is fixed to the shaft A^2 in the same manner as previously described for the cross M upon the shaft A′. Upon the lower end of the shaft A^2 is a means for transmitting power to the mechanism to be driven. In the present case this consists of a beveled gear O engaging a beveled pinion P upon the horizontal shaft Q, from the outer end of which the power is transmitted.

The object of this construction being to transmit power from the shaft E to shaft Q, it is accomplished through the loosely connected shafts A, A′, A^2, by means of the lever arms I, I′, which, when twisted or turned about the center of the first application of power, will by the change of angle of the power part, caused by this twisting, act upon the levers K, K′ to lift the weights L, L′. If the braces N are used, the weights will be pushed out along the lever arms K as the latter rise, and thus maintain their distance from the center. Now, if this action takes place, and after the weights are thus raised, the driving shaft E would stop, the weights would fall, as far as the connections would allow, and as the upper ends of the lever rods I and disk G would be held in place and prevented from moving back, the action of the weights would be communicated to move the disk forward a little, and this would be communicated again through the disk G′, lever rods I′, and connections to the disk H′. The small amount of play between the disks G and J will be increased with each successive addition, and several shafts A′, A^2, &c., would allow the shaft E to turn a considerable distance before any motion would be communicated to shaft Q. The constant tendency of the weights to fall after being lifted would cause an action something like that of a spring partially coiled by the action of one shaft and constantly exerting its power to turn the other shaft with which its opposite end might be connected. This does not add any power but acts as a sort of storage, the weights being raised and as it were suspended while the power is being applied, and falling a little if the speed slackens, so that the movement of the driven shaft is made more regular and constant. When the apparatus is once set in motion, the inertia of the weights is such that it will continue to move very steadily, although the movements of the motor may be irregular and any sudden increase of speed or power from the motor will twist the lever rods I and correspondingly raise the weights L L′, and any decrease in the speed will at once allow gravitation to act upon the weights, and their descent acts through the lever rods I I′ to which they are attached, and moves the vertical shafts A′ A^2, thus keeping up the rate of speed and utilizing the power which may have been stored when the weights were raised by the first action of the mechanism.

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

1. In a power storage apparatus, the independent vertical shafts standing in line and movable with relation to each other, mechanism through which power is applied to rotate the uppermost of the shafts, a disk secured to the lower end of each of said shafts, the vertical lever rods crossing each other spirally having their ends loosely connected with each of said disks, horizontally disposed lever arms, having their inner ends secured to the lever rods, weights upon the outer ends of said arms adapted to be raised by the twisting of the said lever rods in one direction and depressed when the lever rods are allowed to turn in the opposite direction, and stays on the lower ends of the lever rods having their outer ends loosely connected with the contiguous disk, substantially as herein described.

2. In a power storage apparatus, the independent vertical shafts standing in line and movable with relation to each other, means for applying power to the uppermost of said shafts, a disk fixed to the lower end of each of said shafts having holes made in them near their peripheries, spiral lever rods having their ends loosely entering the holes in said disks, said lever rods crossing each other spirally, horizontal stays each having one end secured to one of the lever rods above the lower disk and the opposite end loosely connected with said lower disk, horizontal lever arms fixed to the lever rods and extending outwardly therefrom, weights upon the outer ends of said horizontal lever arms, a cross fixed to the lower shaft above the lower disk, and links connecting the weights with the cross, substantially as herein described.

3. The combination of the shafts A, A′ and A^2 arranged in line and movable with relation to each other, a power mechanism connected with the shaft A and a disk on said shaft, a disk upon the shaft A^2 and independent disks

upon the shaft A′, a series of spirally arranged lever rods having their opposite ends loosely passing through the disk on the shaft A and one of the disks on the shaft A′, a similar series of lever rods having their opposite ends loosely passing through the disk on the shaft A^2 and the remaining disk on the shaft A′, horizontal stays having one end secured to the lower ends of each lever rod and the opposite end loosely connected with the contiguous disk, lever arms rigidly connected with each lever rod and extending outwardly, weights slidable upon said lever arms, crosses on the shafts, and connections from the weights to the crosses, substantially as herein described.

In witness whereof I have hereunto set my hand.

ALBERT G. PAGE.

Witnesses:
S. H. NOURSE,
J. A. BAYLESS.