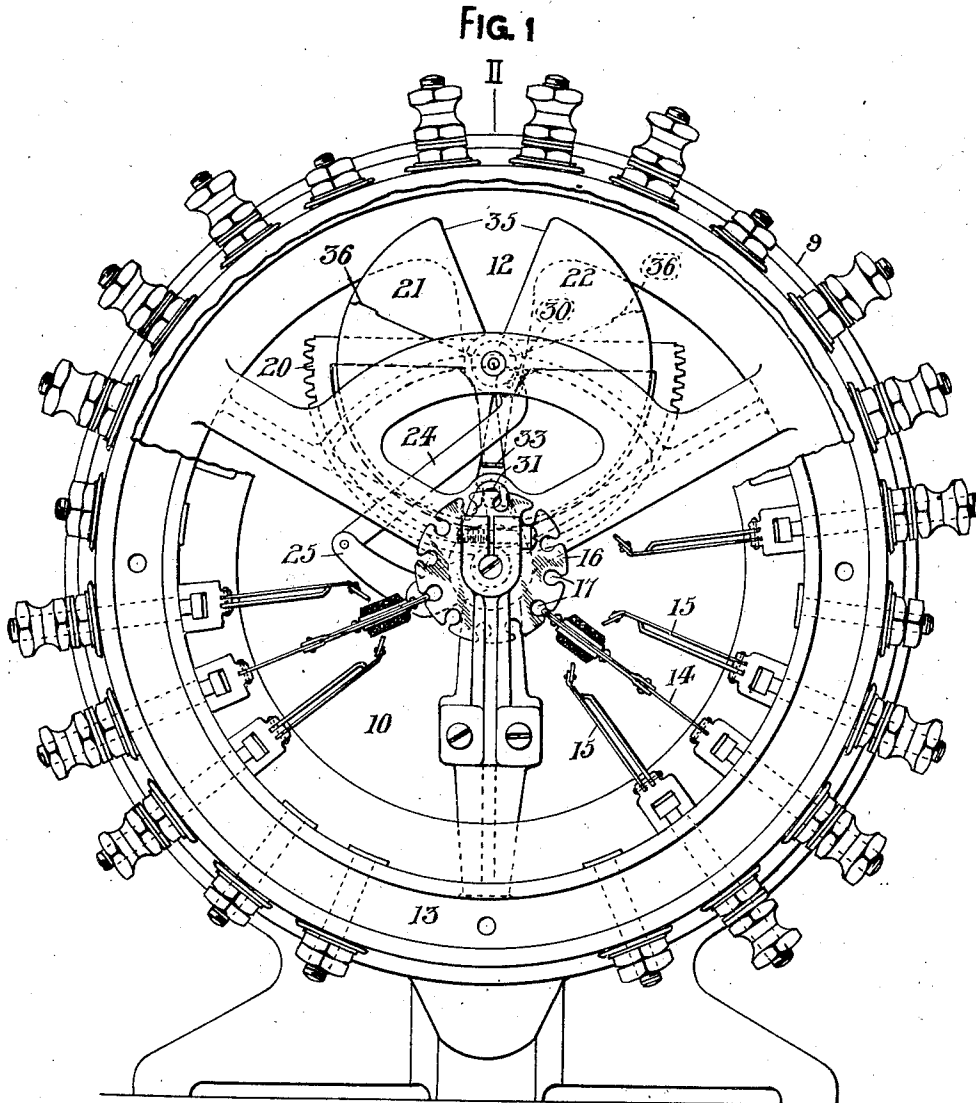


J. P. COLEMAN & P. UTNE.
CIRCUIT CONTROLLER.
APPLICATION FILED MAR. 10, 1911.

1,009,476.

Patented Nov. 21, 1911.

3 SHEETS—SHEET 1.



WITNESSES:
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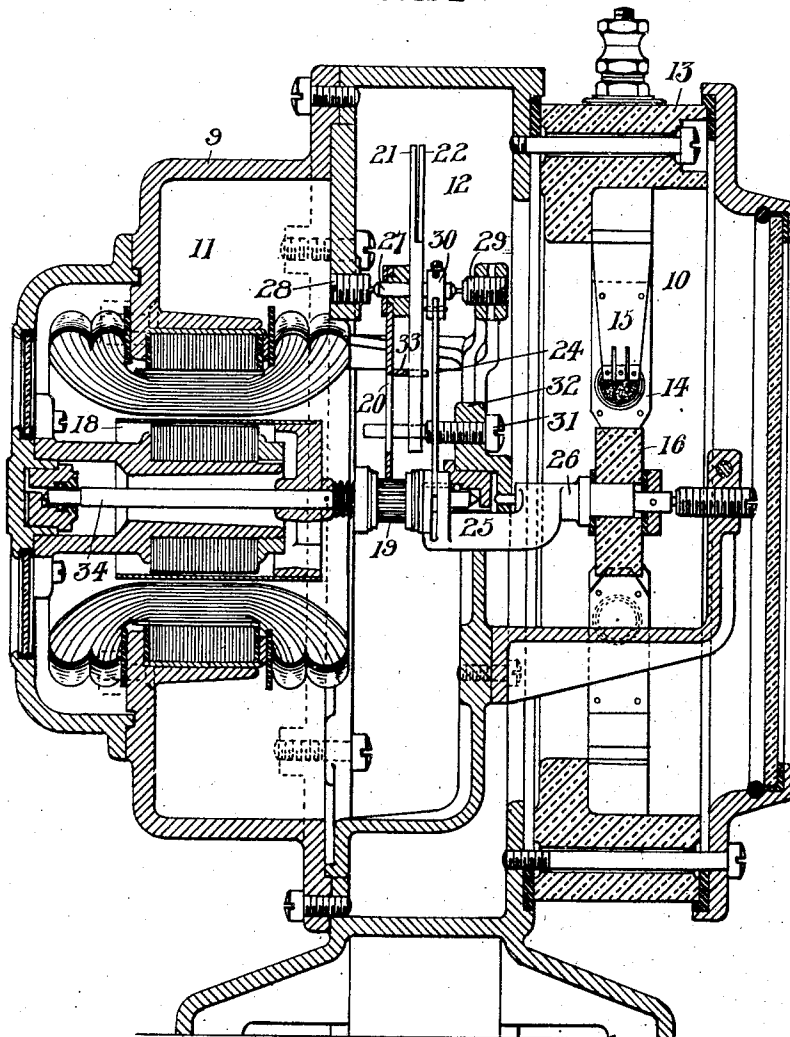
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3 SHEETS—SHEET 2.

FIG. 2



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3 SHEETS-SHEET 3.

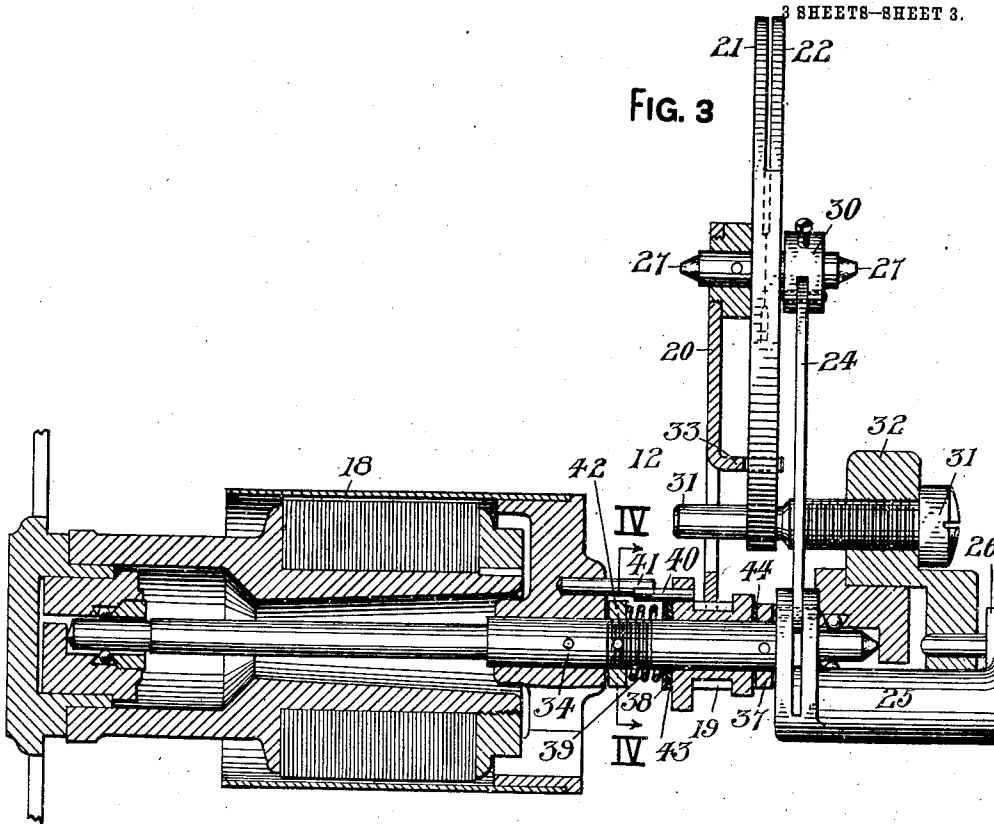
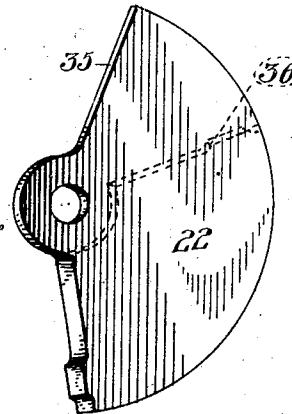
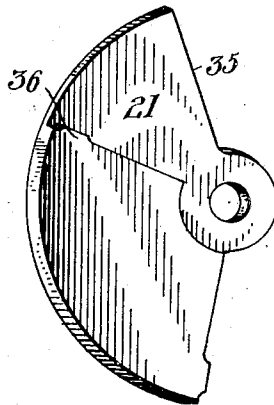
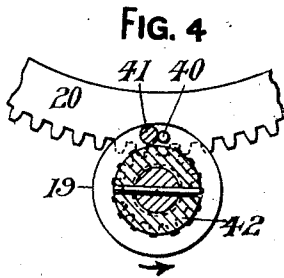


FIG. 5

FIG. 6



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UNITED STATES PATENT OFFICE.

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CIRCUIT-CONTROLLER.

1,009,476.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed March 10, 1911. Serial No. 613,645.

To all whom it may concern:

Be it known that we, JOHN P. COLEMAN, a citizen of the United States, and resident of the borough of Manhattan, in the city, county, and State of New York, and PER UTNE, a subject of the King of Norway, and a resident of the borough of Wilkinsburg, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Circuit-Controllers, of which the following is a specification.

Our invention relates to circuit controllers.

We will describe a circuit controller embodying our invention and then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a view showing in front elevation a circuit controller, part of which is cut away to show a portion of an operating mechanism therefor, embodying our invention. Fig. 2 is a sectional view on the line II—II of Fig. 1. Fig. 3 is a view in side elevation, partly sectioned, showing on a larger scale the operating mechanism shown in the preceding views and embodying our invention. Fig. 4 is a sectional view on the line IV—IV of Fig. 3, looking in the direction of the arrows. Figs. 5 and 6 are views showing in perspective two counterweights comprised in the operating mechanism shown in the preceding views.

Similar reference characters refer to similar parts throughout the several views.

Referring now particularly to Figs. 1 and 2, 9 designates an inclosing casing or framework in which are mounted a circuit controller 10, an electric motor 11, and a mechanism 12 for the operation of the circuit controller by an armature 18 of the motor device.

Briefly described, the circuit controller 10 comprises a circular contact carrier 13, preferably of insulating material, such as porcelain, in which are mounted contact fingers arranged to project radially toward the center. As here shown, these contact fingers are in sets, each set comprising two stationary fingers 15 and a movable finger 14. At the center of the contact carrier is a contact operating member, here shown as being a rotatable drum 16, preferably of insulating material such as porcelain, which

drum is provided with slots 17 adapted to receive the end of the movable contact finger 14 of each set and to move such finger into contact with either of the stationary fingers 15 of the same set, depending on the direction of rotation of the drum.

The motor 11 may be of any suitable type which is adapted to cause its armature 18 to rotate in either direction.

The operating mechanism 12 between the armature 18 and the drum 16 of the circuit controller comprises a pinion 19 mounted upon a shaft 34 of the armature 18 and operatively connected therewith in a manner which will be hereinafter explained. Meshing with this pinion 19 is a segmental gear 20 secured to a shaft 27 which is journaled in two bearings 28 and 29. Secured also to the shaft 27 is a crank 30 which is connected by a link 24 with a crank 25 secured to a shaft 26, to which shaft the drum 16 is also secured. It will be seen, therefore, that the rotation of the armature 18 may be transmitted through the operating mechanism 12 to produce movements of the drum 16.

The drum 16 is biased in a suitable manner to a middle position; that is, to such a position that the movable contact finger 14 of each set is held out of engagement with each of the stationary contact fingers 15 of the same set. As here shown, the drum is biased to this middle position by gravity, by means of counterweights 21 and 22 which are shown in perspective in Figs. 5 and 6. These counterweights are mounted to rotate freely on the shaft 27. Their rotation in a downward direction under the influence of gravity is limited by means of a stop 31 here shown as being a screw mounted in a portion 32 of the framework 9. As here shown, the upper portions of these counterweights are cut away in such a manner as to permit them to telescope when one or the other of the counterweights is rotated upward, and the amount of upward rotation of each one is limited by the engagement of an edge 35 of each counterweight with a face 36 of the other. A crank pin 33, carried by the segmental gear 20, engages the counterweights 21 and 22, and when there is no torque exerted upon the segmental gear, the counterweights act upon the crank pin 33 to hold the segmental gear 20 and the drum 16 in the middle position, in which position

the parts of the apparatus are shown in Figs. 1 and 2 of the accompanying drawings.

The operation of the apparatus as thus far described will be readily understood. When the motor device 11 is deenergized, that is, when no torque is exerted on the armature 18, the counterweights 21 and 22 will act on the pin 33 to hold the drum 16 in its middle position as hereinbefore explained. When now the motor device is energized and the armature rotated, the drum 16 will be rotated, thus moving the movable contact finger 14 of each set into engagement with one or the other of the stationary contact fingers 15 of the same set, depending on the direction of rotation of the armature 18. During such movement, one or the other of the counterweights 21 or 22, depending on the direction of rotation, will be raised by the pin 33. The rotation of the drum 16 is limited by the engagement of the edge of each counterweight with the face of the other counterweight as hereinbefore explained. The parts will be held in the positions to which they have been moved as long as the motor device is energized, but as soon as the motor device is deenergized, thus removing the torque on the armature, the counterweight which was raised will act upon the pin 33 to move the drum 16 and the apparatus connected therewith back to the biased or middle position. The operation of the apparatus is similar for a movement of the drum 16 in either direction from its middle position.

It will be evident from the foregoing explanation, that while the drum 16 is being moved back from either of its extreme positions to its middle position by the action of one or the other of the counterweights 21 or 22, the armature 18 will also be rotated, and if no means were provided for absorbing the inertia of the armature when the middle position of the drum is reached, this inertia would carry the drum beyond the middle position and might move the movable contact finger 14 into momentary engagement with the stationary contact finger opposite to the one with which it had just previously been in engagement. To prevent this, we provide means for absorbing the inertia of the armature without moving the drum 16, which means we will now describe.

Referring now more particularly to Figs. 3 and 4 of the drawings, it will be seen that the pinion 19 is mounted to rotate on the armature shaft 34. This pinion may, however, be positively rotated in either direction with the armature by means of the engagement of a pin 40 carried by the pinion with a pin or stud 41 carried by the armature 18. Hence, with the parts in the positions shown, the armature 18 may rotate in

the direction indicated by the arrow in Fig. 4 through substantially one complete revolution before the pin or stud 41 engages with the pin 40 to rotate the pinion 19.

It will now be clear that when the drum 16 has been moved back to its biased or middle position by the action of one of the counterweights 21 or 22, the armature 18 may continue to rotate independently of the pinion 19 through substantially one revolution after the middle position of the drum 16 has been reached. This one revolution might not in itself be sufficient to expend all inertia of the armature, but we provide for absorbing all of the inertia during this revolution by means of friction between the pinion 19 and the shaft 34. As here shown, the device for creating this friction may be described as follows: 37 designates a collar secured to the shaft 34, between which collar and the pinion 19 is a washer 44 of a suitable soft material, such as raw hide, which washer is free to rotate on the shaft. 43 is a similar raw hide washer on the other side of the pinion, and 38 is a metallic washer, both of which washers rotate freely on the shaft 34.

42 designates a nut adapted to turn on a threaded portion of the shaft 34. Between this nut and the washer 38 is a spiral spring 39. The compression of this spring may be adjusted to give the desired friction between the pinion 19, the washers 38, 43 and 44 and the collar 37 by rotating the nut 42, after which the nut may be permanently secured to the shaft in any desired manner, for example, by means of a pin as shown. The adjustment of the spring 39 is such that the friction between the pinion and the shaft is insufficient to move the segmental gear 20 against the action of either of the counterweights, but is sufficient to bring the armature 18 to rest during one revolution or less. It has been found by experiment that such an adjustment is entirely practicable and may readily be obtained.

The operation of the entire apparatus will now be clearly understood. When the motor 11 is energized, the armature 18 will rotate independently of the pinion 19 until the pin 41 engages the pin 40, when the segmental gear 20 and the drum 16 will be rotated to move the contact finger 14 of each set into engagement with one or the other of the contact finger 15 of the same set. When the motor is again deenergized, the entire apparatus will be rotated in the opposite direction by the action of one of the counterweights until the middle position of the drum 16 is reached, at which point the action of the counterweight will cease, owing to the engagement of this counterweight with the stop 31. The rotation of the drum 16, and the segmental gear 20, is so slow that the inertia of these parts will not carry them any ap-

preciable distance beyond the middle position. The armature 18 will, however, continue to rotate through a revolution or a portion of a revolution, during which its inertia will be absorbed by friction as hereinbefore explained.

Having thus described our invention, what we claim is:

1. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the armature and the contact operating member, said mechanism comprising means for operatively engaging the two to move the contact operating member in either direction from its biased position, and for permitting disengagement of the two when the contact operating member has been moved back to its biased position.

2. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two and comprising two rotatable members operatively connected respectively with the contact operating member and with the motor armature; and means for engaging said rotatable members whereby the armature may move the contact operating member from its biased position, and for permitting disengagement of said members when the contact operating member has been returned to its biased position.

3. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two comprising two rotatable members adapted to have relative rotation and operatively connected respectively with the contact operating member and with the motor armature, means for producing friction between the two said rotatable members, and means for engaging said rotatable members whereby the armature may move the contact operating member from its biased position, and for permitting disengagement of said members when the contact operating member has been returned to its biased position.

4. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be ro-

tated in opposite directions; and mechanism interposed between the two comprising a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the armature, and means for engaging the armature and the said rotatable member whereby the armature may move the contact operating member from its biased position and for permitting disengagement of the two when the contact operating member has been returned to its biased position.

5. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two comprising a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the armature, means for producing friction between the armature and the said rotatable member, and means for engaging the armature and the said rotatable member whereby the armature may move the contact operating member from its biased position and for permitting disengagement of the two when the contact operating member has been returned to its biased position.

6. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two comprising a shaft to which the armature is secured, a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the said shaft, and means for engaging the armature and the rotatable member whereby the armature may move the contact operating member from its biased position, and for permitting disengagement of the two when the contact operating member has been returned to its biased position.

7. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two comprising a shaft to which the armature is secured, a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the said shaft, means for producing friction between the said rotatable member and the said shaft, and means for engaging the armature and the rotatable member whereby the ar-

mature may move the contact operating member from its biased position and for permitting disengagement of the two when the contact operating member has been returned to its biased position.

8. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two comprising a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the armature, coacting pins secured respectively to the armature and to the said rotating member whereby the two may be positively engaged to move the contact operating member from its biased position and whereby the two may be disengaged to permit the armature to expend its inertia when the contact operating member has been returned to its biased position.

9. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two comprising a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the armature, means for producing friction between the armature and the said rotatable member, and coacting pins secured respectively to the armature and to the said rotating member whereby the two may be positively engaged to move the contact operating member from its biased position and whereby the two may be disengaged to permit the armature to expend its inertia when the contact operating member has been returned to its biased position.

10. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to rotate in opposite directions; and mechanism interposed between the two, comprising a shaft to which the armature is secured, a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the said shaft, coacting pins secured respectively to the armature and to the said rotating member whereby the two may be positively engaged to move the contact operating member from its

biased position and whereby the two may be disengaged to permit the armature to expend its inertia when the contact operating member has been returned to its biased position.

11. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to rotate in opposite directions; and mechanism interposed between the two, comprising a shaft to which the armature is secured, a rotatable member operatively connected with the contact operating member and mounted to rotate relatively to the said shaft, means for producing friction between the shaft and the said rotatable member, coacting pins secured respectively to the armature and to the said rotating member whereby the two may be positively engaged to move the contact operating member from its biased position and whereby the two may be disengaged to permit the armature to expend its inertia when the contact operating member has been returned to its biased position.

12. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two and comprising a clutch device having coacting members operatively connected respectively with the armature and the contact operating member, whereby the armature may rotate through a given number of revolutions independently of the contact operating member.

13. In combination, a contact operating member biased to one controlling position and adapted to be moved in opposite directions therefrom to two other controlling positions; a motor armature adapted to be rotated in opposite directions; and mechanism interposed between the two and comprising a rotating member mounted to rotate with friction on the armature shaft and operatively connected with the contact operating member, and two coacting members secured respectively to the armature and the said rotating member.

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

JOHN P. COLEMAN.
PER UTNE.

Witnesses:

A. L. VENCILL,
I. J. HARTER.