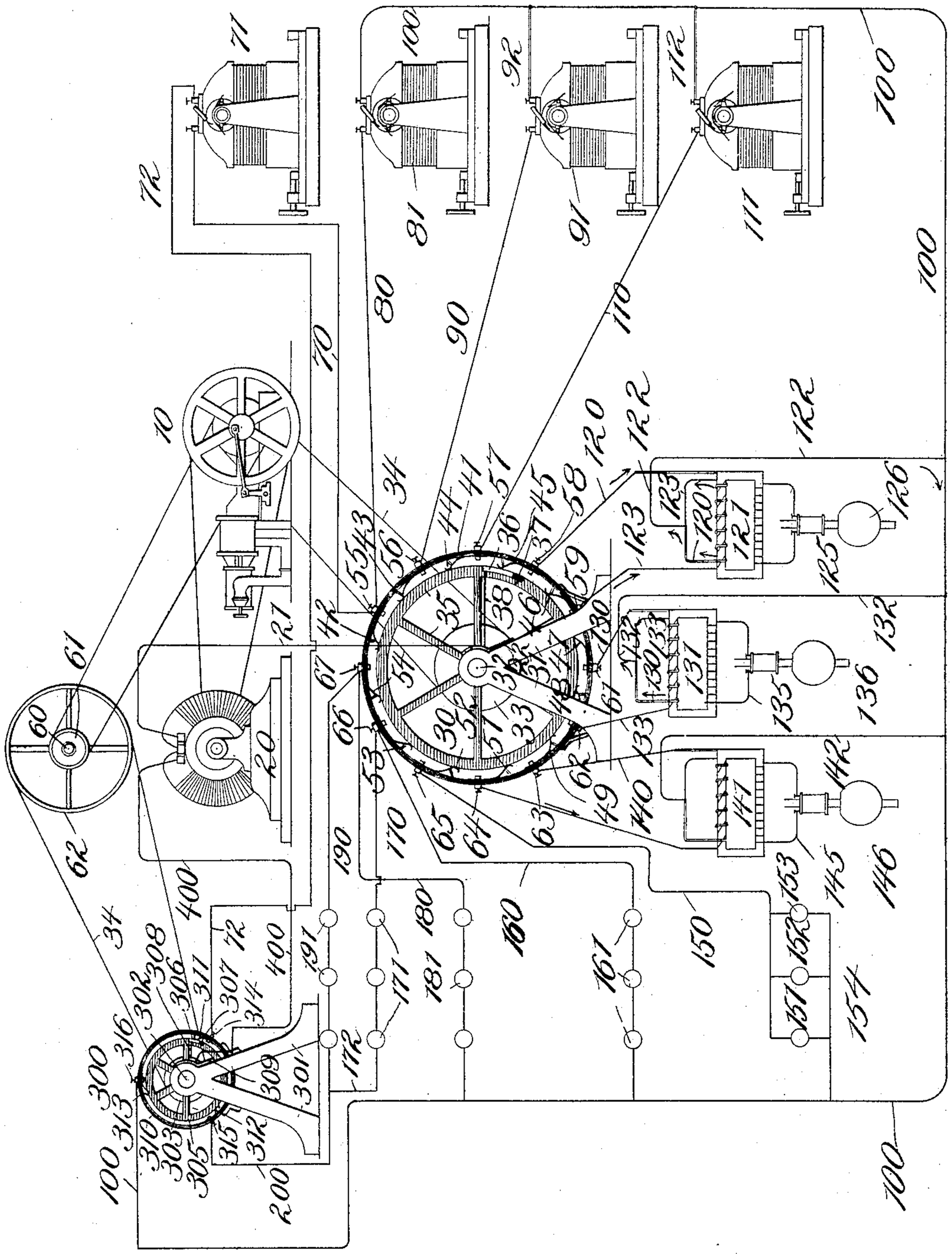
(No Model.)

G. B. PENNOCK.

ELECTRIC CURRENT DISTRIBUTING SYSTEM.

No. 534,281. Patented Feb. 19, 1895.



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ELECTRIC-CURRENT-DISTRIBUTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 534,281, dated February 19, 1895.

Application filed June 1, 1894. Serial No. 513,129. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. PENNOCK, a citizen of the United States of America, residing at Boston, in the county of Suffolk, in the State of Massachusetts, have invented certain new and useful Improvements in Electric-Current-Distributing Systems, of which the following is a specification.

This invention relates to a current distributing system including a single source circuit and a number of consuming circuits, for lamps, motors and other translating devices, separate and independent of each other and successively interposed in and forming a part of the source circuit, being similar in character to the system described in my Patent No. 510,188, entitled improvement in electric lighting systems, dated December 5, 1893.

The object of the invention is to provide simple, durable, economical and efficient means of multiplying the consuming circuits for electric illumination and electric power within the same source circuit.

The invention consists in a current or voltage distributer of peculiar construction as hereinafter described.

The invention consists further in the combination with the source circuit, the consuming circuits, and the voltage distributer of a negative pole step back hereinafter described, disposed in the source circuit, whereby the number of consuming circuits may be greatly increased without materially increasing the current of the source circuit.

The accompanying drawing represents partly in diagram and partly in side elevation an apparatus for carrying out this system of distribution.

Any suitable prime mover, as for instance, a steam engine 10, may be employed as the original source of power.

A dynamo electric generator 20 is belted to and driven by the engine 10. A current or voltage distributer 30 is also belted to and driven by the steam engine, and a negative pole step-back 300 is also belted to the steam engine through the medium of a countershaft 60, and small and large pulleys 61 and 62 thereon.

The voltage distributer 30 has any suitable supporting means, that indicated in the drawing being in the form of pedestal brackets, as 31. A shaft 32 is mounted in said brackets and provided with a pulley 33 on which the belt 34 for transmitting power from the engine 10 passes. A wheel 35, constructed of non-conducting material is fixed to the shaft 32 and rotates therewith. The rim of this wheel has a smooth periphery, and a contact plate or segment 36 of copper or other suitable conductive material is sunk therein flush with said periphery. An insulating plate 37 composed of mica or other material which is a non-conductor of heat, is also sunk in said rim immediately in rear of said contact plate. A radial conductor 38 connects the contact plate 36 with the metal hub of the wheel. A stationary ring 41 composed of non-conductive material and of somewhat larger diameter than the wheel 35 is disposed around said wheel concentrically therewith, being supported in a suitable manner. A number of flexible conductive contact brushes are disposed at intervals around the inner face of this ring and binding posts are connected respectively therewith. Twelve of these brushes numbered respectively 42, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, and 54, are shown in the drawing in connection with their respective binding posts 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, and 67, said binding posts extending through the ring 41. The wheel 35 rotates at a high speed in the direction of the arrow and carries the conductive segment 36 into contact successively with the several brushes disposed around the ring 41.

A wire 21 connects the positive pole of the dynamo 20 with a brush 22 which is attached to the pedestal bracket 31 and bears on the metal hub of the wheel 35 whereby the current is transmitted from the dynamo to the voltage distributer.

Any desired number of consuming circuits, each containing a motor, or incandescent or arc lamps, or other electric translating devices, are connected with the binding posts attached to the ring 41 of the voltage distributer 30. In some cases two consuming circuits are connected with the same binding post. In others a plurality of binding posts pass current to the same consuming circuit, and in other cases a single consuming circuit is connected to a single binding post.

A positive wire 70 representing one of the

consuming circuits leads from the binding post 55 to a motor 71 and a return wire 72 connects said motor with the negative pole step back 300.

Another positive wire 80 representing another consuming circuit leads from the same binding post 55 to a motor 81, which is connected with a general return wire 100 which leads to said negative pole step back.

Another positive wire 90 representing another consuming circuit leads from the binding post 56 to another motor 91, the negative pole of which is connected by a wire 92 with the general return wire 100.

Another positive wire 110 representing another consuming circuit leads from the binding post 57 on a stationary ring of the voltage distributer to another motor 111 and the negative pole of said motor is connected by a wire 112 with said general return wire 100.

Positive wires 120 and 123 lead respectively from the binding posts 58 and 59 to a transformer 121 and both of these wires after passing through the transformer connect with the wire 122 which leads to the general return wire 100. A secondary circuit 125 is connected with the converter 121 and contains an arc lamp 126.

Another consuming circuit in which the current is transformed is represented by positive wires 130 and 133 connected with the binding posts 61 and 62 of the voltage distributer passing through a transformer 131 and connected by a wire 132 with the general return wire 100, a secondary working circuit 135 containing an arc lamp 136 being energized by said transformer.

Another consuming circuit is represented by positive wires 140 and 143 connected respectively to binding posts 63 and 64 of the voltage distributer, passing through a transformer 141, and connected to a wire 142 which leads to the general return wire 100, the transformer having a secondary circuit 145 containing an arc lamp 146.

Another consuming circuit containing incandescent lamps 151, 152 and 153 in multiple arc is represented by a positive wire 150 which is connected with the binding post 65 and by wire 154 with the general return wire 100.

Two consuming circuits connected with the same binding post 66 are represented by wires 160 and 170 leading from said binding post and each containing incandescent lamps 161 and 171 disposed in series. The wire 160 is connected with the general return wire 100 and the wire 170 is connected with another return wire 200 leading to the negative pole step back.

Two other consuming circuits both connected with the same binding post 67 are represented by the wires 180 and 190, each containing lamps in series, one being connected with the general return wire 100 and the other with the return wire 200.

The negative pole step back 300 is supported on pedestal brackets as 301, or other suitable supports. A shaft 302 having its bearings in said brackets is provided with a pulley 303 from which a belt 304 extends to the larger pulley 62 on the counter shaft 60. This step back is of similar general construction to the voltage distributer 30. A wheel 305 is fixed to the shaft 302 and provided with a contact segment 306, set flush and smooth with its periphery, and with a non-conducting plate of mica or any other incombustible material set immediately in the rear of said conducting segment. A radial conductor 308 extends from the plate 306 to the hub of the wheel, and a brush 309 attached to the standard 301 bears upon said hub, which is composed of conductive material. The rim of the wheel is composed of non-conducting material. A stationary ring 310 of larger diameter than the wheel 305 is disposed around said wheel concentric thereto and provided on its inner face with three flexible spring brushes 311, 312, and 313, which are respectively connected with binding posts 314, 315, and 316 which pass through said ring.

The return wire 72 of the first mentioned consuming circuit is connected with the binding post 314 of the negative pole step back, the return wire 200 is connected with the binding post 315 and the general return wire 100 is connected with the binding post 316 of said step back. A wire 400 is connected at one end with the brush 309 and at the other end with the negative pole of the dynamo, and serves to complete the circuit from the negative pole step back to the dynamo.

The operation will now be described.

The dynamo 20, voltage distributer 30 and negative pole step back 300 are all driven simultaneously from the steam engine 10. The wheel 35 of the voltage distributer rotates at a high speed and the step back 300 rotates at a higher rate of speed. The current flows out from the positive pole of the dynamo 20 through the wire 21 to the brush 22 which bears on the axle of the wheel 35 of the voltage distributer. The current passes through the hub and thence through the radial conductor 38 to the conductive segment 36 which is set in the rim of said wheel. This segment, owing to the rapid rotation of the wheel, is brought successively into contact with the several brushes 42 to 54 which are connected with the binding posts 55 to 67. From these binding posts the current passes into the several consuming circuits 70, 80, 90, 110, 120, 130, 140, 150, 160, 170, 180 and 190. From the consuming circuit 70 it passes through the wire 72 to the binding post 314 of the negative pole step back 300. From the consuming circuits 80, 90, 110, 120, 130, 140, 150, 160, and 180 it passes through the general return wire 100 to the binding post 316 on said negative pole step back, and from the consuming circuits 170 and 190 it passes through the duplex return wire 200 to the binding post 315 on said step back. From the several binding

posts 314, 315, and 316 on the negative pole step back, the current passes to the corresponding brushes 311, 312, and 313 respectively connected with said binding posts, and is then taken up by the segment 306 on the wheel 305 which rotates rapidly within the ring 310 and comes successively in contact with said brushes. From this conductive segment 306 the current from all the consuming circuits passes through the radial conductor 308 to the hub of said wheel, thence to the brush 309, which bears on said hub, and thence through the final return wire 400 back to the negative pole of the dynamo.

The rotation of the wheel 35 of the voltage distributer 30 is so rapid and the contact of the conductive segment 36 with each brush 42 to 54 is so frequent that the interruption of the current is not apparent to the eye and the lamps or other translating devices maintain a practically continuous operation.

The speed of the rotating wheel of the step back 300 being greater than that of the wheel of the voltage distributer 30 and its circumference being smaller, its conductive segment comes in contact a plurality of times with each of the conducting brushes on said step back, while the conductive segment of the voltage distributer is passing a single brush thereof, thereby insuring the completion of the circuit simultaneously in both rotating wheels.

For incandescent lamps in multiple arc, it has been ascertained by practice that with a voltage distributing wheel of twenty-five inches in diameter, a speed of two thousand five hundred revolutions per minute must be maintained, in order to keep such lights perfectly steady. This speed may be reduced to fifteen hundred revolutions per minute when incandescent lamps are arranged in series. For motor distribution a larger voltage distributer may be used, as momentum is more effective in continuing the motors during the actual interruption of the current, than is the residual electricity or heat contained in the lamp circuits to continue the glow of the lamps.

As considerations of safety somewhat limit the size and speed of the voltage distributer, the step-back is employed to multiply the circuits. Suppose for instance that the voltage distributer has fifty brushes and fifty different consuming circuits, the negative pole step-back may have ten brushes, each brush serving to convey back the current for ten of the consuming circuits. The smaller negative pole step-back, even when revolving at a comparatively slow and safe speed, will, owing to its smaller circumference, keep the five hundred lamps running apparently steady. The number of lamps or other translating devices can thus be increased indefinitely.

I claim as my invention—

1. The combination of an electric source, a voltage distributer comprising a rotary member provided with a conductive segment, and a member provided with a number of contact brushes disposed in position for contact with said segment during the rotation of said rotary member, separate consuming circuits connected with said brushes, a negative pole step-back comprising a member provided with brushes to which said consuming circuits are connected, and a rotary member provided with a contact segment adapted for contact with said brushes, and conductors connecting said source with the voltage distributer and step-back.

2. The combination of an electric source, a voltage distributer connected therewith, a plurality of consuming circuits connected with said voltage distributer, a negative pole step-back, a plurality of return wires connecting said consuming circuits with said step-back, one or more of said return wires including two or more of said circuits, and a final return wire connecting said step-back and electric source.

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