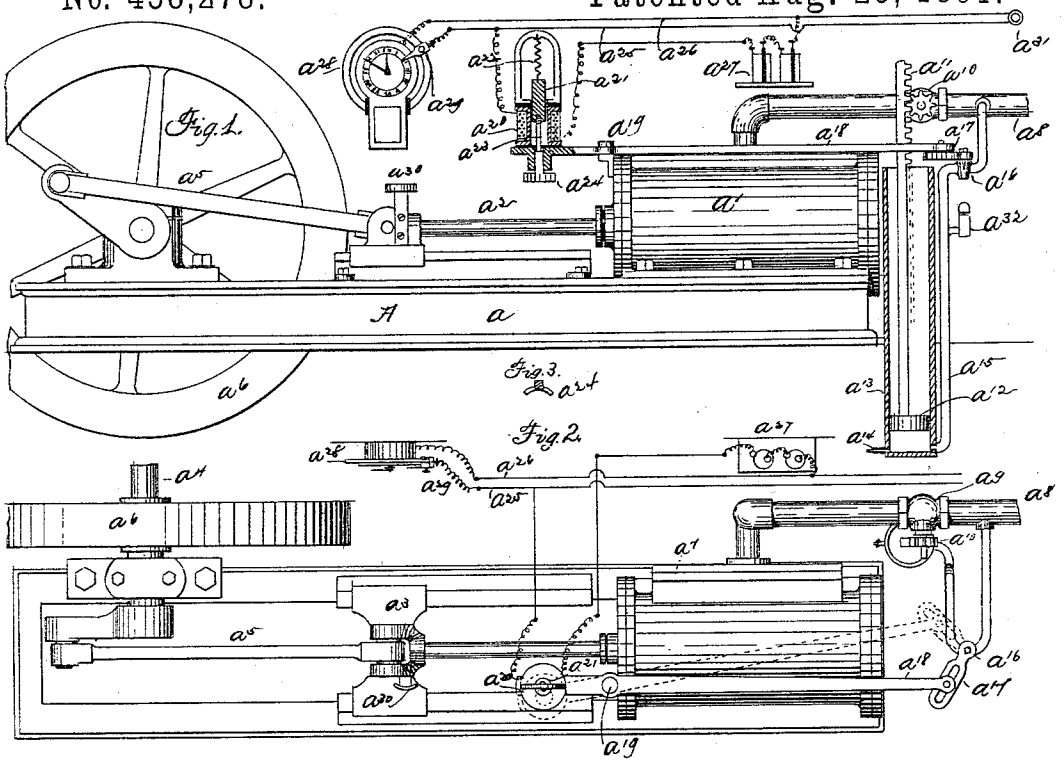
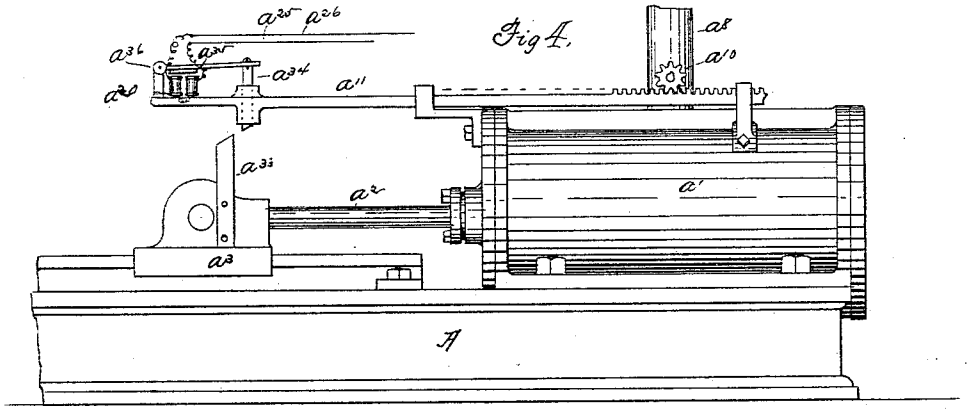
(No Model.) 2 Sheets—Sheet 1.

# E. BOENING.

## ELECTRIC STOP MECHANISM.

No. 458,278. Patented Aug. 25, 1891.




WITNESSES:
C. R. Ingmanson
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INVENTOR
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

# E. BOENING.

## ELECTRIC STOP MECHANISM.

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Fig. 5.

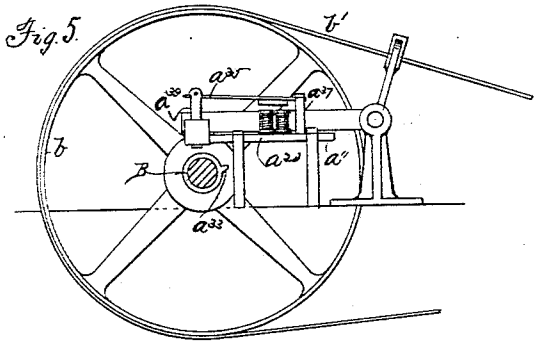



Fig. 6.

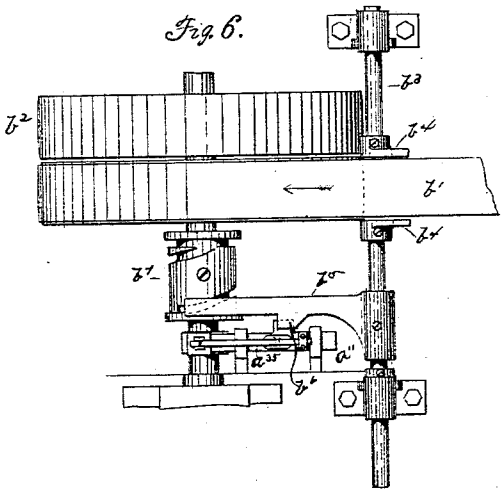



Fig. 7.

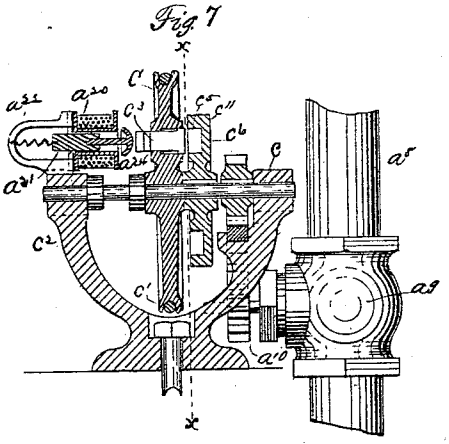
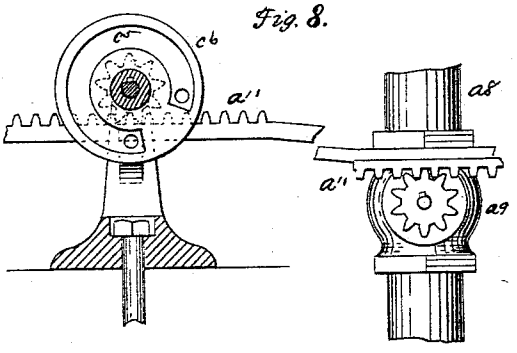



Fig. 8.




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# UNITED STATES PATENT OFFICE.

ERNEST BOENING, OF YONKERS, NEW YORK, ASSIGNOR OF ONE-HALF TO AUGUST SUNDH, OF SAME PLACE.

## ELECTRIC STOP MECHANISM.

SPECIFICATION forming part of Letters Patent No. 458,278, dated August 25, 1891.

Application filed July 24, 1890. Serial No. 359,817. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST BOENING, of Yonkers, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Stop Mechanism, of which the following is a specification.

The object of this improvement is to provide a stop mechanism whereby a steam-engine or a driving-shaft may have its motion arrested at any desired time, either automatically or from a distant place.

I will describe apparatus embodying my improvement, and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a side view of a steam-engine and a sectional elevation of an apparatus connected therewith and embodying my improvement. Fig. 2 is a plan or top view of the parts illustrated in Fig. 1. Fig. 3 is a top view of one of said parts and a horizontal section of the shank of the same. Fig. 4 is a side elevation of a steam-engine with another combination of parts connected therewith and embodying my improvement. Fig. 5 is a transverse section of a driving-shaft, a side view of a belt-pulley thereon, and a side view of a belt-shifter and other parts operating in connection therewith embodying my improvement. Fig. 6 is a plan of the parts illustrated in Fig. 5. Fig. 7 shows a steam-pipe and a sectional elevation embodying my improvement, a throttle-valve controlling the passage of steam through the same, and certain parts for operating said valve. Fig. 8 is a section taken at the plane of the dotted line $x$ $x$, Fig. 7.

Similar letters of reference designate corresponding parts in all the figures.

Referring first to Figs. 1 and 2, A designates a steam-engine, which may be of ordinary or any desirable form. It is shown as having a bed $a$, a cylinder $a'$, which is to contain a piston connected to a piston-rod or motive part $a^2$, a cross-head $a^3$ for guiding the piston-rod, a crank-shaft $a^4$, a link $a^5$, connecting the crank-shaft with the piston-rod, and a fly-wheel $a^6$ on the said shaft. The cylinder has a valve-chest $a^7$ of any desired construction, and this receives steam from a pipe $a^8$ under control of a throttle-valve $a^9$, with which said pipe is provided. The throttle-valve is shown as having a gear-wheel $a^{10}$ affixed to its stem. With this gear-wheel engages a rack-bar $a^{11}$, which, as here shown, forms a piston-rod for a piston $a^{12}$, that works within a cylinder $a^{13}$, extending transversely to the cylinder of the engine. The lower part of the cylinder $a^{13}$ is provided with a drip-cup $a^{14}$ to provide for taking off water of condensation, and has connected with it a pipe $a^{15}$, whereby steam may be conducted to it from the pipe $a^8$. The passage of steam through the pipe $a^{15}$ is controlled by a valve $a^{16}$. I have shown the valve $a^{16}$ as having an arm $a^{17}$ affixed to its stem. This arm is longitudinally slotted and has connected with the slotted portion one arm of a lever $a^{18}$, which is fulcrumed between the ends to a pin $a^{19}$, which, as here shown, is supported by a bracket fastened to one of the cylinder-heads. The other arm of the lever $a^{18}$ has an electro-magnet $a^{20}$, mounted upon it. This electro-magnet is shown as of the solenoid form and has a tubular core within which moves a bar $a^{21}$ of soft iron. A spring $a^{22}$ serves to elevate the soft-iron bar. When the magnet is energized, the bar will be drawn downward. To the lower end of the bar is attached a rod $a^{23}$, which extends through the lever $a^{18}$ and at the lower end is provided with an arc-shaped piece $a^{24}$. The shape of this piece may be best understood by reference to Fig. 3. The ends of the coils of the electro-magnet are connected to two line-wires $a^{25}$ $a^{26}$. As here shown, one of the connections includes an electric battery $a^{27}$. One of the line-wires is electrically connected to the works of a clock $a^{28}$ and the other to a contact-piece $a^{29}$, which is insulated from the works of the clock, but extends into such position over the dial that the hour-hand of the clock will contact with it. Whenever this happens, the circuit, including the electro-magnet, will be completed, the latter will be energized, and the piece $a^{24}$ will be lowered. After the lowering of the piece $a^{24}$ the cross-head $a^{23}$ on its next reciprocation toward the cylinder $a'$ will cause a cam-plate $a^{30}$, which is carried by it to contact with the piece $a^{24}$ and oscillate the lever $a^{18}$. The ensuing oscillation of the lever will cause the valve $a^{16}$ to be opened. Steam will thereupon be admitted to the cylinder $a^{13}$ below the piston that works

therein. Hence the piston will be caused to rise, and its rod $a^{11}$ will rotate the valve $a^9$, and thereby cut off the supply of steam to the valve-chest of the steam-cylinder. In this way the steam-engine will be stopped. If the contact-piece $a^{29}$ be made adjustable, the clock may be used to stop the steam-engine at any hour. Any kind of a circuit-closer may be employed in connection with the line-wires $a^{25}$ $a^{26}$, so as to provide for closing the electric circuit including the electro-magnet by manual action. I have shown a push-button $a^{31}$ for this purpose. Obviously this push-button may be located in a distant part of the building. Obviously a steam-whistle $a^{32}$ may be placed upon the pipe $a^{15}$, so as to sound an alarm whenever the engine is to be stopped.

In the combination of parts represented by Fig. 4, $a'$ is the engine-cylinder, $a^2$ the piston-rod, and $a^3$ the cross-head of a steam-engine. $a^{11}$ is a rod sliding in brackets fastened to the cylinder and made to constitute a rack which will impart motion through a gear-wheel $a^{10}$, affixed to the stem of the valve which controls the passage of steam through a pipe $a^8$ to the valve-chest of the engine. On the cross-head $a^3$ is a tappet $a^{33}$, and on the sliding rod $a^{11}$ is a transversely-adjustable rod $a^{34}$. This rod $a^{34}$ may be lowered into the path of the tappet $a^{33}$, and whenever this happens the said tappet will impart such movement to the rod $a^{11}$ as to cause the latter to rotate the valve $a^9$ and cut off the supply of steam to the valve-chest of the engine. The rod $a^{34}$ is connected to a lever $a^{35}$, which is fulcrumed by a pin $a^{36}$ to a standard mounted upon the rod $a^{11}$. On this rod is also mounted an electro-magnet $a^{20}$. An armature for this electro-magnet is affixed to the lever $a^{35}$. The coils of the electro-magnet are connected with line-wires $a^{25}$ $a^{26}$, and the latter may be connected by a clock or by a hand-piece. Obviously whenever the electro-magnet $a^{20}$ is energized it will lower the rod $a^{34}$ into the path of the tappet $a^{33}$.

In Fig. 5, B designates a driving-shaft or motive part, supported in suitable bearings and having affixed to it a belt-pulley $b$, which transmits motion to any other part by means of a belt $b'$ passing around it. The shaft B also has an idler or loose pulley $b^2$ mounted upon it. A belt-shifter consisting of a longitudinally-movable rod $b^3$ and arms $b^4$, embracing the belt $b'$, serves to shift the belt from one pulley to the other. An electro-magnet $a^{20}$ is connected with an electric circuit in the manner heretofore described, and the electric circuit may be closed, as already explained. It is mounted on a sliding bar $a^{11}$, and when it is energized it attracts an armature carried by a lever $a^{35}$, which is fulcrumed by a pin to a standard $a^{37}$, carried by the rod $a^{11}$. The free end of the lever $a^{35}$ has a pin $a^{39}$ pivotally connected to it. This pin works toward and from the shaft B through a guide with which the rod $a^{11}$ is provided. When the magnet attracts its armature, this pin $a^{39}$ is moved into the path of a tappet $a^{33}$ with which the shaft B is provided. The shaft $b^3$ has a slight oscillating movement, and has affixed to it an arm $b^5$, which at one side is provided with a lug $b^6$, that rests upon an arm on the sliding rod $a^{11}$, except when the latter is moved by the tappet $a^{33}$. When deprived of its support by the movement of the rod $a^{11}$, the arm $b^5$ will descend, and a pin with which its under side is provided will thereupon engage with a groove in a spiral cam $b^7$. On the engagement of the arm with the cam the rod $b^3$ will be moved longitudinally, so as to shift the belt onto the idler-pulley. The cam is provided at the end nearest the belt-pulley $b$ with a continuous circumferential groove, so that it may go on rotating without applying more force to the arm $b^5$ after the shifting of the latter and the rod $b^3$.

In Figs. 7 and 8 I have shown a wheel or pulley C, mounted loosely upon a shaft $c$ and deriving motion through a belt $c'$ from any source of power. The shaft $c$ is journaled in a bracket $c^2$ and ordinarily has no motion. It has mounted upon it a gear-wheel, which engages with a rack engaging a gear-wheel $a^{10}$, affixed to the stem of a valve $a^9$, whereby the passage of steam through a pipe $a^8$ is controlled. The wheel C is provided with a transversely-sliding bolt $c^3$, which may be forced into a groove $c^5$, formed in a disk $c^6$, affixed to the shaft $c$.

$a^{20}$ is an electro-magnet having a bar of soft iron $a^{21}$ combined with it. This bar has a push-piece $a^{24}$ fastened to it and is retracted by a spring $a^{22}$. The coils of the magnet are in a circuit, as already explained, and the magnet may be energized through the closing of a clock or by means of a hand-piece. When the electro-magnet is energized, this push-piece will force the bolt $c^3$ into the groove $c^5$ of the disk $c^6$, and after this happens motion will be imparted by the wheel C to said disk and thence to the stem of the valve $a^9$.

In all the mechanisms which I have just described parts may be reset by hand after operation.

It will be seen that I provide in a simple manner for stopping a steam-engine or a driving-shaft at any time either automatically or from a distant point.

In every example of the improvement which I have explained there is, it will be seen, a driving device or driver and an electro-magnetic stop mechanism for preventing the transmission of power by the driver to some other device.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a stop mechanism, the combination, with a motive part, of a tappet mounted on and moving with said motive part, a pin or rod movable into the path of said tappet, an electro-magnet for moving the pin or rod, and means substantially such as described

connected therewith, whereby the transmission of power is stopped when the magnet is energized, substantially as specified.

2. The combination, with a steam-engine, of a pipe supplying steam thereto, a valve controlling the supply of steam, a movable part for operating said valve, a tappet carried by the cross-head of the engine, a rod capable of being moved into the path of the tappet, mechanism substantially such as described between the rod and movable part, and an electro-magnet for shifting said rod, substantially as specified.

3. The combination, with a steam-engine, of a pipe supplying steam thereto, a valve controlling the supply of steam, a movable part for operating said valve, a tappet carried by the cross-head of the engine, a rod capable of being moved into the path of the tappet, mechanism substantially such as described between the rod and movable part, an electro-magnet for shifting said rod, and means for causing the operation of said electro-magnet, substantially as specified.

4. The combination, with a steam-engine, of a pipe supplying steam thereto, a valve controlling the supply of steam, a movable part for operating said valve, a tappet carried by the cross-head of the engine, a rod capable of being moved into the path of the tappet, mechanism substantially such as described between the rod and movable part, an electro-magnet for shifting said rod, and means for causing the operation of said electro-magnet, substantially as specified.

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

ERNEST BOENING.

Witnesses:

THOMAS H. KELLY,

JERE. S. CLARK.