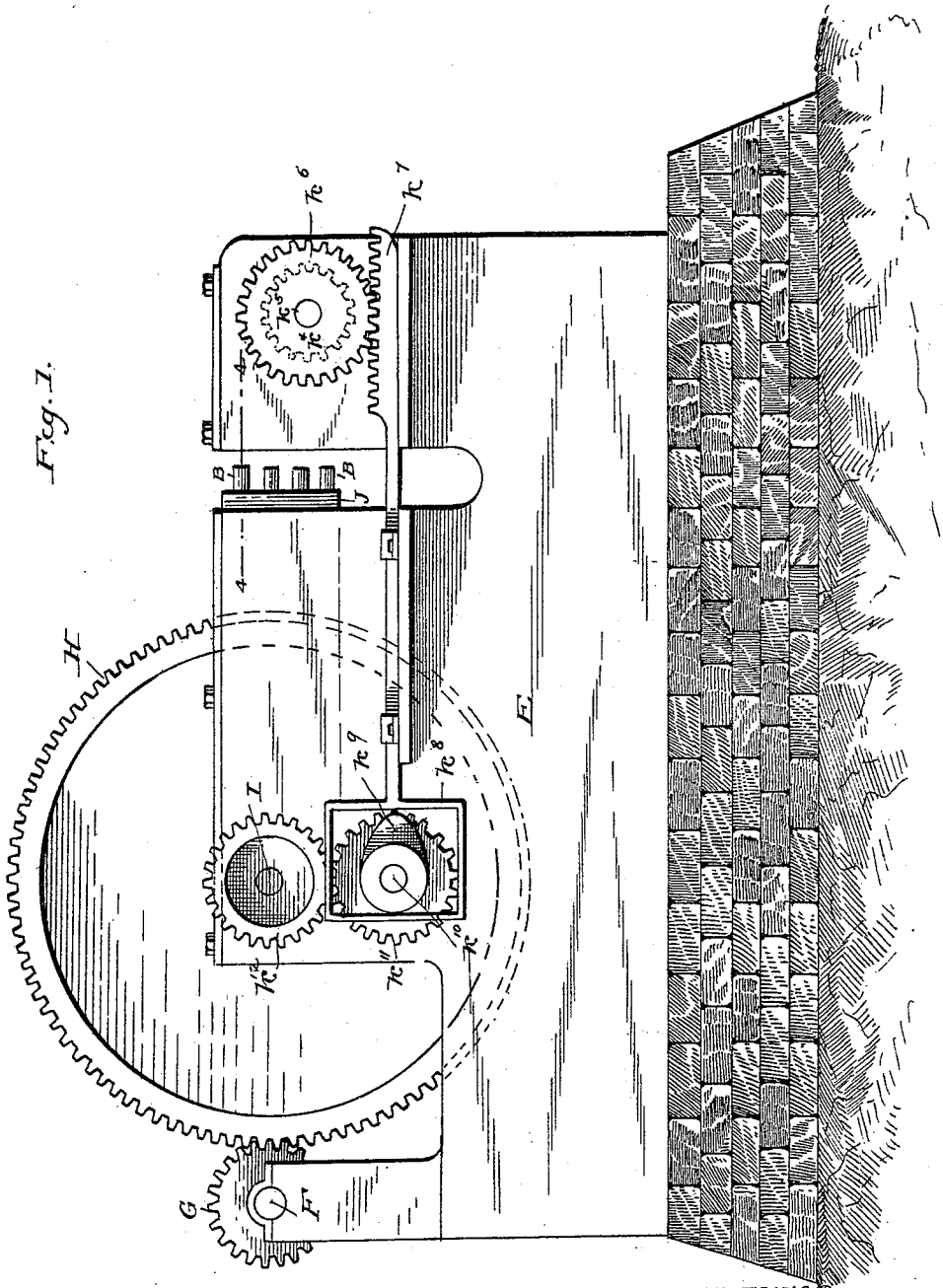
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J. ETTINGER.

MACHINE FOR MAKING METAL WASHERS.

No. 457,950. Patented Aug. 18, 1891.

Fig. 1.



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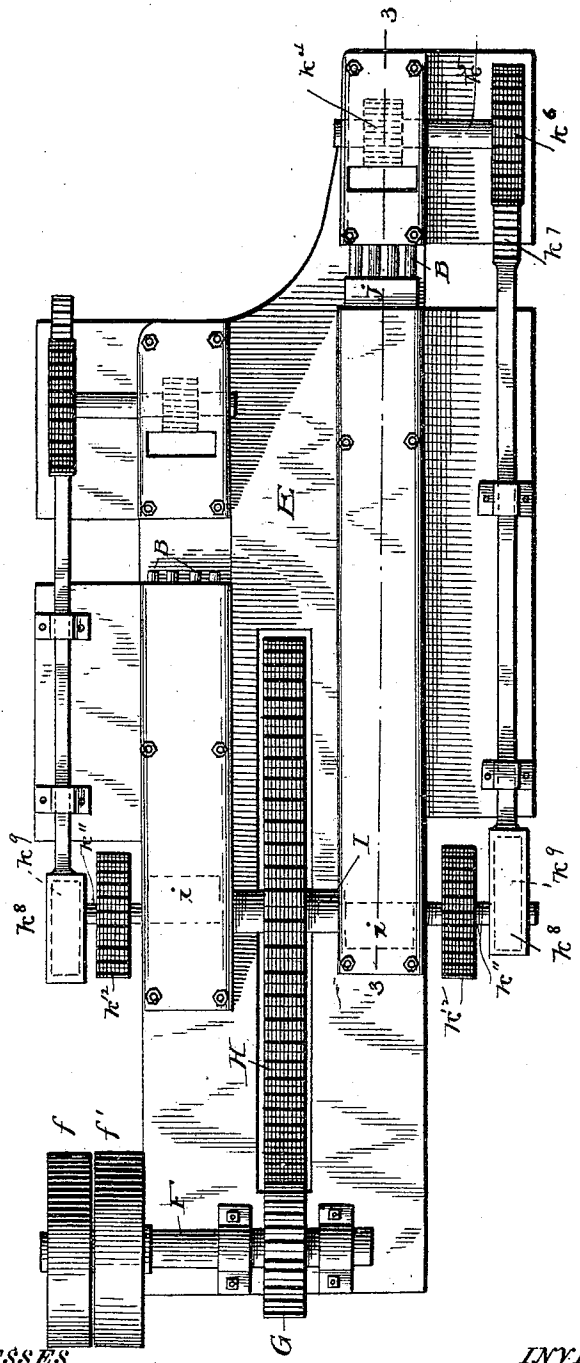


Fig. 2.

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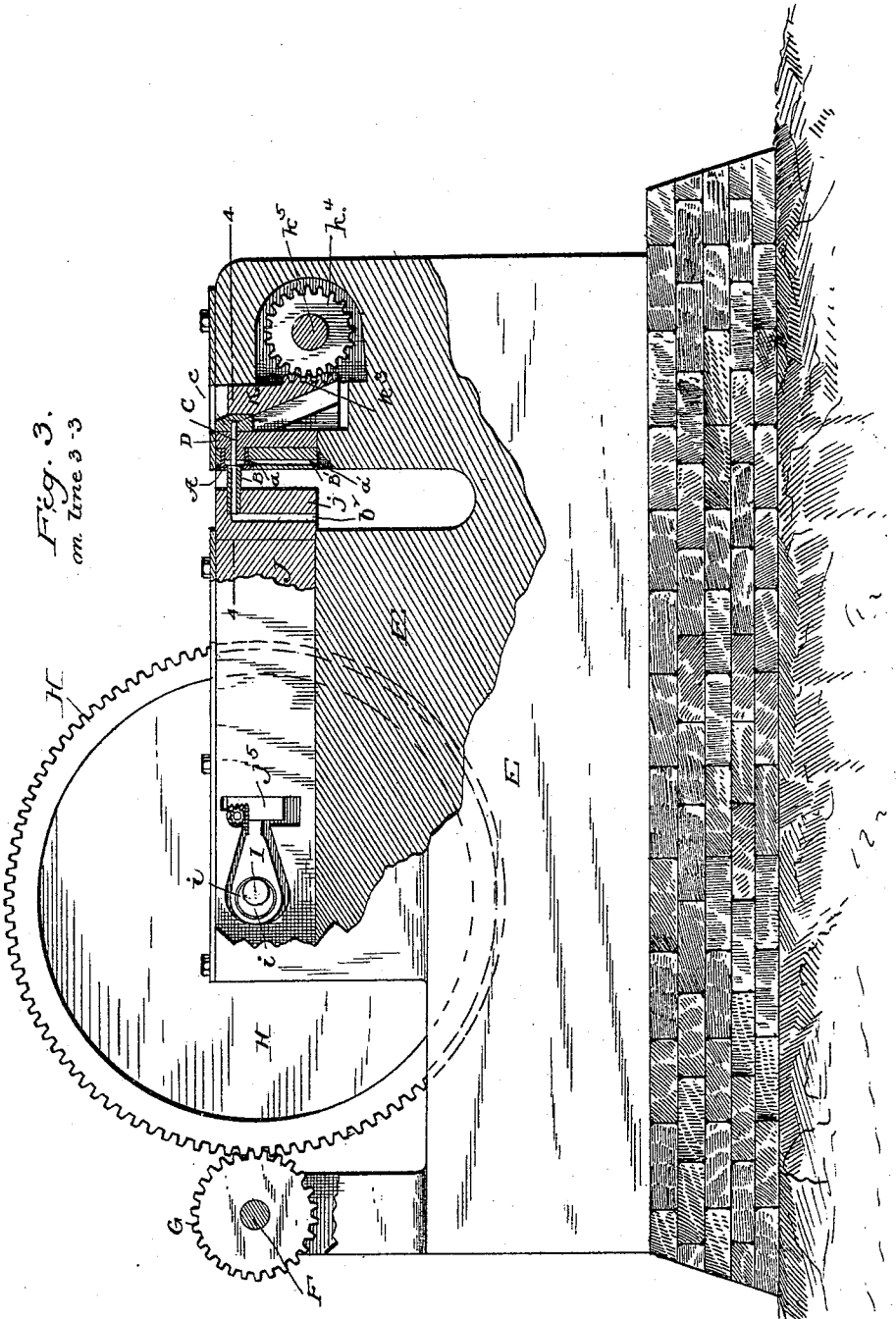


Fig. 3.
on line 3-3

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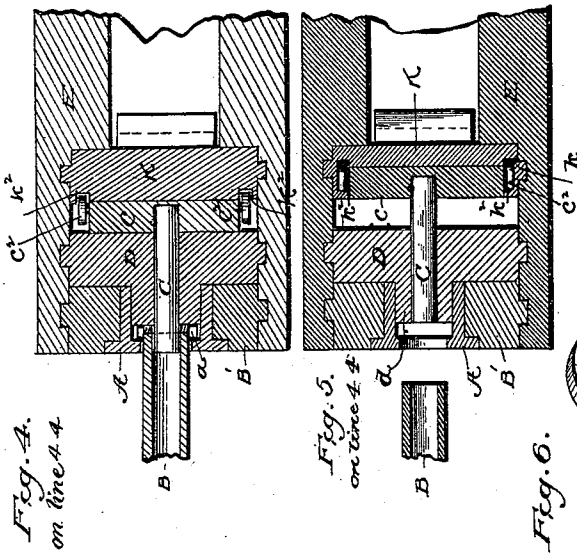


Fig. 4. on line 4 4

Fig. 5. on line 4 4

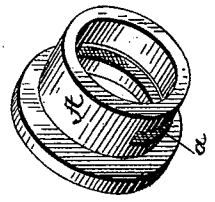


Fig. 6.

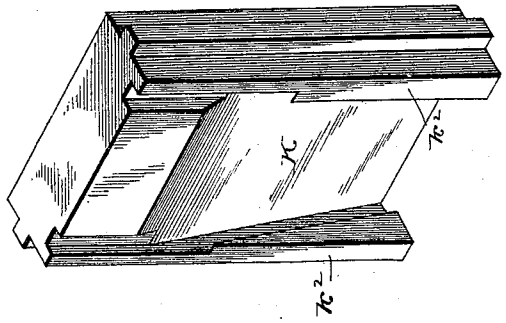


Fig. 8.

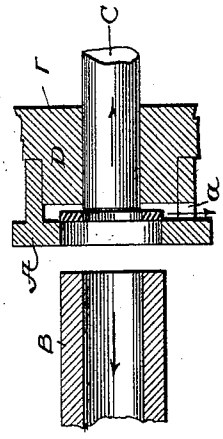


Fig. 11.

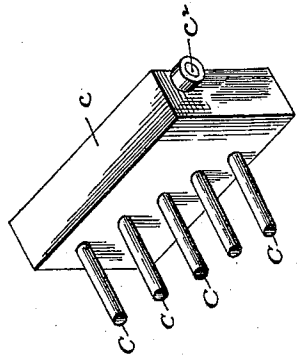


Fig. 7.

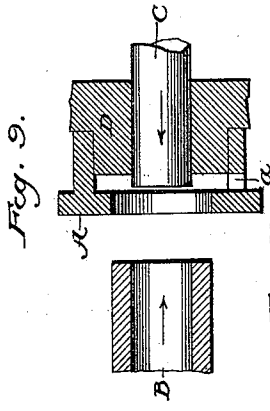


Fig. 9.

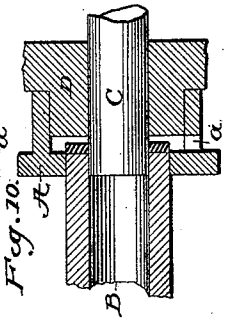


Fig. 10.

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UNITED STATES PATENT OFFICE.

JOEL ETTINGER, OF MILTON, PENNSYLVANIA, ASSIGNOR OF FOUR-FIFTHS TO CHARLES A. GODCHARLES, CHARLES D. GODCHARLES, JOSEPH W. GODCHARLES, AND JOHNSON B. GODCHARLES, ALL OF SAME PLACE.

MACHINE FOR MAKING METAL WASHERS.

SPECIFICATION forming part of Letters Patent No. 457,950, dated August 18, 1891.

Application filed December 15, 1890. Serial No. 374,774. (No model.)

To all whom it may concern:

Be it known that I, JOEL ETTINGER, of Milton, in the county of Northumberland and State of Pennsylvania, have invented certain Improvements in Machines for Making Metal Washers, of which the following is a specification.

The aim of my invention is to provide a simple and easily and rapidly operated machine in which the washers shall be driven through the cutting-die and discharged at the rear, instead of being ejected through the front or face of the die.

To this end it consists, essentially, in the combination of a main tubular punch, a die into which the tubular punch is advanced from the front to cut the washer, and which die has a delivery-opening for the washer back of its cutting-face, a center punch extending into the die from the rear and in opposition to the main punch, and mechanism by which the relation of die and center punch are exchanged, so that the finished washer is stripped from the center punch and permitted to escape through the rear opening. I prefer to fix the die horizontally and rigidly in position and to retract the center punch after the completion of the washer, allowing the latter to fall through a vertical opening, and such is the arrangement shown in the drawings. While I have represented a satisfactory mechanism for advancing and retracting the opposing punches, it is to be understood that the details of such mechanism are not of the essence of my invention. Many mechanisms suitable for the purpose are known to every skilled mechanic.

The drawings represent a duplex machine—that is to say, a machine containing two alternately-acting sets of punches and dies.

Figure 1 is a side elevation of the machine; Fig. 2, a top plan view of the same; Fig. 3, a side elevation with the punching mechanism and driving devices in section on the line 3 3, Fig. 2; Figs. 4 and 5, horizontal sections through the punching mechanism on the line 4 4, Figs. 1 and 3, showing the punches in different positions; Fig. 6, a perspective view of one of the cutting-dies; Fig. 7, a perspective view of one of the gangs of center punches; Fig. 8, a perspective view of the sliding block or anvil to advance, support, and retract the center punches; Figs. 9, 10, and 11, sectional views showing the relative positions of the die and punches before, during, and after the punching operation, respectively.

In order that the construction and operation of the parts may be the more readily understood, I will first describe the manner in which the punches and dies are operated, and thereafter the special means shown for operating them.

A represents an annular or tubular die to cut the periphery of the washer; B, a tubular punch having its forward end adapted to enter the die from the front, and thus punch or cut the washer from sheet metal, and C the solid center punch, which projects centrally into the die from the rear, its forward end standing in position to enter the end of the advancing punch B, and thus produce the central opening in the washer and drive the punchings into the main punch, which has a rear opening to permit their escape. By the joint action of the two punches and the die the washer is cut and left within the die, as shown in Figs. 4 and 10.

In order to permit the escape of the newly-formed washer from the interior of the die without ejecting it at the front, I provide a lateral discharge-opening *a* at any convenient point in rear of the face of the die, so that when the center punch is retracted and drawn out of the washer the latter is left free to escape edgewise through the opening *a*, which will be continued down through the frame, as shown at *a'*, or otherwise exposed to permit the washer to continue its outward course and fall from the machine.

As it is an object to give the center punch as short a movement as possible, I prefer to cut the discharge-opening through the side of the die, as shown in Figs. 3, 6, 9, and 10; but the die may of course be made of short length and the opening located behind it. In order to insure the stripping of the washer from the center punch when the latter is retracted, I project it through a stripper-block D, hav-

ing a neck d extended into and fixed within the die, as shown. The center punchings pass rearward through the hollow die B and escape through the hole b^2, leading from its rear end, as shown in Fig. 3.

Under the preferred mode of operating the parts the center punch is advanced and held at rest during the advance of the main punch and then the two punches retracted simultaneously in reverse directions; but obviously the two punches may be advanced at the same time.

I commonly arrange the punches and dies in groups or gangs, so that a number of washers may be produced, and such is the arrangement shown in the drawings.

Referring now to the details of the machine, E represents a rigid main frame, which may be of any appropriate form; F, the main driving-shaft mounted on bearings therein and provided with fast and loose pulleys $f\,f'$ and a pinion G, which engages a large gear-wheel H on a second shaft I, also seated on fixed bearings in the frame. At each end this shaft has an eccentric carrying a yoke or pitman i, through which reciprocates a slide J, guided horizontally in the main frame. To the front end of this slide is firmly but detachably secured a block j, to which a number of the tubular punches B are firmly attached in a horizontal position. A corresponding number of dies are seated firmly in an uprising portion of the frame in position for the advancing punches to enter them, and from the interior of these the openings are extended down through the frame, as shown in Fig. 3, for the escape of the washers. The dies are usually formed with encircling shoulders or flanges to sustain them firmly on the frame; but they may be raised in this regard at will. Internally they should be and usually are enlarged rearward to permit the free discharge of the washers. The die-supporting block b' is usually provided with vertical ribs in its edges and dropped into grooves in the frame, as shown in Figs. 4 and 5. The stripper-block D is formed and introduced in like manner, its neck being first inserted into the dies and the two blocks introduced into the frame at one time.

The center punches are secured firmly at their rear ends to a block c, and when in operative position are sustained by a vertically-sliding wedge or anvil K, mounted in the frame, so as to stand between the punch-block and a solid part of the frame, as clearly shown in Fig. 3. This sliding block has, as shown in Figs. 3 and 8, vertical side flanges k, containing internal inclined grooves k^2, which receive rollers c^2 on the ends of the punch-block, (shown in Figs. 3, 4, 6, and 7,) so that as the slide is raised the punch-block is first released and thereafter positively retracted in a horizontal direction, so withdrawing the punches from the newly-formed washers and into the stripper-blocks. The sliding anvil is provided with a vertical rack k^3, engaging pinion k^4 and shaft k^5, the outer end of which carries a second pinion k^6, operated by a reciprocating rack-bar k^7, guided horizontally in the frame and provided at one end with an oblong yoke k^8, which encircles an operating-cam k^9 on the lower shaft k^{10}, as plainly shown in Figs. 1 and 2. This cam through the intermediate parts raises and lowers the anvil, and thus advances, retracts, and locks the center punches in a positive manner. The two punch-operating eccentrics stand in such relation that the anvil and center punches are held at rest during the advances of the tubular punches. In the drawings the eccentric anvil or pitman for operating the main slide J is represented as acting against a vertically-movable bearing-block j^5, seated in the slide so that when the block is raised the slide may remain at rest. This is an old device and is not claimed herein.

The entire punching mechanism on one side of the machine is a duplicate of that on the other side, and the foregoing description will therefore apply to both. The eccentrics at the respective sides are, however, set in opposite directions, so that the two mechanisms act alternately. It will be observed that the two series of punches are set out of line, or, in other words, one in advance of the other, and this in order that they may both be fed by a single attendant at the same time. The machine will be provided as usual with feed-rolls and shears to cut the scrap into small pieces; but as these parts have no special relation to my invention it is deemed unnecessary to describe them herein.

I arrange the punches in each group or gang in a plane oblique to the horizon, as shown in Fig. 7, as this permits a narrower strip to be fed to the machine with short step-by-step movements and facilitates the operation of the machine at high speeds.

The lower shaft k^{10} is provided with driving-pinion k^{11}, receiving motion from pinion k^{12} on shaft I.

What I claim in my invention is—

1. In a washer-punching mechanism, the combination of a tubular punch, a die through which it acts, said die constructed to permit the escape of the washers in rear of its face, a center punch arranged in opposition to the tubular punch, and means for retracting the center punch to strip the washer therefrom.

2. In a washer-punching mechanism, the combination of a tubular punch, a die which it enters to cut the washer, said die having a rear delivery-opening for the washer, a center punch in opposition to the main punch, and a stripper-plate through which the center punch is projected and retracted.

3. In a washer-punching mechanism, a tubular punch, a die in which the washer is cut and through which it passes rearward to the point of discharge, a stripper-plate, a center punch which is projected through the stripper to meet and enter the tubular punch, and means for changing the relations of the cen-

ter punch and die to effect the release of the finished washer.

4. The combination of the tubular punch, the annular die having a rear delivery-opening for the washer, the center punch opposing the tubular punch, the stripper, and mechanism, substantially as shown, for advancing the center punch and holding the same at rest, advancing the tubular punch, and retracting the two punches in the order named.

5. In a washer-making machine, the combination of a reciprocating slide, a tubular washer-punch fixed therein, a reciprocating opposing center punch opposing the first, a die provided with a washer-escape opening in rear of the cutting-edge, and mechanism, substantially as described, for reciprocating the punches.

6. In a washer-making machine, the combination of a single shaft carrying two eccentrics, two slides of different lengths connected to the respective eccentrics, washer-punches in the slides, reciprocating center punches, and dies between the punches, substantially as and for the purpose specified.

7. In a washer-making machine, the combination, with a reciprocating washer-punch, of a die formed with a washer-escape slot, a stripper-block behind the die having a projection extending into the die, a horizontally-reciprocating center-punch block behind the stripper-block, a center punch in the said punch-block projected through the stripper-block into the die, and a vertically-reciprocating block behind the center-punch block having connection thereto, substantially as and for the purpose specified.

8. In a washer-making machine, the combination, with a reciprocating washer-punch, of a reciprocating rod formed with a rack-gear on its free end, a shaft mounted in the frame carrying a gear-wheel to mesh with the rack-gear on the rod, a second gear-wheel on the said shaft, a vertically-reciprocating block having a rack-gear on its rear face to mesh with the said second gear-wheel and formed on its front face with an incline, flanges having grooves in their inner faces, and a horizontally-reciprocating center-punch block provided with anti-friction rollers on its sides to engage the grooves of the vertically-sliding block, substantially as and for the purpose specified.

9. In a washer-making machine, a die formed with a transversely-arranged washer-escape slot back of its cutting portion, and a washer-stripper block arranged behind the die and formed with a projection extending partially through the shell of the die and having a punch-hole through its body and projection, as and for the purpose specified.

10. The combination, with the reciprocating washer-punch and the die, of the reciprocating center punch, a vertical reciprocating block to push the punch forward, and an eccentric arranged to move the center punch and hold it until the washer-punch forces the washer over the center punch, as shown and described.

In testimony whereof I hereunto set my hand, this 11th day of December, 1890, in the presence of two attesting witnesses.

JOEL ETTINGER.

Witnesses:
W. R. KENNEDY,
FABIUS STANLY ELMORE.