(No Model.) 3 Sheets—Sheet 1.

W. F. BANCROFT & H. A. STONE.

WIRE NAIL MACHINE.

No. 382,632. Patented May 8, 1888.

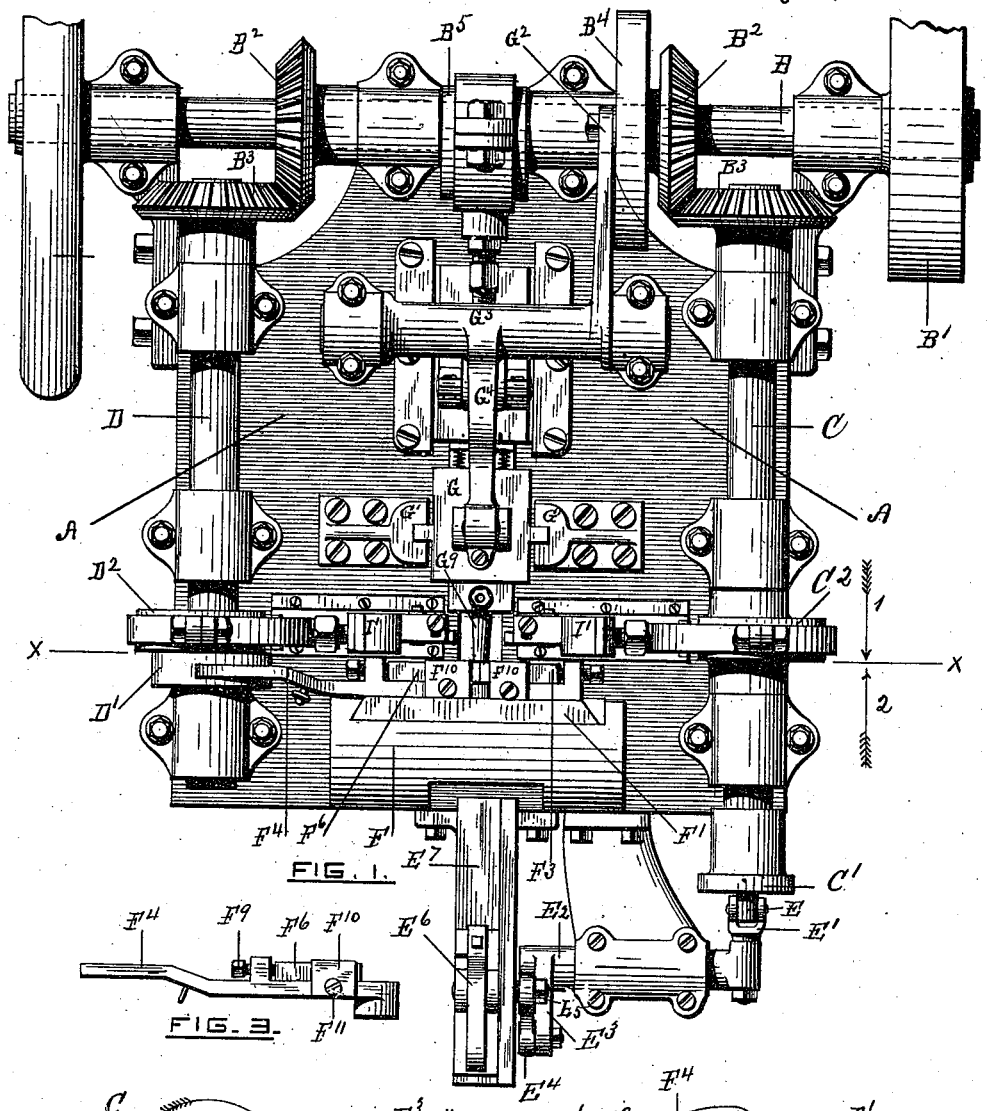

FIG. 1.

FIG. 3.

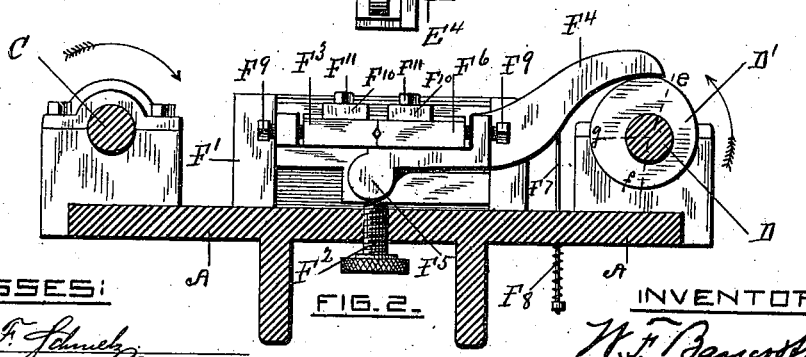

FIG. 2.

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(No Model.) 3 Sheets—Sheet 2.

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WIRE NAIL MACHINE.

No. 382,632. Patented May 8, 1888.

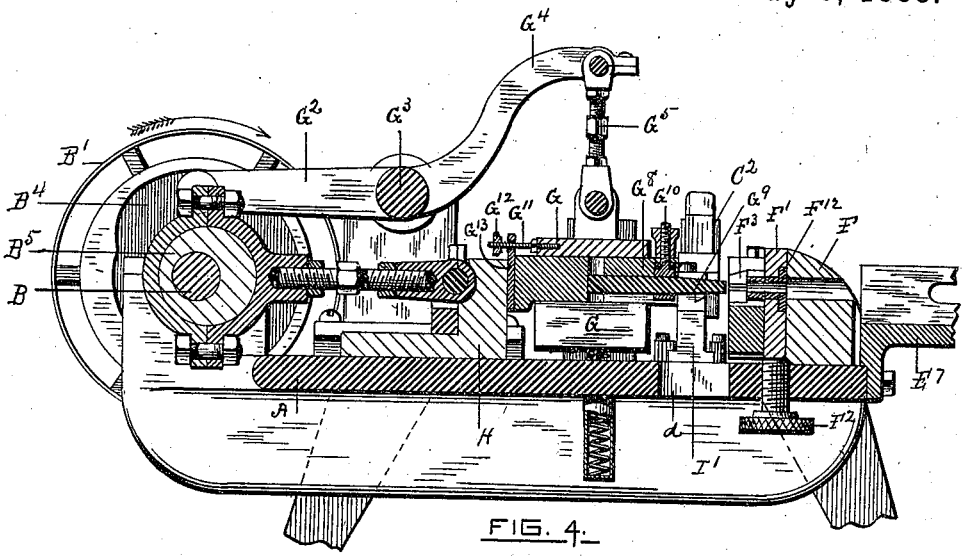


FIG. 4.

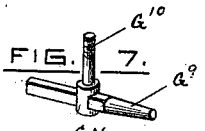


FIG. 7.

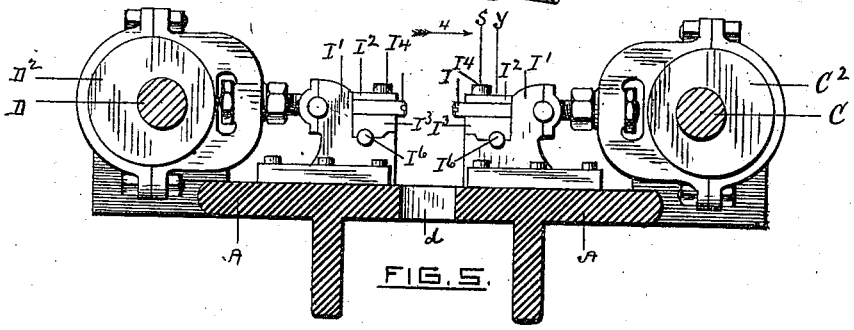
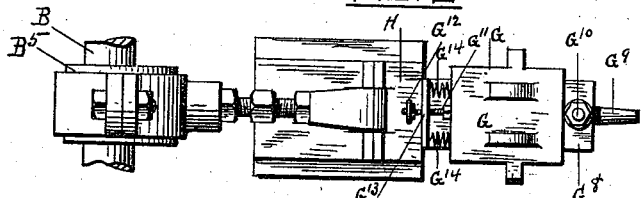


FIG. 5.

FIG. 6



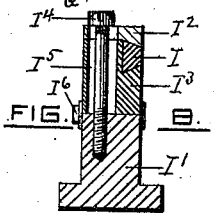
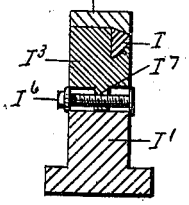


FIG. 8.

FIG. 9.



WITNESSES:

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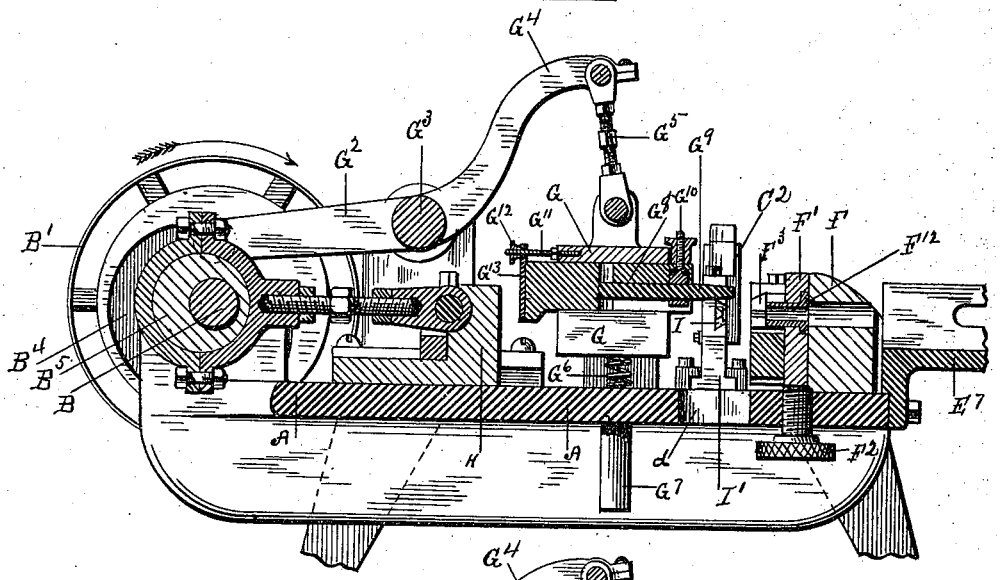
3 Sheets—Sheet 3.

W. F. BANCROFT & H. A. STONE.

WIRE NAIL MACHINE.

No. 382,632. Patented May 8, 1888.

FIG. 10.



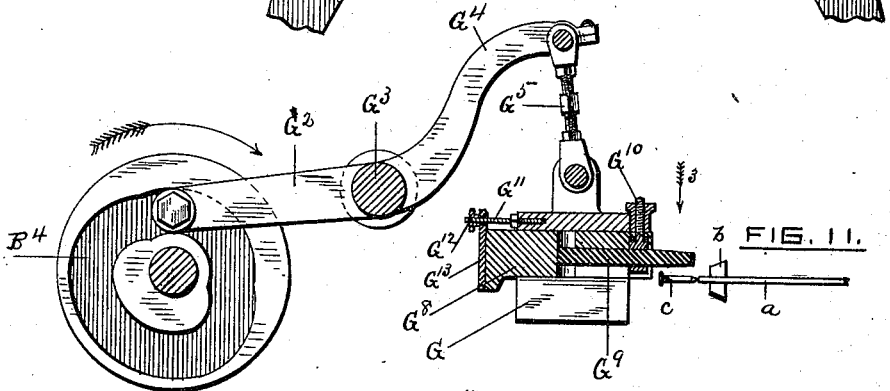


FIG. 11.

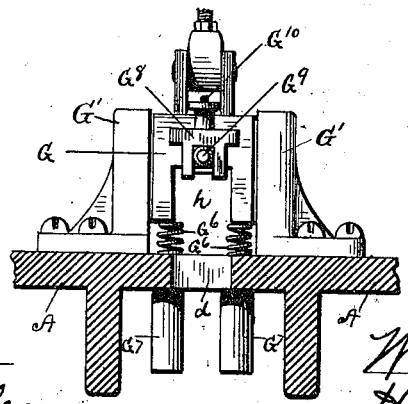


FIG. 12.

WITNESSES:

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Rufus B. Fowler

INVENTORS:

W. F. Bancroft Jr.

H. A. Stone.

UNITED STATES PATENT OFFICE.

WILLIAM F. BANCROFT AND HARLEY A. STONE, OF WORCESTER, MASSACHUSETTS; SAID STONE ASSIGNOR OF ONE-HALF HIS RIGHT TO SAID BANCROFT.

WIRE-NAIL MACHINE.

SPECIFICATION forming part of Letters Patent No. 382,632, dated May 8, 1888.

Application filed February 19, 1887. Serial No. 228,254. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. BANCROFT and HARLEY A. STONE, citizens of the United States, and residents of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Wire Nails, of which the following is a specification, accompanied by drawings forming a part of the same, and illustrating a wire-nail machine embodying the several features of our invention, in which—

Figure 1 shows a top view of the machine. Fig. 2 is a transverse sectional view on line X X, Fig. 1, looking in the direction of the arrow 1 and showing the mechanism for gripping the wire. Fig. 3 represents a detached portion of the gripping mechanism. Fig. 4 is a central longitudinal sectional view with the operating parts in the position in which a nail is headed. Fig. 5 is a transverse sectional view on line X X, Fig. 1, looking in the direction of the arrow 2 and showing only the mechanism for cutting off the wire. Fig. 6 is a top view of a portion of the nail-heading mechanism. Fig. 7 is a perspective view of a portion of the nail-heading mechanism. Figs. 8 and 9 are sectional views of a portion of the wire-cutting mechanism on lines S and Y, Fig. 5, respectively, looking in the direction of the arrow 3. Fig. 10 is a central longitudinal view of the machine with the operating parts in the position opposite that shown in Fig. 4. Fig. 11 is a side view of a part of the heading mechanism, partly in section; and Fig. 12 is a front view of a part of the heading mechanism.

Like letters refer to like parts in the several views.

A denotes a table mounted upon a suitable frame-work, and upon which the operating parts of the machine are supported. B is the main driving-shaft, to which power is imparted through the belt-pulley B'. Upon the shaft B are the bevel-gears B^2 B^2, communicating motion through similar bevel-gears, B^3 B^3, to the shafts C and D. A slotted crank-plate, C', on the shaft C carries a crank-pin, E, connected by a link with an arm, E', swiveled in the rocking shaft E^2, to which an arm, E^3, is attached. The arm E^3 is connected by a link, E^4, to a stud, E^5, projecting from a wire carrier, E^6, such as is now in use upon machines of this class. The wire-carrier has a reciprocating motion along the way E', and at each forward movement carries the wire required to form the nail into the machine.

We have not herein shown in detail the construction of the mechanism employed in feeding the wire to the nail-making portion of the mechanism, as it has been deemed advisable to incorporate the same in a separate application. For that reason the feeding mechanism is hereby disclaimed.

F is a raised block or anvil either securely attached to or cast as a part of the table A. Upon the perpendicular side or face of the anvil F is a way, in which slides a block, F', resting on the adjusting-screw F^2, by which the block F' is raised to bring the gripping-dies in alignment with the wire and the heading mechanism. The block F' has a fixed gripping-die, F^3, and a lever, F^4, pivoted in the block F' at F^5.

The lever F^4 carries a gripping-die, F^6, and is rocked on its bearing by the action of a cam, D', on the shaft D, on which the free end of the lever F^4 is held partly by its own weight and partly by means of a rod, F^7, and spiral spring F^8. As the gripping-dies are opened by the depression of the free end of the lever F^4, the wire is fed into the machine by the forward reciprocating motion of the carrier E^6. The dies F^3 and F^6 are then closed by the action of the cam D' in raising the free end of the lever F^4, thereby firmly holding the wire in the dies F^3 F^6, while the operation of heading is performed and the nail is cut off. The dies F^3 and F^6 are adjusted laterally in ways by the screws F^9, and are securely clamped in their position by means of the gibs F^{10} and screws F^{11}. We insert a steel tube, F^{12}, between the ends of the dies F^3 F^6, with its flanged end resting against the anvil F, for the purpose of transferring the force of the blow employed in heading the nail from the gripping-dies to the anvil itself.

The wire having been seized by the grip-

ping-dies F^5 F^6, with the end projecting far enough to form the head of the nail, the block G, sliding in the ways G′, is lowered from the position seen in Fig. 10 to that seen in Fig. 4 by the action of the cam B^4 on the main shaft B through the arm G^2, rocking shaft G^3, arm G^4, and connecting-link G^5, all of which are clearly shown in Fig. 11. The downward motion of the block G is cushioned by the spiral spring G^6, held in tubes G^7 beneath the table A. The block G carries a sliding plate, G^8, sliding horizontally in ways formed in the block G, and having a "header," G^9, (seen in a detached and perspective view in Fig. 7,) and consisting of a steel bar held in a groove in the lower surface of the sliding plate G^8 by means of the binding-bolt G^{10}. A screw-threaded rod, G^{11}, projects from the block G, having an adjusting-nut, G^{12}, against which the plate G^{13}, attached to the sliding plate G^8, is normally held by means of the spiral springs G^{14}, placed between the block G and the plate G^{13}, Fig. 6.

The header G^9 having been brought into alignment with the wire held in the gripping-dies F^5 F^6, as shown in Fig. 4, the "ram" H, sliding in ways on the table A, is brought against the end of the sliding plate G^8 by the eccentric B^5 on the shaft B, forcing the header G^9 against the end of the wire held in the dies F^5 F^6 and forming the head of the nail. The motion of the parts is then reversed, assuming the position shown in Fig. 10, the dies F^5 F^6 are opened, releasing the wire, which is again fed the length of the required nail, the gripping-dies F^5 F^6 are closed by the action of the cam D′, and the cutting and pointing dies I are brought against the wire by the action of the eccentrics C^3 on the shaft C and D^2 on the shaft D. The cutting and pointing dies are carried in blocks I′, sliding in ways on the table A, and are held in position by the gibs I^2, intermediate blocks, I^3, and binding-screws I^4, which pass through slots I^5 and enter the sliding blocks I′. The adjustment of the dies I is made laterally by the screws I^6, journaled in the blocks I′ and passing through the screw-threaded lugs I^7 on the intermediate blocks, I^3, while the adjustment of the cutting-dies in the direction of their length is effected by the adjustable connections between the sliding blocks I′ and their actuating-eccentrics C^2 D^2. The connection between the sliding block G and arm G^4 is adjustable, as is also that between the sliding ram H and its eccentric B^5.

The relative position of the nail to the header is shown in Fig. 11, in which *a* denotes the wire as held by the gripping-dies represented by *b*, and the nail, as it is carried forward by the feed motion, will occupy the position *c*, unless it should have been entirely severed by the action of the cutting-dies. It will sometimes occur that the nail will not be severed from the wire, in which case the downward motion of the header G^9 will clear the nail from connection with the wire, causing it to fall through the opening *d* in the table A, and by the proper adjustment of the sliding plate G^8 by means of the adjusting-screw and nut G^{12} the header G^9 is made to just clear the end of the wire held by the gripping-dies.

The cam D′ on the shaft D, by which the gripping dies are actuated, is so shaped as to allow the free end of the lever F^4 to fall and open the gripping-dies, thereby releasing the wire during the time that the wire is being fed to the machine, or during the rotation beneath the lever F^4 of the surface from *e* to *f*. The dies are then closed with a moderate pressure on the wire from *f* to *g*, or while the operation of cutting and pointing is being performed by the action of the dies I, while from *g* to *f* the lever F^4 is raised, so as to bring a firm pressure on the wire in the gripping-dies while the operation of heading the nail is performed. Moderate pressure only is applied while the nail is being pointed and cut off, as it is necessary to allow the wire to move back in the gripping-dies as the nail is cut off, in case any pressure is brought to bear on the wire by the cutting off dies in that direction. The lower and central section of the block G is removed, as seen at *h*, Fig. 12, in order to allow the nail to pass beneath the header G^9 and through the block G, allowing a very long nail to be made, if required.

It will be observed that the three actuating-shafts B C D are in the same horizontal plane and also in the same horizontal plane as the gripping and cutting dies and the header G^9 when in the position of heading a nail. The action of all the eccentrics is brought, therefore, in a direct line with the centers of the shafts B C D. The action of the header as a "clearer" in clearing the completed nail from the wire is peculiar, in that it is parallel with the nail as it is brought in contact with it, and its position is easily adjustable with reference to the point of the nail. We are aware, however, that a header has been employed to clear the nail. Such we do not claim, broadly. The sliding block F′ is easily removed from its ways in the anvil F, and the opposing ends of the gripping-dies F^5 F^6 overlap the end of the steel tube F^{12}, so the force of the blow in heading the nail is received by the anvil through the tube F^{12} and the ends of the dies F^5 and F^6. The arrangement of all the operating parts of the machine upon the top of the table A allows all the parts of the machine to be readily reached for repairs or adjustment.

We do not confine ourselves to the particular method of constructing the adjustable connections between the several eccentrics and the parts moved by them, nor between the sliding block G and the arm G^4, all of which, as shown in the drawings, consist of the well-known form of a right and left screw-threaded bolt.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a nail-machine, the combination, with an anvil-block to receive the force of the blow in heading the nail and a vertically-adjustable

plate carrying the wire-gripping dies, of a tube held in said vertically-adjustable plate with one end of said tube in contact with said wire-gripping dies and the opposite end of said tube in contact with the anvil-block, whereby said tube is vertically adjustable simultaneously with said gripping-dies, substantially as set forth.

2. In a nail-machine, the combination of an anvil to receive the force of the blow in heading the nail, a die-holding block vertically adjustable in ways on said anvil, a fixed die held in said die-holding block, a lever pivoted in said die-holding block and carrying a movable wire-gripping die, and an actuating-cam by which said lever is vibrated and the wire-gripping dies closed, substantially as described.

3. In a nail-machine, the combination, with a fixed and movable gripping-die and a pivoted lever actuating said movable die, substantially as described, of a cam acting on said pivoted lever, the face of said cam being so formed as to effect the three successive movements of said pivoted lever, as described, whereby, first, the gripping-dies are opened and the wire released; second, the gripping-dies are partially closed and the wire held with a moderate pressure, and, third, the gripping-dies are completely closed and the wire firmly seized, substantially as described.

4. The combination of the vertically-adjustable block F′, pivoted lever F^4, gripping-dies F^3 F^6, adjusting-screws F^9, and actuating-cam D′, as and for the purpose set forth.

5. The combination of blocks I′, sliding on horizontal ways, intermediate die-carrying blocks, I^5, gibs I^2, binding-screws I^4, and adjusting-screws I^6, substantially as described.

6. The combination of the vertically-sliding block G, horizontally-sliding block G^8, provided with a groove to receive the header, header G^9, held in said groove, and eyebolt G^{10}, as and for the purpose set forth.

7. In the heading mechanism of a nail-machine, the combination of the vertically-sliding block G, a horizontally-sliding plate carrying a nail-header, a screw-threaded rod held in the vertically-sliding block and provided with an adjusting-nut, whereby the rearward motion of the header is limited, and a retractile spring by which said horizontally-sliding block is held against said adjusting-nut, substantially as described.

8. In the heading mechanism of a nail-machine, the combination of the vertically-sliding block G, horizontally-sliding block G^8, carrying a nail-header, and cushioning-springs G^6 to check the downward movement of said vertically-sliding block, substantially as described.

9. In the heading mechanism of a nail-machine, the combination of a vertically-sliding block, G, a horizontally-sliding block, G^8, a binding-bolt, G^{10}, carried by said sliding block G^8, and a nail-header, G^9, held by said binding-bolt, substantially as described.

10. The combination, with a vertically-sliding-block and a horizontally-sliding block sliding in said vertically-sliding block and carrying the header, of a screw-threaded rod held in said vertically-sliding block and passing through a lug on said horizontally-sliding block, an adjusting-nut on said screw-threaded rod, and a spring applied to said horizontally-sliding block to hold it against said adjusting-nut, substantially as described, whereby the position of the header is adjusted relatively to the end of the wire.

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HARLEY A. STONE.

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H. M. FOWLER.