ing the two first boilers erected by me, and which they had at first refused to insure.

In conclusion, I desire to call attention to the quotations from the December JOURNAL, which I have italicized, and to show the inconsistency of the statements of the agents of the Hartford Boiler Insurance Company, regarding the boilers in question, with the action of the company in insuring the same.

THE WIRE BOOK SEWING MACHINE.

By H. BILGRAM, M.E.

Read before the Franklin Institute at its meeting, October 15th, 1879.

The most important step forward that has lately been made in book binding is undoubtedly the substitution of wire for thread. A machine for sewing books with wire was recently exhibited at a meeting of the Franklin Institute, where several books were sewed before the audience.

The principle of this machine consists in producing a number of U-shaped wire staples, which are driven *from the inside* of each section of the book through the back and through one wide or several narrow bands of a strong linen or cotton fabric, whereupon the ends projecting through the back are clinched over, and thus a firm connection between the sheets of the section themselves and the band or bands covering the back of the book is produced. The machine fastens a section at each revolution of the main shaft, and can be run at 40 to 43 revolutions per minute. The book sections are fed by the operator, partly opened, upon a table which, by an oscillating motion, brings the sheet in position to be sewed. By an adjustable downward feed of the table on which the book is sewed, the sections can be sewed tight or loose, to suit the degree of "backing" in the subsequent forwarding of the book.

The principal merits of this mode of binding books are strength, durability and flexibility, besides the saving of labor, as an operator can turn out as much work on one of these machines as from five to eight operators can do by hand. Greater strength is given by the several sheets of each section being clamped firmly between the back and the clinched legs of the wire staple while the thread in thread-

sewed books holds the centre sheet only by the edges of the cuts through which the thread passes. If the inner sheet of any section of a thread-bound book be torn out by force, the thread cuts its way through the fold of the sheet; while in a wire-sewed book the sheet will tear in a double line, leaving a small strip of paper underneath the wire staple. This simple test proves at once the superior strength of a wire-sewed book.

The firmness of a wire-sewed book is not so much dependent on the gluing of the back as is the case with a thread-bound book. The inner sheet of any thread-bound book is held in position by the glue in the several saw-cuts; for if this connection is carefully severed without injuring the thread connection, the sheet can be moved up and down as much as the thirty-second of an inch, while nothing short of actual tearing of the paper can make the corresponding sheet of a wire-sewed book move through the same distance.

Rusting of the iron wire is effectually guarded against by tinning it.

Increased flexibility is insured by the diminished thickness of the flexible back of the book. In the old way of binding, the flexible connection of the several sections of the book is represented by two or more comparatively thick strands laid in the saw-cuts on the back of the book, and held there by the thread passing round them; while on the wire-sewed books the corresponding connection extends over the greater part of the back, and is not only much thinner and more flexible, but also much stronger. The book opens very freely indeed.

In binding the first books sewed with wire, some difficulty was experienced in the wires thickening the back of the book so much that in pressing it for the purpose of cutting, the paper was crushed by the wire just where it should have been strongest. This defect has been overcome by inserting the staples in a zigzag line, so that there appear two or three times as many rows of staples on the back as there are staples in each section.

In Europe these machines have been introduced with a remarkable rapidity, there being now about 150 of them in successful operation in England, Germany, France, Belgium, etc. Both the United States and the English Government binderies have adopted them, and thereby considerably reduced the cost of binding, besides producing superior work. Especially for the manufacture of blank books is this mode of binding superior, as is shown by the fact that in Germany hand-sewed books are sold at a discount in order to compete with the wire-sewed work.