No. 696,281. Patented Mar. 25, 1902.

A. H. TOOLE.

PAPER SHEET.

(Application filed Dec. 30, 1901.)

(No Model.)

Fig. 1.

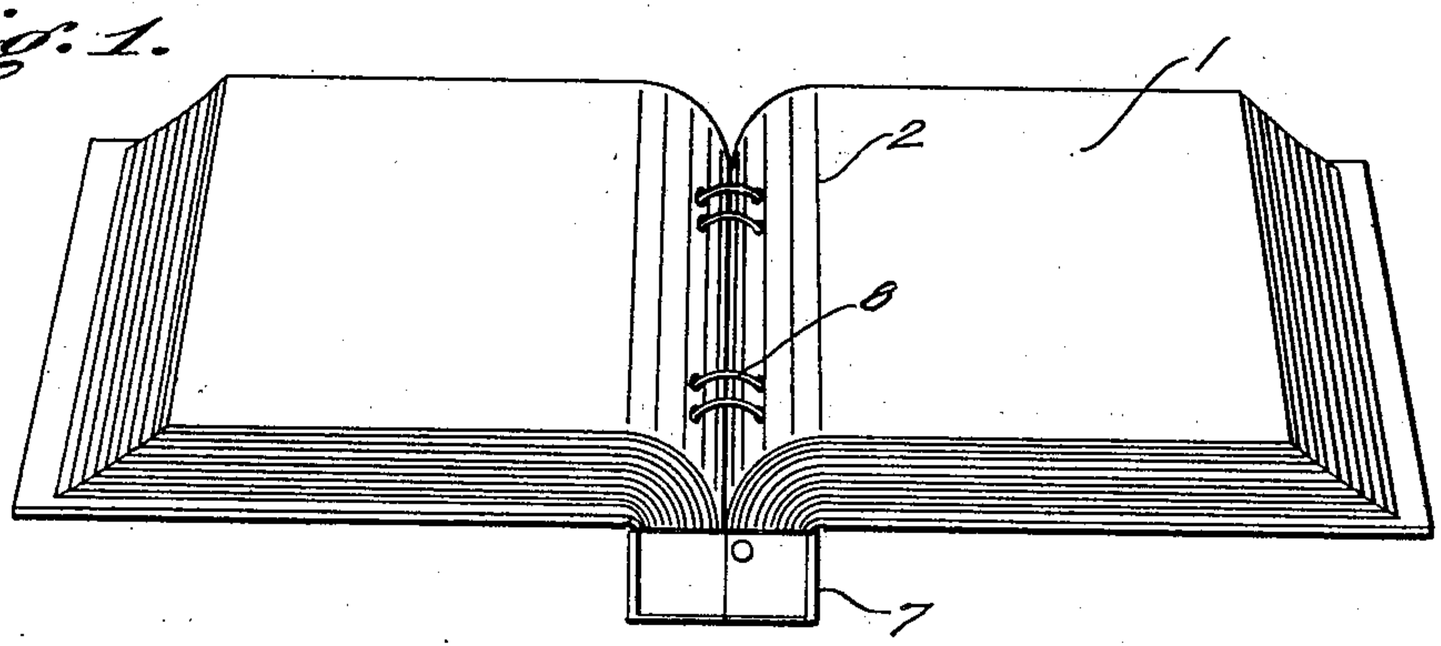
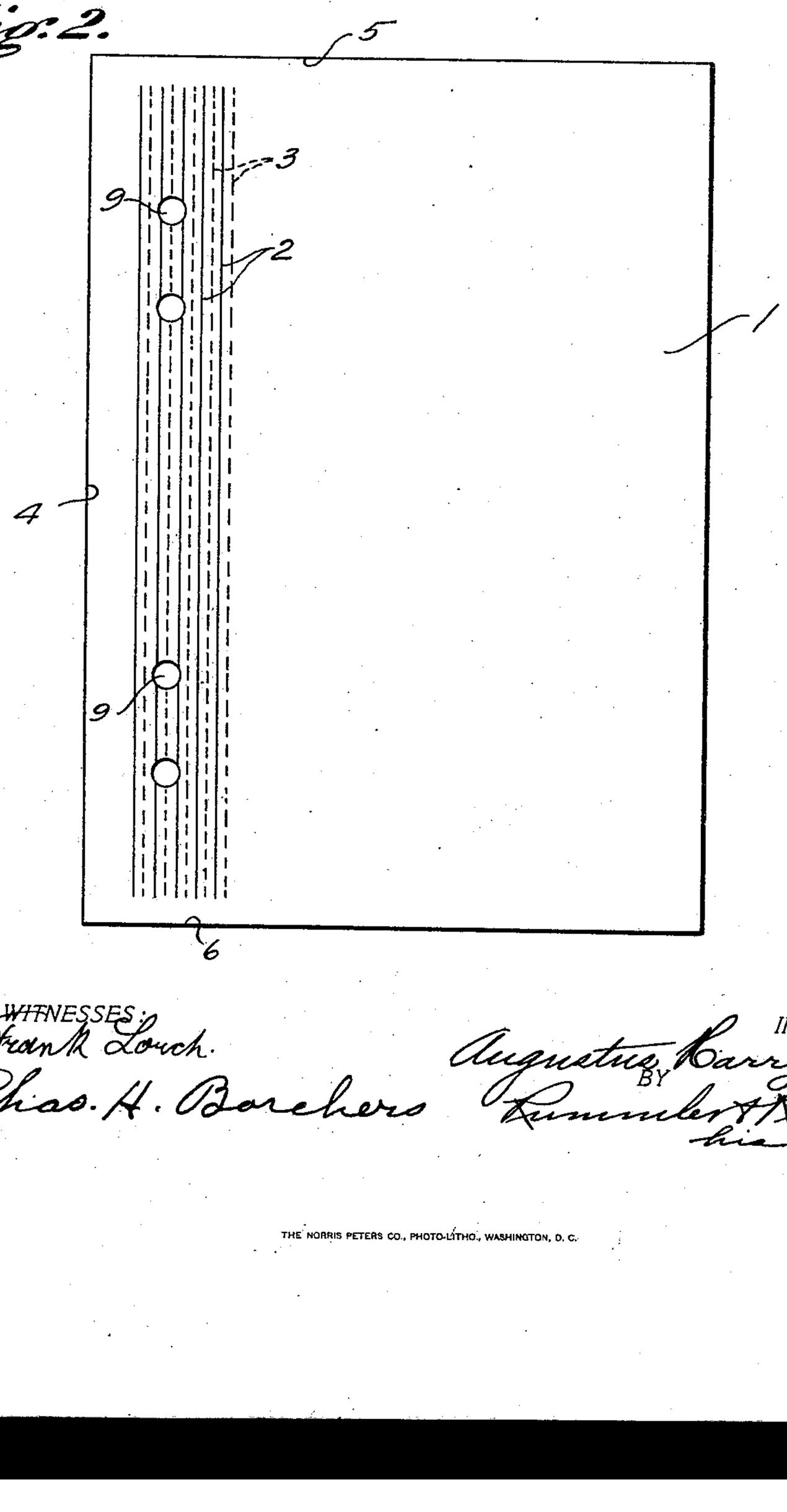


Fig. 2.



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UNITED STATES PATENT OFFICE.

AUGUSTUS HARRY TOOLE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO CHARLES ARTHUR BURTON, OF CHICAGO, ILLINOIS.

PAPER SHEET.

SPECIFICATION forming part of Letters Patent No. 696,281, dated March 25, 1902.

Application filed December 30, 1901. Serial No. 87,790. (No specimens.)

To all whom it may concern:

Be it known that I, AUGUSTUS HARRY TOOLE, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Paper Sheets, of which the following is a specification.

My improvement is designed mainly for loose-leaf ledger-sheets in which it is desirable that a part extending near to and parallel with the binding edge of each sheet be made more flexible than the body of the sheet. The purpose of this is to cause the main parts of the sheets to lie flat upon each other when the book is opened. This has been accomplished heretofore by milling away part of the surface of each sheet on several lines extending near to and parallel with the binding edge or by creasing or scoring the paper on such lines. The milled lines when properly made have been generally regarded as superior to scored or creased lines. The proper milling of such lines, however, requires very accurate machinery and is a comparatively slow and expensive process.

The main object of my invention is to produce improved sheets of the class described and to render same more flexible or weaken same at the desired parts by a method which is quicker and cheaper than the milling process and more efficient than the method of scoring or creasing. I accomplish these objects by the process hereinafter described and the product illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a loose-leaf ledger made according to my invention. Fig. 2 is a plan of one of the sheets from which said ledger is constructed.

In putting my invention into practice I rule the sheets 1 with a plurality of lines 2 on one face of the sheet and with similar lines 3 on the opposite face of the sheet. The lines 2 and 3 are arranged alternately. All of said lines extend along the binding edge 4 of the sheet and preferably have one end terminating a short distance inward of the upper edge 5 of said sheet and have the other end terminating a short distance inward of the lower edge 6 of said sheet. Each of said lines is ruled with a corrosive liquid coming in contact with the fibers of the sheet to a considerable depth of the paper, but not affecting the fibers of said paper throughout its entire thickness along said line.

The corrosive liquid used may be made of sufficient strength to destroy the fibers with which same comes in contact; but I prefer to use a weak solution which in itself is not strong enough to destroy the fibers under ordinary atmospheric temperature. I have used a weak solution of sulfuric acid for this purpose; but it is plain that many other corrosive liquids may be used with similar effect. In thus treating the paper I first rule the lines with the corrosive liquid and then bring the sheets of paper thus ruled into contact with a heated roll or other suitable surface of sufficiently high temperature to carbonize or destroy the fibers with which said liquid has been brought in contact, but of insufficient temperature to carbonize or render brittle the other parts of the sheet.

In the drawings, 7 represents the casing or frame of the binding, and 8 represents metallic binding-teeth acting through the apertures 9, with which each of the sheets is provided. The binding and frame shown in Fig. 1 is merely one of many different forms of devices used for binding together the sheets of loose-leaf ledgers. In order to have the sheets lie flat upon each other, it is necessary to weaken same along the lines 2 or at the part of the sheets adjacent to their binding edges. By my method of destroying or carbonizing some of the fibers of the paper along the lines 2 and 3 it will be seen that the paper is rendered weaker and readily bendable along these lines. Since the sheet will most readily bend away from the surface upon which the fibers have been destroyed, the same is made to bend toward either side with equal facility by making similar lines on both sides of the sheet. These lines are preferably arranged alternately, as shown in Fig. 2, so as to avoid excessive weakening of the paper along any given line.

It will be understood that the structure and process may be varied in some respects from that hereinbefore described without departing from the spirit of my invention. I there-

fore do not confine myself to the details mentioned except as hereinafter limited in the claims.

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

1. As an article of manufacture, a sheet of book-paper having a line extending along the binding edge of said sheet and ruled with a corrosive liquid, for the purpose specified.

2. As an article of manufacture, a sheet of book-paper having a plurality of substantially parallel lines extending along the binding edge of said sheet and ruled with a corrosive liquid, for the purpose specified.

3. As an article of manufacture, a sheet of book-paper having a plurality of substantially parallel lines extending along the binding edge of the sheet on each face thereof and ruled with a corrosive liquid, said lines being alternately arranged on the opposite faces of the sheet, for the purpose specified.

4. As an article of manufacture, a sheet of book-paper having a line extending along the binding edge of said sheet and ruled with a corrosive liquid, said line having one end terminating a short distance inward of the upper edge of said sheet, and the other end terminating a short distance inward of the lower edge of said sheet, for the purpose specified.

5. As an article of manufacture, a sheet of book-paper having a plurality of substantially parallel lines extending along the binding edge of said sheet and ruled with a corrosive liquid, each of said lines having one end terminating a short distance inward of the upper edge of said sheet, and the other end terminating a short distance inward of the lower edge of said sheet, for the purpose specified.

6. As an article of manufacture, a sheet of book-paper having a plurality of substantially parallel lines extending along the binding edge of the sheet on each face thereof and ruled with a corrosive liquid, said lines being alternately arranged on the opposite faces of the sheet, each of said lines having one end terminating a short distance inward of the upper edge of said sheet, and the other end terminating a short distance inward of the lower edge of said sheet, for the purpose specified.

7. A book comprising a plurality of sheets of paper each having a line extending along its binding edge, and ruled with a corrosive liquid, said lines being substantially equidistant from said binding edges, for the purpose specified.

Signed at Chicago this 28th day of December, 1901.

AUGUSTUS HARRY TOOLE.

Witnesses:

WM. R. RUMMLER,

EUGENE A. RUMMLER.