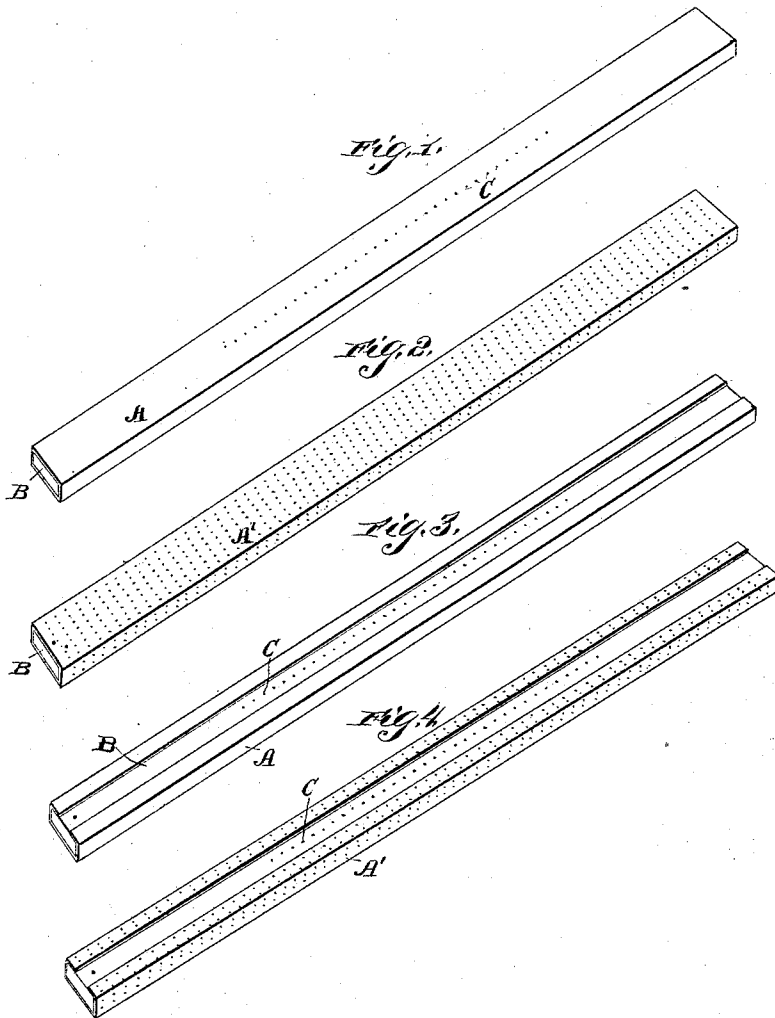


(No Model.)

N. T. HARTSHORN.
PANTOGRAPH BAR.

No. 469,420.

Patented Feb. 23, 1892.



Witnesses:
George Barry.
R. D. Seward.

Inventor:
Newton T. Hartshorn
By Brown & Seward
his Attys.

UNITED STATES PATENT OFFICE.

NEWTON T. HARTSHORN, OF CLEVELAND, OHIO.

PANTOGRAPH-BAR.

SPECIFICATION forming part of Letters Patent No. 469,420, dated February 23, 1892.

Application filed March 7, 1891. Serial No. 384,186. (No model.)

To all whom it may concern:

Be it known that I, NEWTON T. HARTSHORN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Pantograph, of which the following is a specification.

My invention relates to an improvement in pantographs; and it consists in providing an instrument of this character in which the parts consist of thin metallic facings provided with a filling or backing of wood or other analogous material, for the purposes as will be hereinafter set forth.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view in perspective of one of the pantograph-bars, showing the filling or backing completely surrounded by a thin strip of plain metal. Fig. 2 is a similar view showing the filling or backing completely surrounded by a thin sheet of perforated metal. Fig. 3 is a view showing the filling partially surrounded by a thin sheet of plain metal, and Fig. 4 is a view showing the filling partially surrounded by a perforated sheet-metal casing.

In carrying out my invention I provide a thin sheet of metal A A', either plain or perforated, which sheet either partially or wholly surrounds a filling or backing B, of wood or other analogous material, which is used because of its yielding tendency. I preferably form the casing as a thin sheet-metal tube completely surrounding the wood or other analogous material.

The grading-holes C are stamped or punched through the filling and casing at a single operation, thereby securing several good results, among which are, first, I am enabled to stamp the holes much nearer together, thereby se-

curing a much nicer and more accurate adjustment of the pantograph, and, secondly, I am enabled to exactly space the holes apart, which has been impossible heretofore when the same have been formed one at a time.

By providing the filling or backing of wood or other yielding material and facing the same with a thin sheet of metal I secure stiffness and strength with a very light structure. By the above construction the bar is also prevented from warping or splitting. The wood or other analogous backing or filling will form a packing around a pivot when inserted in any of the grading-holes, because of the tendency of the wood or analogous material to spring back into position after being forced apart. Thus all rattling at the pivots is obviated and a steady smooth rocking movement of the pivot is obtained.

In some cases for the sake of lightness I provide a perforated sheet of metal A' partially or wholly surrounding the filling or backing, the grading-holes being punched between two lines of perforations.

What I claim is—

1. In a pantograph, the bars consisting of a sheet-metal casing with a backing or filling of wood or other analogous material, said bars being provided with holes for pivots extending through the casing and backing or filling, substantially as set forth.

2. In a pantograph, the bars consisting of a filling or backing of wood, having a casing of thin metal surrounding the same, said bars being provided with holes for pivots extending through the casing and backing or filling, substantially as set forth.

NEWTON T. HARTSHORN.

Witnesses:

ART. A. KUNTZ,
M. R. COATES.