(No Model.) 2 Sheets—Sheet 1.

A. K. DEVENPORT.

SANDPAPERING MACHINE.

No. 445,749. Patented Feb. 3, 1891.

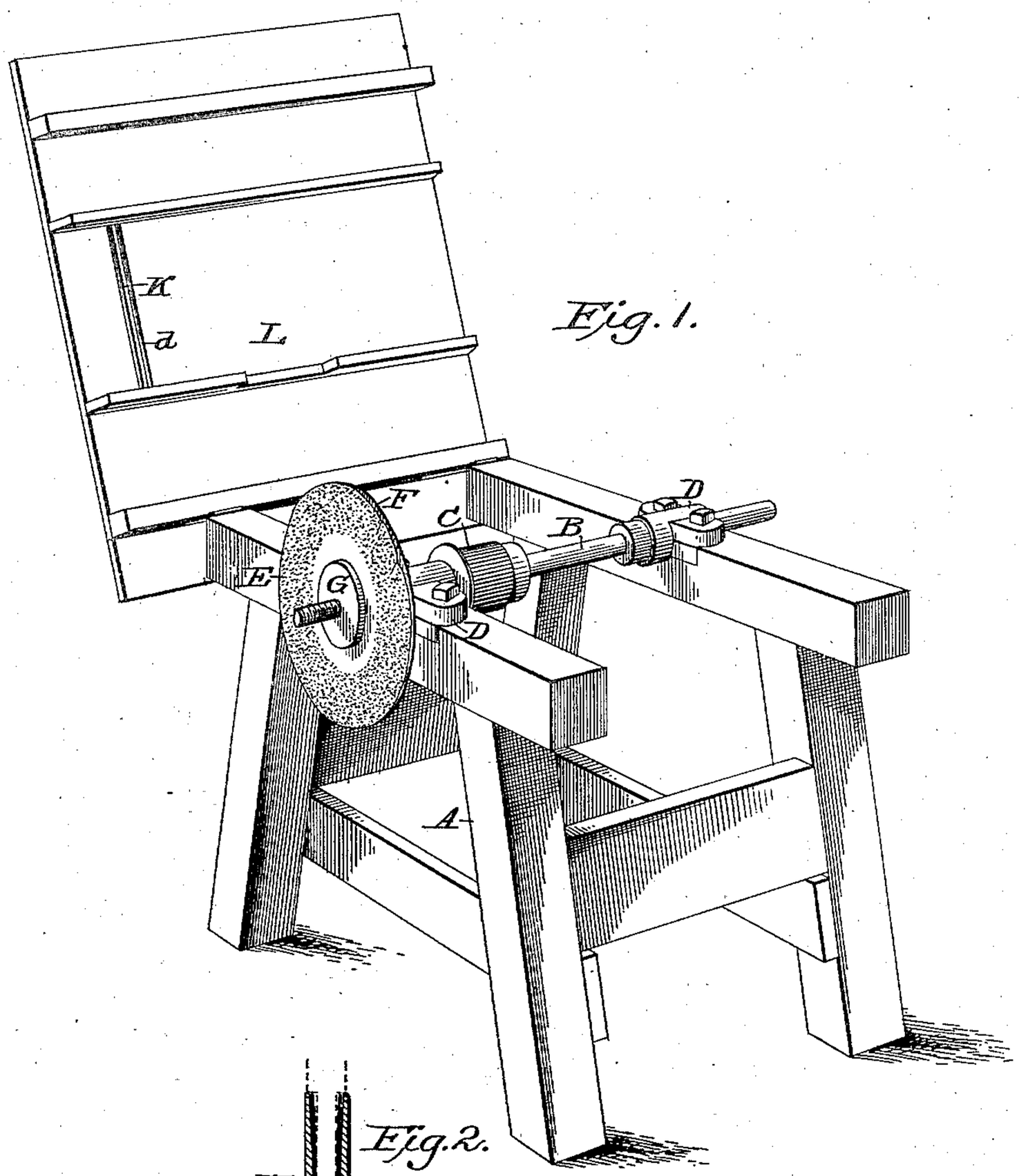

Fig. 1.

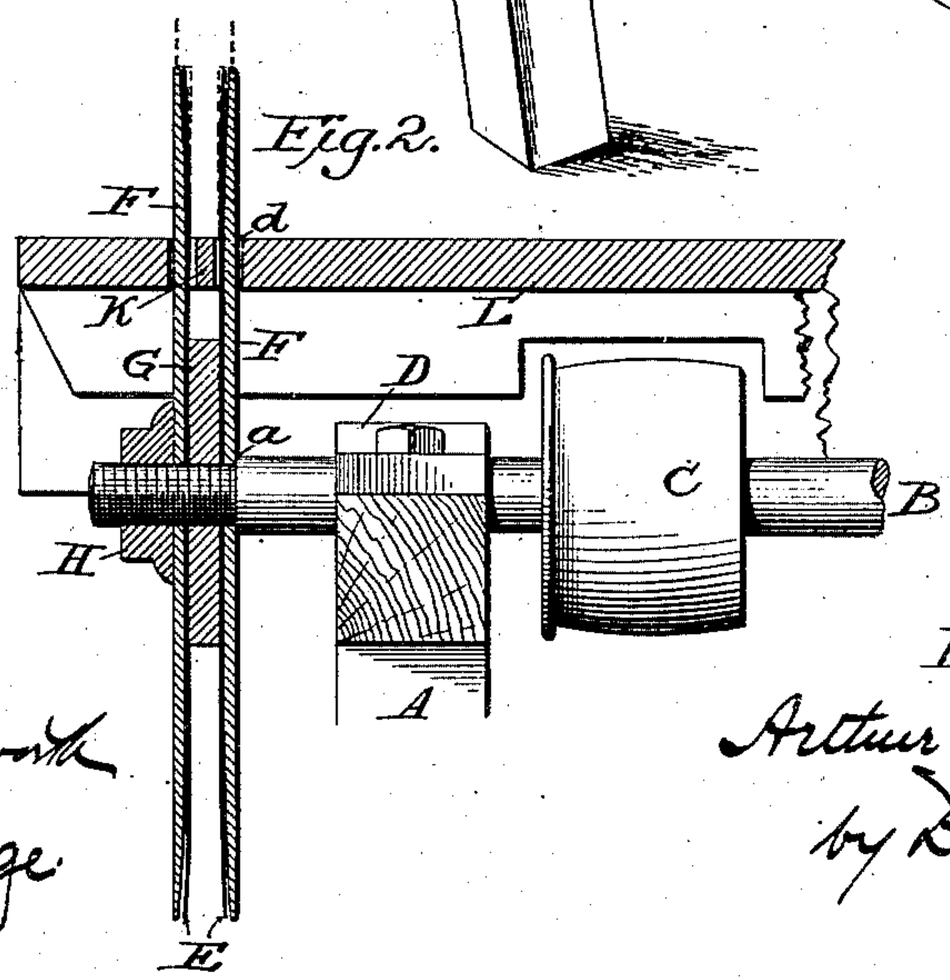

Fig. 2.

Witnesses:
S. P. Wellingsworth
Horace A. Dodge.

Inventor:
Arthur K. Devenport,
by Dodger Sons,
Attys.

(No Model.) 2 Sheets—Sheet 2.

A. K. DEVENPORT.

SANDPAPERING MACHINE.

No. 445,749. Patented Feb. 3, 1891.

Fig. 3.

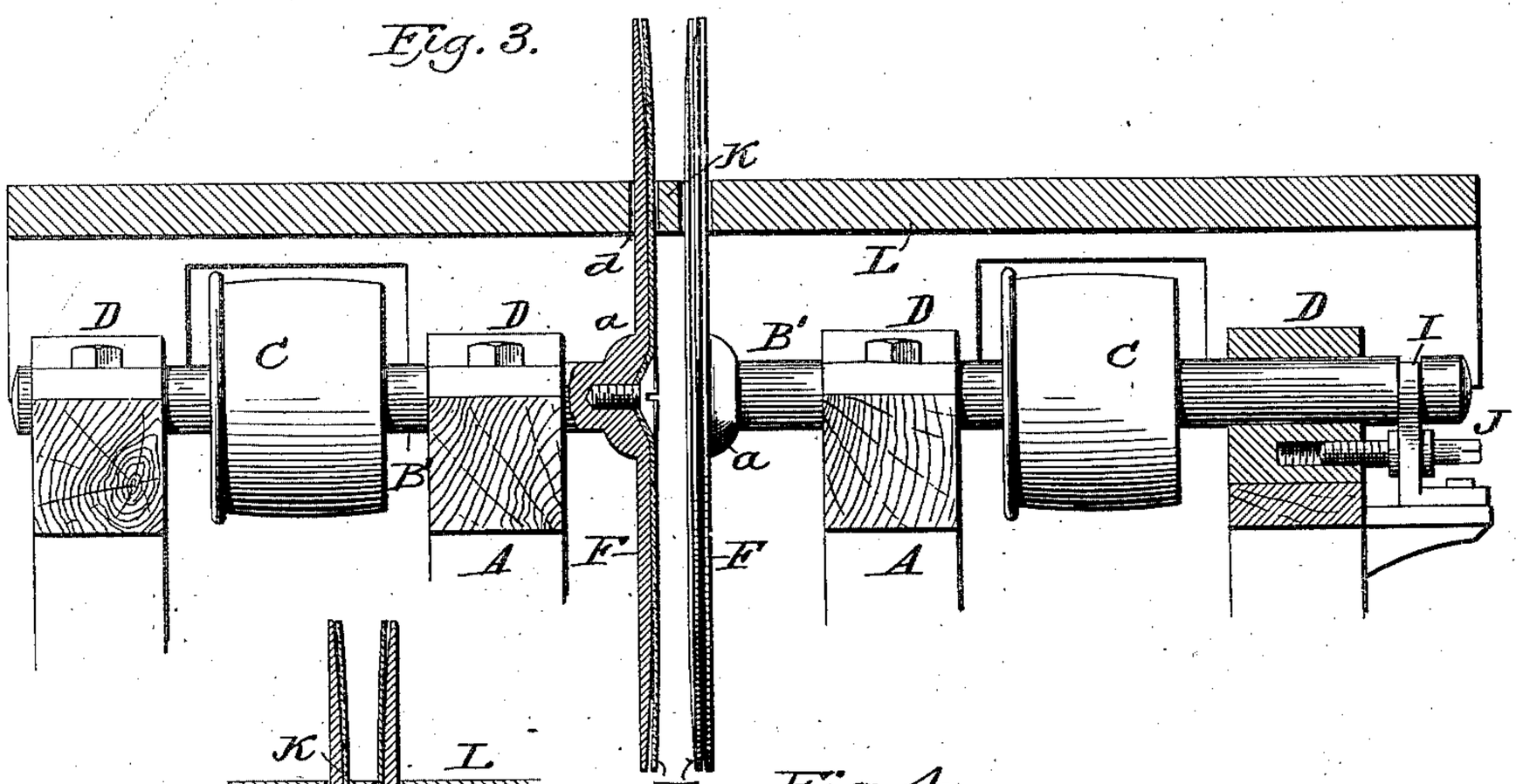

Fig. 4.

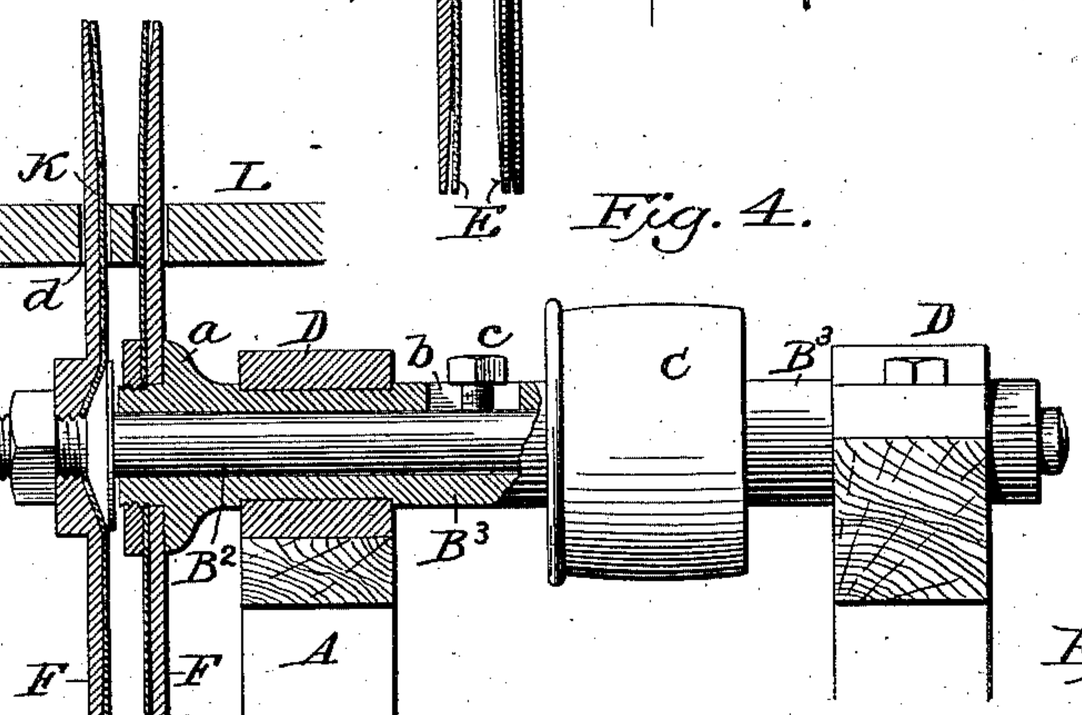

Fig. 7.

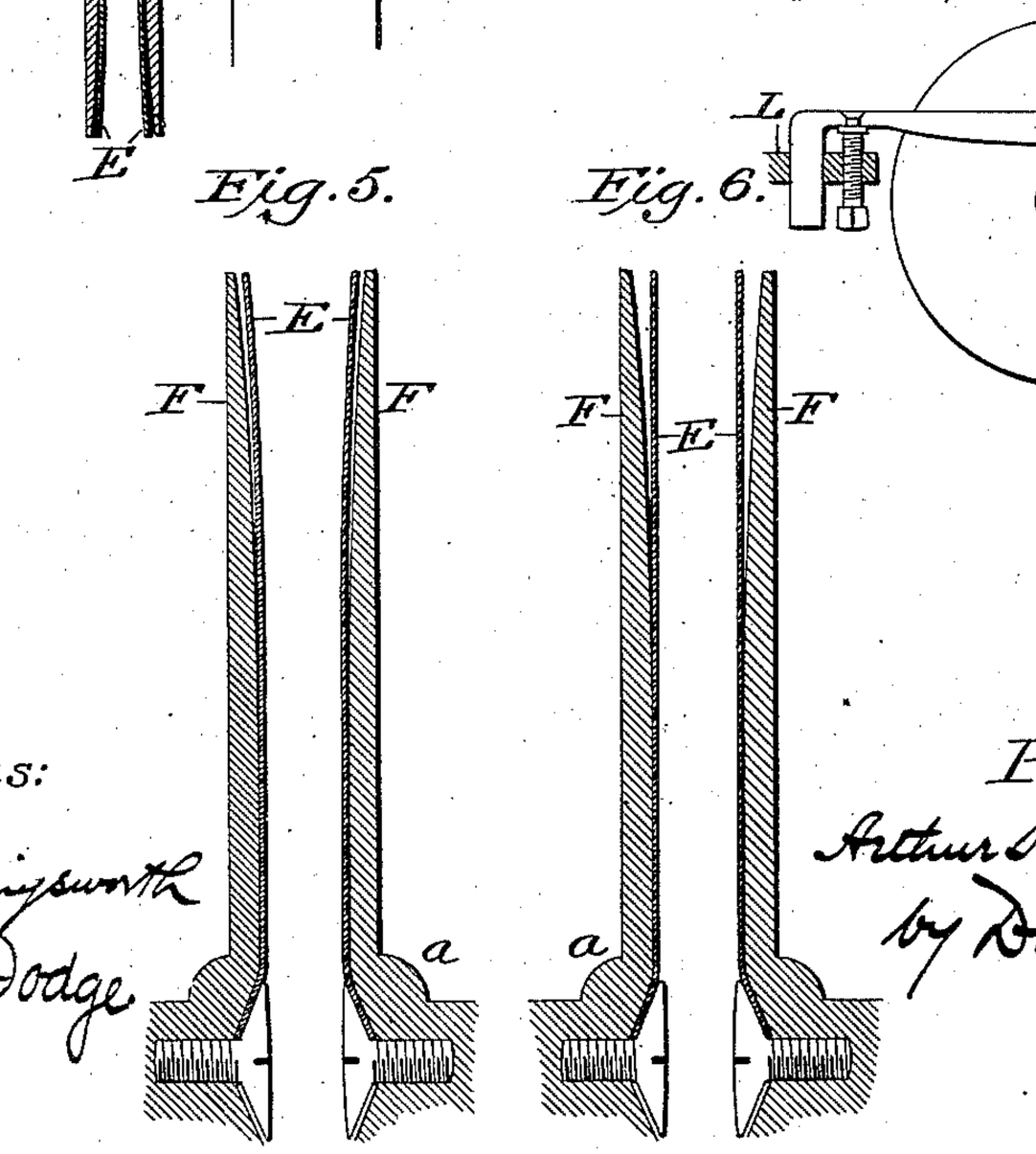

Fig. 5.

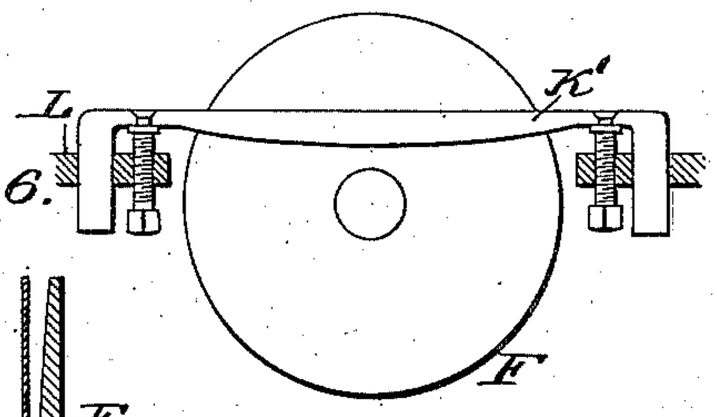

Fig. 6.

Witnesses:

S. P. Hollingsworth

Horace A. Dodge

Inventor:

Arthur K. Devenport,

by Dodger Sons,

Attys.

UNITED STATES PATENT OFFICE.

ARTHUR K. DEVENPORT, OF JACKSON, MICHIGAN, ASSIGNOR OF ONE-HALF TO S. HEYSER & SONS, OF SAME PLACE.

SANDPAPERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 445,749, dated February 3, 1891.

Application filed September 26, 1889. Serial No. 325,122. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR K. DEVENPORT, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Sandpapering-Machines, of which the following is a specification.

My invention relates to sandpapering-machines, and consists, primarily, in the employment of flexible abrading-disks carried by an arbor and arranged to be rotated at high speed, the disks being free at their outer edges.

In the drawings, Figure 1 is a perspective view of a machine designed to carry out my improvements, one of the disks being shown in position upon and the other removed from the arbor; Fig. 2, a sectional view of the parts in position; Figs. 3 and 4, similar views showing modifications; Figs. 5 and 6, enlarged views designed to illustrate the action of the machine; Figure 7, a view illustrating means for adjusting the bridge or work-support independently of the table.

Prior to my invention machines for sandpapering panels and other wood-work have been constructed with two disks or rotary heads, each faced with sand-paper or other abrading material, which material has, however, been tightly drawn or stretched over the face of the disk or head and clamped or bound at the edges. To prevent the outer edges of the disks or heads thus covered from marring the work, it has been customary to round off or bevel them; but as a result of such construction it has been impracticable to work close up to the edges or boundaries of the raised portion of the panel, and in attempting to do so the edges have unavoidably been cut away. In other words, one of two difficulties has inevitably resulted from the use of abrading-disks having fixed edges—failure to dress the entire face of the sunken portion or cutting away the edges of the raised portion. I avoid these difficulties and attain most satisfactory results by the employment of the free-edged abrading-disks in the manner explained below.

A indicates a stout frame, which may be of wood or metal; B, an arbor provided with a band-pulley C and mounted in boxes or bearings D upon the frame A, and E E two disks of sand-paper or other suitable material, as emery-paper or cloth, applied to said arbor and arranged to rotate therewith, the disks being clamped in any suitable manner at their central portions, but free at their outer edges. These parts are all that are essential to the carrying out of my invention; but better results may be secured by the adoption of the further parts and features indicated in the drawings. Thus in practice I find it advantageous to employ two disks F F, one back or outside of each of the abrading-disks E E, to prevent the latter from falling over, buckling, or otherwise getting out of shape, and a spacing collar or disk G between the abrading-disks, to serve the double purpose of determining their distance apart and of aiding in clamping them.

The outside or supporting disks are preferably made of metal and quite thin, their inner or opposing faces being slightly beveled or curved outward toward their peripheries, as best shown in Figs. 5 and 6. The arbor B is formed with a reduced end portion, as shown in Figs. 1 and 2, and with a fixed collar or shoulder *a*, against which one of the supporting-disks rests, and abrading-disk E coming next, then the spacing-collar G, then the outer abrading-disk, followed by the second supporting-disk F, and lastly by a nut H, which screws upon the threaded end of the arbor and binds the several disks together and secures them so firmly to the arbor that they rotate therewith. A feather or spline may be provided to prevent the several disks from turning upon or independently of the arbor; but this is not important and is not ordinarily used. By varying the thickness of the spacing disk or collar G the distance between the abrading-disks may be varied and determined as required. A like result may also be attained by either of the modifications illustrated in Figs. 3 and 4.

In Fig. 3 I have shown a separate arbor B′ for each of the abrading-disks with its backing or supporting disk, one of the arbors being longitudinally adjustable in its bearings

to permit variation of the distance between the disks. A yoke I, having the arms of its fork seated in a circumferential groove in the arbor B′, has swiveled in it an adjusting-screw J, the stem of which screws into a suitably-threaded socket in one of the bearings of the arbor or in some other fixed part of the machine. By turning the screw J the movable arbor may be adjusted with ease and nicety and held at any desired adjustment. Another equivalent construction is shown in Fig. 4, in which the adjustable arbor B^2 is represented as passing centrally or axially through a tubular arbor B^3, the tubular arbor being formed with a longitudinal slot *b* to receive a screw *c*, which serves to clamp the central arbor and hold it firmly in any desired relation to the fixed arbor. The term "fixed" as above employed has reference only to longitudinal movement, it being understood, of course, that both arbors rotate.

It is not essential that more than one abrading-disk be used, though it is generally desirable to dress or smooth both faces of the work, and will therefore be desirable ordinarily to employ the two. If but one be used, any form of support, either the supporting-disk F or a fixed support, may be used to keep the work in position while being acted upon by the abrading-disk.

K indicates a bridge-piece extending between the disks from one end of the slot *d* of the work-table L to the other end thereof, its purpose being to sustain the work while passing between the disks and to limit its descent between them. The work-table is hinged or otherwise made adjustable as to height, and by raising or lowering it the depth to which the work may enter may be regulated and varied at will.

Referring now to Figs. 5 and 6, the principle of operation will be more fully explained. Fig. 5 represents the abrading-disks as they appear when at rest, their flexibility permitting them to fall back against the supporting-disks or away from them, as may be. Fig. 6 represents the position which the flexible disks will assume if the outside supporting-disks be omitted or if they be considerably beveled, so as to leave a comparatively wide space between the plane of the abrading-disks and the inner faces of the supporting-disks. Under such conditions the centrifugal force due to the high speed of rotation will cause the abrading-disks to straighten out in planes perpendicular to the axis of the arbor, as indicated; but if the outside or supporting disks be not considerably beveled the abrading-disks will hug closely to them by reason of the expulsion of air from between the abrading and the supporting disks and the pressure of the air upon the abrading-faces—a fact developed in practical use of the machine. The bridge K′ may be adjusted by means of set-screws, as indicated in Fig. 7, without altering the elevation of the table. The elevation of the work-table or its bridge being properly regulated, the free edges of the abrading-disks will work up to but never beyond the required point, and as a consequence the sunken, reduced, or beveled outer portions of a panel or like piece of work may be perfectly dressed even up to and in the angle formed by the meeting of the sunken and raised portions of the panel or other work. The outer or sunken portion of panels and like work is now generally reduced in thickness toward the edges, and although the disks work very efficiently upon parallel faces they work especially well upon such beveled or inclined faces, because of the tendency of the abrading-disks to hug against them through their centrifugal action. The precise character of the disks E E is not material—that is to say, they may have coarser or finer faces, according to the degree of finish required. In other words, while the machine is referred to under the general and common name of "sandpapering-machine," it is not my intention to convey the idea that the invention is restricted to the use of sand-paper disks.

It has been proposed hitherto to make abrading and polishing disks for dental work and for cleaning or dressing shoe-soles by gluing or cementing two disks of sand-paper or like abrading material to an intermediate disk or body of cloth or other material which will remain pliable during the process of manufacture. It is manifest, however, that an abrading-disk comprising two layers of abrading material, such as sand-paper, emery-paper, or the like, an intermediate body, and two layers of glue or cement will not possess great or even considerable flexibility. In one instance it has been proposed to permit the edges of the abrading-disks to project slightly beyond the intervening disk or body, so as to bend over and cover the edge thereof, such construction necessarily involving the use of an intermediate body of considerable thickness. Such disks are unsuited to the work for which my machine is designed and cannot be successfully or advantageously used therein, because the thickness and comparative stiffness of the composite disks preclude the perfect freedom of movement and the ready and certain adaptation and adjustment of the disks to the surfaces to be operated upon, and for the further reason that it is only after continued use and wear that such composite disks possess even the comparatively slight degree of flexibility claimed for them if they ever possess it.

To be effective for the purposes of my invention the disks must be so thin and light and must possess such degree of flexibility that the partial vacuum produced by the expulsion of air from between the abrading-disks or supports shall cause the abrading-disks to hug normally to such backing or supporting disks and to lie flat and smooth thereon, while leaving their outer edges free from folds or bends and consequently in the

shape best adapted to permit them to work closely into the angle where the raised portion and the reduced portion of the panel meet. Such action and result are unattainable with composite disks such as heretofore proposed. Moreover, so far as I am aware, such composite disks have never been combined with an independent backing or support; nor has any one before proposed to employ a thin flexible disk with a backing or support without securing the one firmly and fixedly to the other. This combination enables me to attain results never before reached by any machine of this character, so far as I have knowledge.

Having thus described my invention, what I claim is—

1. In a machine for smoothing wood or the like, the combination of a frame, a work-support, a rotatable arbor, and a flexible smoothing-disk carried by said arbor and free from its outer edge to the central clamp, by which it is made fast to the arbor.

2. In a sand papering-machine, the combination of a suitable frame, an arbor journaled therein and provided with a wheel through which to receive motion from a suitable source, a flexible abrading-disk made fast at its center to the arbor, but free at its outer edge and arranged to rotate with the arbor, and a guide opposite the working face of the disk to guide the work in passing the same.

3. In a sand papering-machine, the combination of two flexible abrading-disks, means for rotating said disks, and an intermediate work-support, each disk being centrally supported, but free at its periphery.

4. In combination with a suitable frame, a work-support mounted thereon and adjustable relatively thereto, an arbor mounted in said frame, and a flexible abrading or smoothing disk secured concentrically upon the arbor and having its free edge extended beyond the work-support.

5. In a machine for finishing wood-work and the like, the combination of a flexible disk to act upon one face of the work, a second flexible disk to act upon the opposite face of the work, one disk adjustable toward and from the other, and means for imparting rotation to both of said disks, both of said disks being free at their peripheries.

6. The herein-described machine for dressing wood-work and the like, consisting of a frame, an arbor mounted and rotatable therein, two flexible abrading-disks concentrically secured upon said arbor, but otherwise free, and two supporting-disks also carried by said arbor, one behind each of the abrading-disks.

7. The combination, with frame A and arbor B, of disks E E, supporting-disks F F, and an intermediate supporting-bridge.

8. In combination with frame A, arbor B, free flexible disks E E, and supporting-disks F F, carried by said arbor, spacing-collar G, interposed between the disks E E, substantially as and for the purpose set forth.

9. In combination with frame A and table L, having slot D, and a work-support or bridge-arbor B and disks E E, carried by the arbor and extending through the slot on opposite sides of the bridge.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ARTHUR K. DEVENPORT.

Witnesses:
GEO. N. WHITNEY,
HENRY E. EDWARDS.

Corrections in Letters Patent No. 445,749.

It is hereby certified that in Letters Patent No. 445,749, granted February 3, 1891, upon the application of Arthur K. Devenport, of Jackson, Michigan, for an improvement in "Sandpapering-Machines," errors appear in the printed specification requiring correction, as follows: In line 80, page 1, the word "and" should read *an;* in lines 24 and 33, page 3, the words "sand papering-machine" should read *sandpapering-machine*, and in line 71, same page, a comma should be substituted for the hyphen between the words "bridge" and "arbor"; and the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 10th day of February A. D. 1891.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

O. E. MITCHELL,
Commissioner of Patents.