(No Model.)

J. C. CORAM.

EXPANSION SHAFT.

No. 528,150. Patented Oct. 30, 1894.

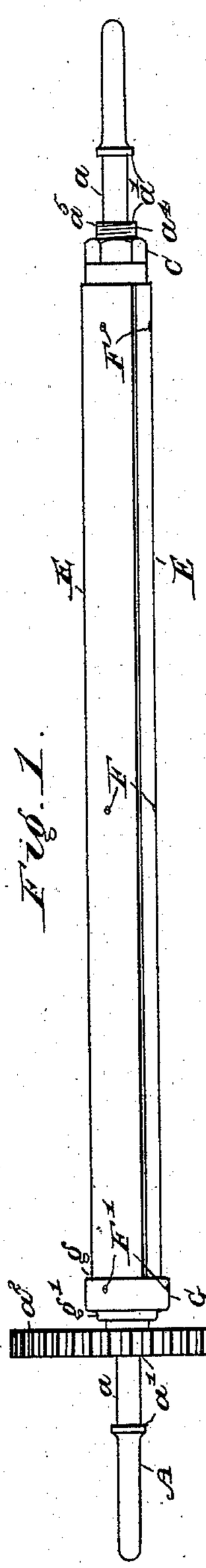

Fig. 1.

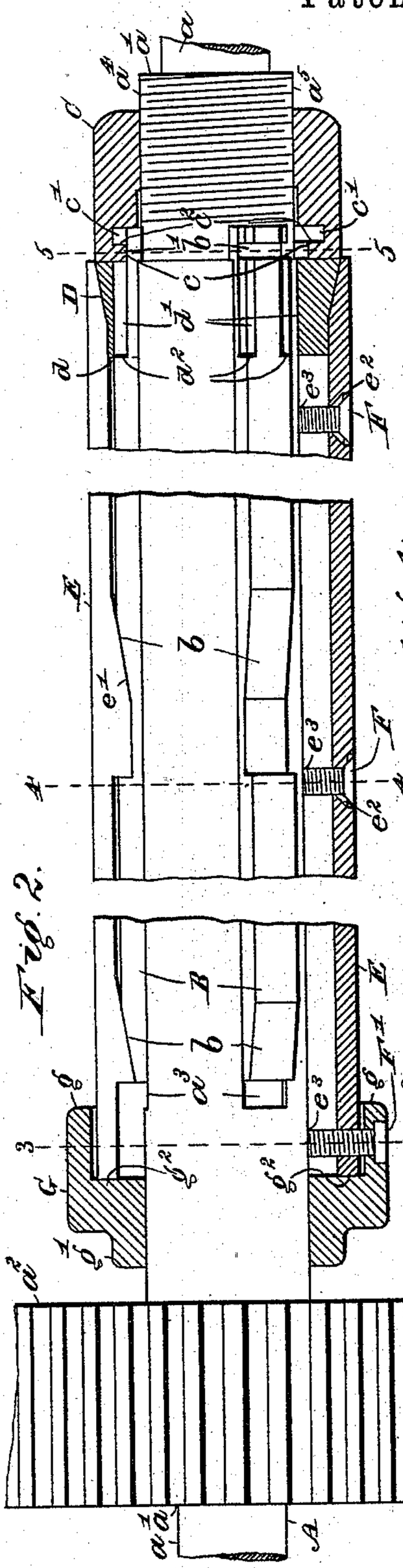

Fig. 2.

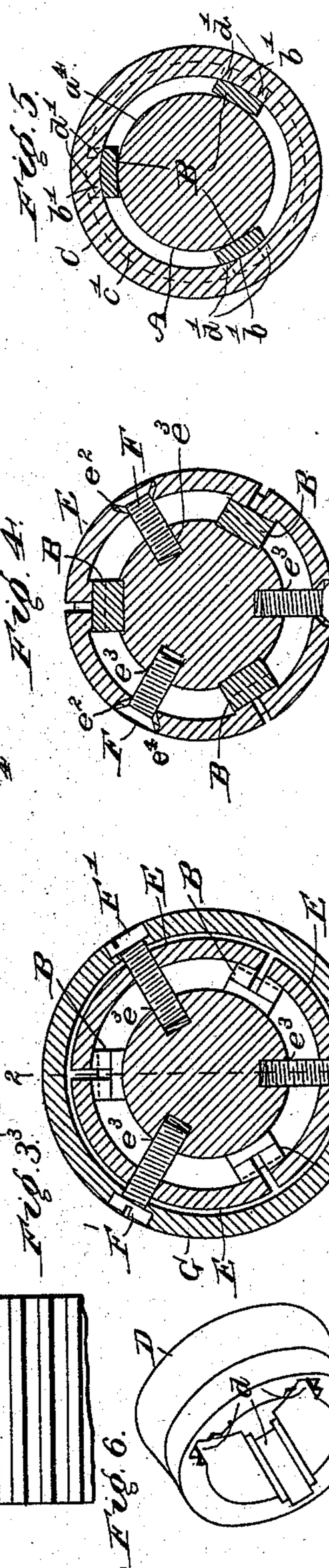

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

WITNESSES.

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EXPANSION-SHAFT.

SPECIFICATION forming part of Letters Patent No. 528,150, dated October 30, 1894.

Application filed April 2, 1894. Serial No. 505,994. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. CORAM, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Expansion-Shafts, of which the following is a specification.

My invention relates to expansion shafts and is especially adapted for the use of paper makers and printers to support the rolls of paper used in web printing presses.

The webs of paper used in printing large newspapers and some other kinds of work are most commonly rolled upon large iron tubes called cores which weigh from seventy-five to a hundred pounds each, one end of the paper of a web being pasted directly to such a core, the web being then rolled upon said core and sent with the core to the printing office, and after the paper is used the core being returned to the paper-maker at a considerable expense for freight, the core during the winding and unwinding being mounted upon a shaft and rotated with said shaft and being prevented from turning on said shaft by a dog. Such cores are quite expensive and large numbers are required at the paper factory, at the printing-office and in the process of transportation between the factory and office. Sometimes the paper is wound upon a wooden roll formed in two longitudinal sections and having a central orifice, rectangular in cross-section, to receive a square or rectangular shaft, but these wooden cores are very bulky and form quite an item of expense to the paper-maker and increase the freight bills of the printer. The cores whether iron or wood are charged to the customer as so much paper, being weighed with the web, and the customer is credited with a like amount upon the return of the cores.

The object of this invention is to enable the paper to be wound upon a comparatively thin tube of straw-board or other inexpensive material of small bulk and light weight held securely upon a shaft while being wound and unwound. Such paper cores are of so small value as not to be worth returning to the paper mill and the loss occasioned by reckoning their weight in with the weight of the paper web is of slight importance, as compared with the freight charges on the iron or wooden cores commonly used. In using such a paper core, it is necessary that the core should be prevented from turning on the shaft by friction of comparatively large surfaces, rather than by dogs or sharp projections or corners on the shaft such as would break or cut the core.

In the accompanying drawings, Figure 1 is a plan of an expansion shaft, provided with my improvement; Fig. 2, a central longitudinal section on the line 2 2 in Fig. 3, of the expansion-shaft, showing in elevation the body or shaft proper, two of the wedges and one of the segments, portions of the shaft proper and its driving gear being broken away; Figs. 3, 4 and 5, transverse sections on the lines 3 3, 4 4, and 5 5 respectively, in Fig. 2; Fig. 6, an isometric perspective view of the expansion-ring, showing its inclined surface and grooves.

The shaft-body A is provided with reduced end-portions a having bearing collars a', in the usual manner, to prevent any endwise motion of said body in its supporting-stands, and has fast thereon a gear a^2, by which said shaft is rotated in the usual manner. The shaft-body is provided with two or more longitudinal grooves a^3 (three such grooves being shown) of substantially uniform depth from end to end, to receive the wedge-pieces B which project from said grooves, each wedge-piece being provided with a series of inclines b on its outer surface.

The wedge-pieces B are retained in their grooves by the nut C and by the expansion-ring D or annular wedge (shown detached in Fig. 6), which ring D surrounds all of said wedge-pieces and is provided with as many internal longitudinal grooves d as there are wedge-pieces, said grooves d fitting said wedges and said ring D fitting the body of the shaft A between said wedge-pieces which are reduced or rabbeted at d', to form shoulders d^2 (Fig. 2), against which the small end of said ring bears, the rabbets being continued to the adjacent ends of the wedge-pieces.

The nut C engages a screw-thread a^4 on a portion a^5 of the shaft which is turned down to the bottom of the grooves a^3, but is of a

diameter on the screw-thread a^4 not less than the diameter of the adjacent bearing-collar a', to allow of said nut being passed over said bearing-collar in either direction. The end of the nut C next the wedges is counterbored at c, to leave an annular space between said nut and the shaft-body A, and near each end is provided with an internal annular groove c' having an internal annular flange c^2, and the wedge-pieces are each transversely grooved near their ends b', so that the flange c^2 enters the grooves b' and so that turning the nut C will give the wedges a longitudinal movement in the longitudinal grooves a^3 and at the same time will carry the ring D along with the wedges.

The expanding surface of the expansion shaft consists of a tube or hollow cylinder E divided longitudinally into as many segments e as there are wedge-pieces B, each segment having twice as many inclines e' as there are inclines b on a wedge-piece B and two additional inclines e' which rest upon the inclined surface of the ring D, these inclines e' being cast or otherwise formed on the inner surfaces of said segments at their side edges, the inclines e' (except those that rest on the ring D), at opposite sides of the same segment resting upon the inclines of different wedge-pieces. The surfaces of the inclines b e' and of the conical part of the ring D are all at the same angle with the axis of the shaft-body A.

The segments e are prevented from longitudinal movement on the shaft-body A by screws F F′ driven through holes e^2 e^3 in said segments radially into said shaft-body, the screws F also limiting the outward movement of said segments and the outer ends of the holes e^2 being countersunk as shown at e^4, so that said screws F never project beyond the surface of said segments. The screws F′ pass down through the flange g of a collar G which has a hub g' closely fitting the shaft-body, and the main body g^2 of said collar G also further opposes the longitudinal movement of the segments e in the direction in which the movement of the wedge-pieces in expanding the shaft would tend to move said segments. Obviously, turning the nut C in one direction will, by moving the ring D and wedge-pieces endwise, crowd the segments e away from the shaft-body A, and turning said nut in the other direction will allow said segments to be pressed in toward said shaft-body and permit a tube of thick paper or straw-board smaller than the diameter of the expanded shaft to be placed around said segmental cylinder E.

I claim as my invention—

The combination of the shaft-body, having an external screw-thread and having longitudinal grooves, wedge-pieces arranged to slide in said grooves and provided with inclines, cylinder-segments, equal in number to said wedge-pieces and having inclines which rest upon the inclines of said wedge-pieces, said segements having a limited movement toward and from said shaft-body but longitudinally immovable thereon, a ring, having an inclined outer surface to support other inclines with which said segments are provided and having grooves to receive said wedge-pieces, and a nut, turning on said shaft-body and connected to said wedge-pieces, to move said wedge-pieces in said grooves, as and for the purpose specified.

In witness whereof I have signed this specification in the presence of two attesting witnesses, this 26th day of March, A. D. 1894.

JOHN C. CORAM.

Witnesses:
ALBERT M. MOORE,
FRED E. SMITH.