No. 770,522. PATENTED SEPT. 20, 1904.

N. W. FLETCHER.

ROTARY MOTOR.

APPLICATION FILED DEC. 15, 1902.

NO MODEL.

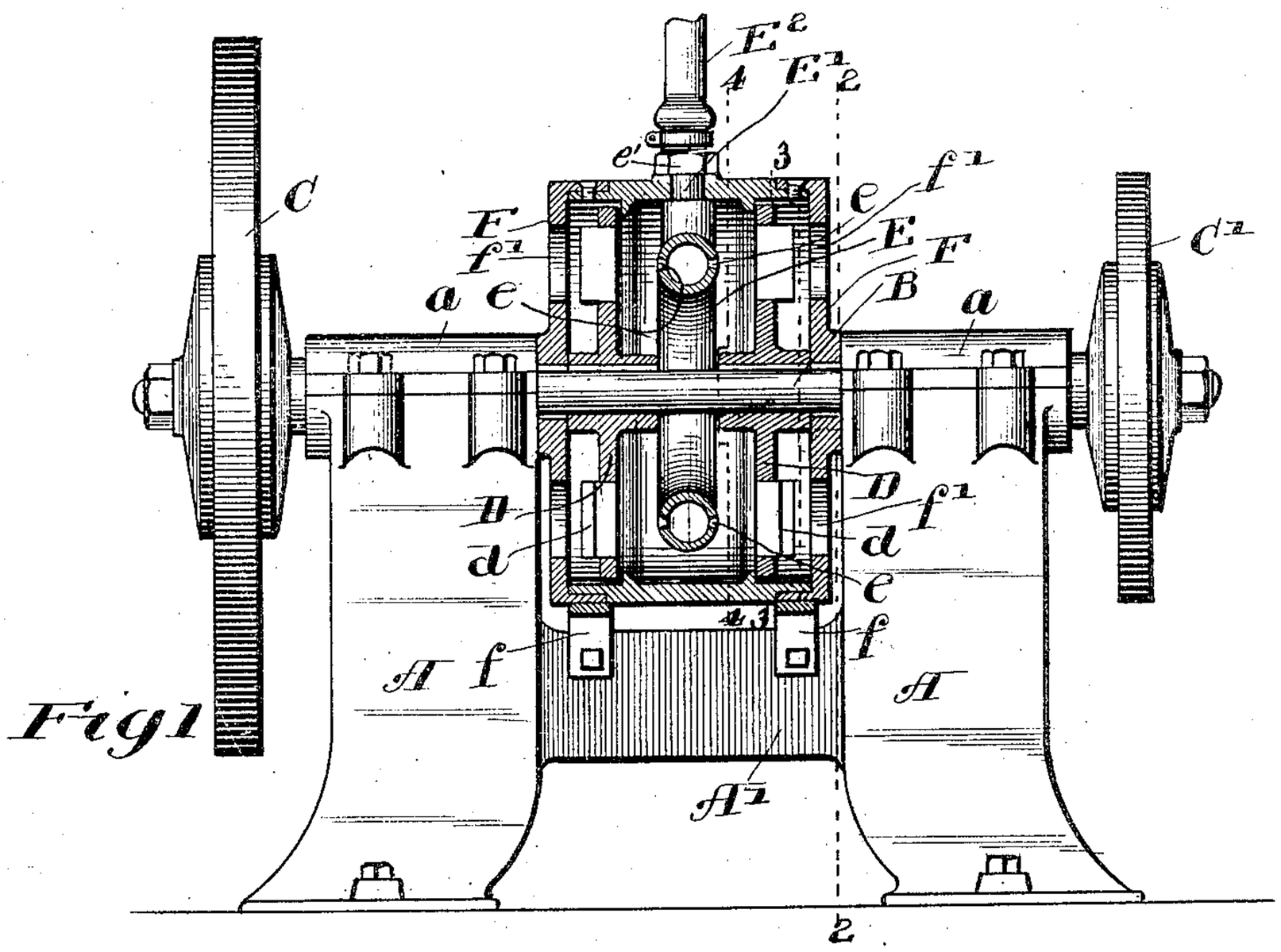

Fig 1

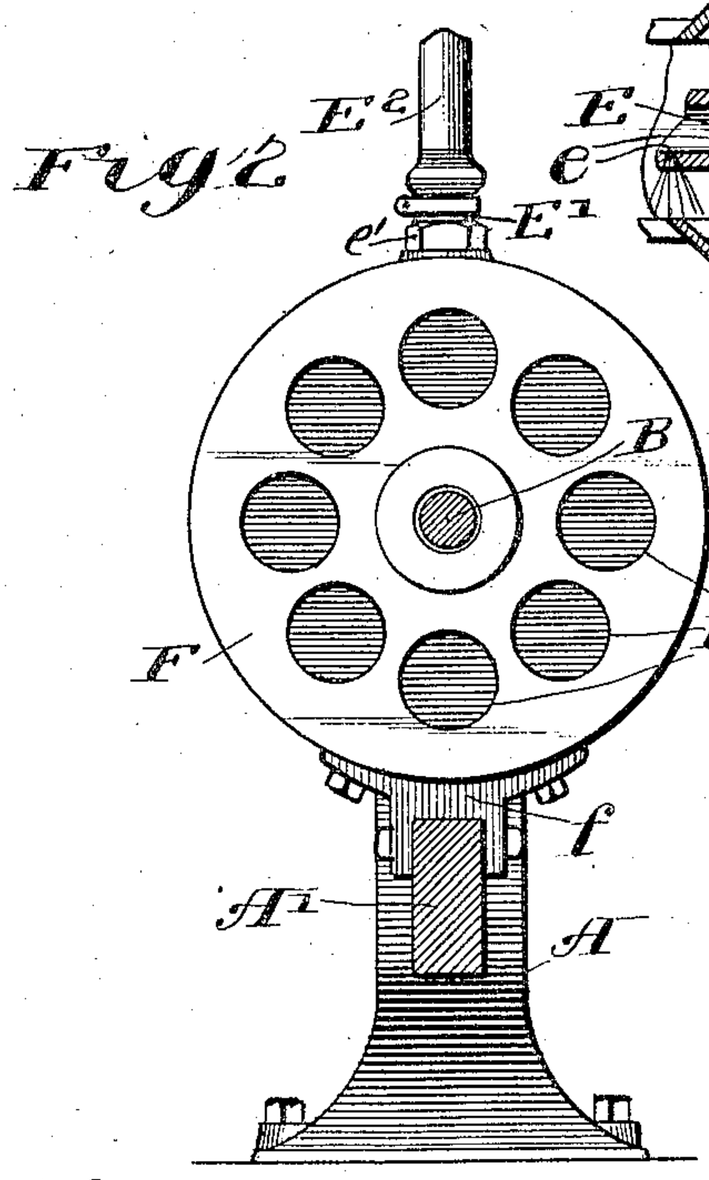

Fig 2

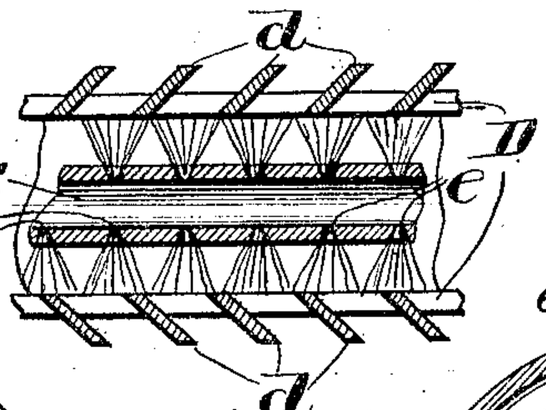

Fig 5

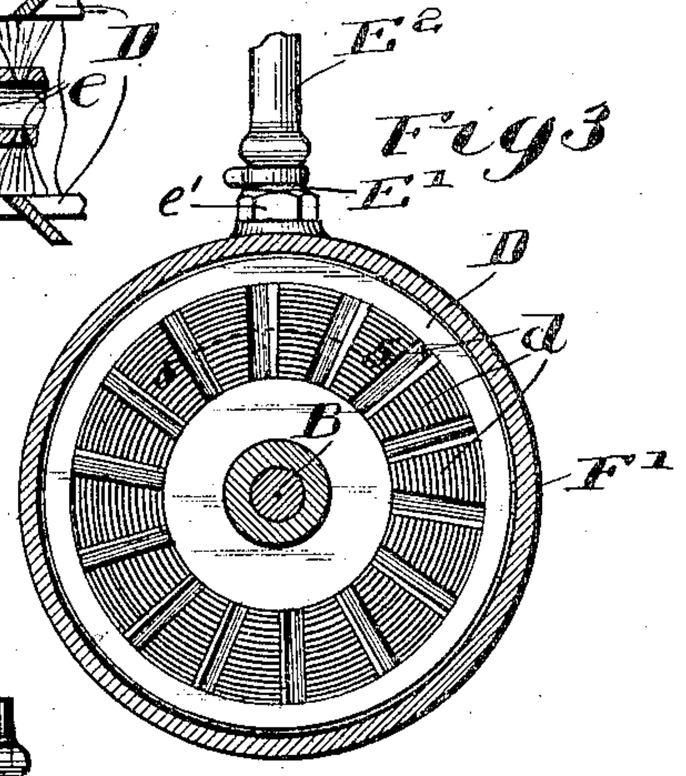

Fig 3

Fig 4

Witnesses:-
Carl H. Crawford
William L. Hall

Inventor:-
Nathan W. Fletcher
by Poole & Brown
his Attorneys

No. 770,522. Patented September 20, 1904.

UNITED STATES PATENT OFFICE.

NATHAN W. FLETCHER, OF BATAVIA, ILLINOIS.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 770,522, dated September 20, 1904.

Application filed December 15, 1902. Serial No. 135,183. (No model.)

To all whom it may concern:

Be it known that I, NATHAN W. FLETCHER, of Batavia, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Rotary Motors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pneumatic motors, the improvements constituting the invention being more especially applicable to the construction of small motors used for driving rotative tools, such as grinding-tools, polishers, drills, and the like.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a view in side elevation, with the main operative parts of a motor in central vertical section, of a motor adapted for a bench grinder or polisher. Fig. 2 is a vertical cross-section taken on line 2 2 of Fig. 1. Fig. 3 is a like section taken on line 3 3 of Fig. 1. Fig. 4 is a like section taken upon line 4 4 of Fig. 1. Fig. 5 is a detail section taken on the curved line 5 5 of Fig. 3.

As shown in the said drawings, A A indicate two frame-standards which are attached to a work-bench or other suitable support and are connected by a cross-piece A′. Mounted in the upper ends of said standards, in bearings *a a* thereon, is a horizontal shaft B. Said shaft is shown as provided at its opposite ends outside of the standards A A with grinding or polishing wheels C C′; but any other rotary tool may be attached to said shaft or the shaft may be provided with a chuck by which a piece of work may be attached thereto, the shaft in that case forming the rotative member of a lathe or like machine. Rigidly attached to the said shaft B between the frame-standards A A are two disks D D, each of which is provided with radially-arranged oblique blades or wings *d d*, forming a series of oblique surfaces annularly arranged around the central axis of the disks, as clearly seen in Fig. 3. Between said disks, concentrically with the shaft B, is located a stationary annular air-tube E, which is provided at its opposite sides with air-discharge openings or jet-orifices *e e*, which are directed toward the annular series of fan-blades *d d* on the disks D. The air-tube E is supported concentrically with respect to the shaft B and is provided with an air-supply pipe E′. This pipe may lead to a source or means supplying air under pressure or, as shown in the drawings, a flexible pipe or hose E^2 may be attached to the outer end of said pipe E′, as will ordinarily be the case in a machine-shop, where a main air-supply pipe will be provided and a flexible pipe or hose will lead from a suitable outlet on said main air-pipe to the motor.

The disks D D and the annular tube E are shown in the drawings as surrounded by an external cylindric stationary casing consisting of heads F F and a cylindric outer wall F′, such outer casing being rigidly attached to the frame-standards A A conveniently by means of clips *f*, bolted to the lower part of the casing and to the frame cross-piece A′. The end walls F F of the casing are shown as provided each with a plurality of outlet-openings *f′*, arranged opposite the oblique blades *d d* of the said disks D to permit the outward escape of air which passes between said blades. The air-supply pipe E′ is shown as arranged to support the air-tube in place. Said supply-pipe passes outwardly through an aperture in the outer cylindric wall F′ of the casing and is provided with a nut *e′*, which bears against the outer face of the casing-wall F′ and serves to clamp the air-tube rigidly to said wall, the air-tube having an annular shoulder which bears against the inner face of the wall.

In the operation of the motor described air delivered under the required pressure to the stationary tube E from the supply-pipe E′ passes from the lateral openings or jet-orifices *e e* in said tube E toward and against the oblique surfaces formed by the blades *d d* and by the impact of the jets against said oblique surfaces giving rapid rotative movement to

disks D D and the shaft B, to which they are attached. The oblique blades *d d* on the two disks D are oppositely arranged with respect to their inclination, as clearly shown in Fig. 5, so that the air-jets striking the inner oblique faces of the two sets of blades will operate to turn both disks in the same direction.

By the employment of the annular air-tube E, provided with discharge-orifices or jet-openings at its opposite sides and located between two disks provided with oppositely-inclined sets of blades, the pressure on the two disks is equalized and no pressure is brought upon the shaft tending to move it endwise. The jet-openings *e e* are disposed at equal distances apart throughout the entire circumference of the air-tube E, this construction having the advantage that each of the oblique surfaces on the disks in the rotative movement of the latter is acted on by the air-jets throughout all or nearly all of its circular path of movement. Preferably the jet-orifices are spaced so closely together that the spread of the jets will bring the same together when they reach the said oblique surfaces, as indicated in Fig. 5. When the jet-orifices are thus closely spaced, each oblique surface will be subjected to the constant impact of the air-jets during its rotation.

The disks D D and air-tube E constitute the rotative and non-rotative members of a motor or turbine of that class in which the impact of air-jets is utilized as means of producing motion, and manifestly such members of the turbine may be variously modified, so far as the arrangement of the jet-orifices and of the form and arrangement of the blades or buckets which form the surfaces of the rotative members against which the air-jets act is concerned.

I claim as my invention—

1. A pneumatic motor comprising two parallel, rigidly-connected, rotative members each provided with an annular series of radially-arranged blades, and a non-rotative member embracing an air-tube of annular form located between and out of contact with the rotative members and blades thereon and provided with opposite, annularly-arranged jet-openings directed toward the said blades.

2. A pneumatic motor comprising a frame provided with separated shaft-bearings, a shaft mounted in said bearings, two rotative motor-disks mounted on the shaft between said bearings, said disks being provided each with an annularly-arranged series of radial blades, and a non-rotative motor member embracing an air-tube of annular form located between and out of contact with the rotative members and the blades thereon and provided in its opposite sides with annularly-arranged jet-openings directed toward the said blades.

3. A pneumatic motor comprising a rotative shaft, two rotative motor members secured to said shaft and provided each with an annularly-arranged series of blades, a non-rotative motor member located between the two disks and provided with oppositely-arranged jet-openings which are directed toward the blades on the rotative members, and a stationary casing or housing surrounding the said rotative and non-rotative members, said housing being provided in its end walls with air-exit openings.

4. A pneumatic motor comprising a rotative shaft, two rotative motor members mounted on said shaft and provided each with an annularly-arranged series of radial blades, a non-rotative motor member consisting of an annular air-tube located between and out of contact with the rotative members and the blades thereon and provided with an annular series of jet-openings directed toward the said series of blades, and a casing surrounding said rotative and non-rotative members, said annular air-tube being rigidly attached to and supported by said casing.

5. A pneumatic motor comprising a rotative shaft, two rotative motor members attached to said shaft and provided each with an annularly-arranged series of radial blades, a non-rotative member consisting of an annular air-tube which is located between and out of contact with the said rotative members and the blades thereon, and provided with oppositely-arranged jet-openings which are directed toward the said blades, a stationary housing embracing a cylindric outer wall which surrounds the said members and an air-supply pipe which is attached to said air-tube and passes through and is rigidly secured to said housing.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 11th day of December, A. D. 1902.

NATHAN W. FLETCHER.

Witnesses:

C. CLARENCE POOLE,

WILLIAM L. HALL.