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EXHAUST MUFFLER

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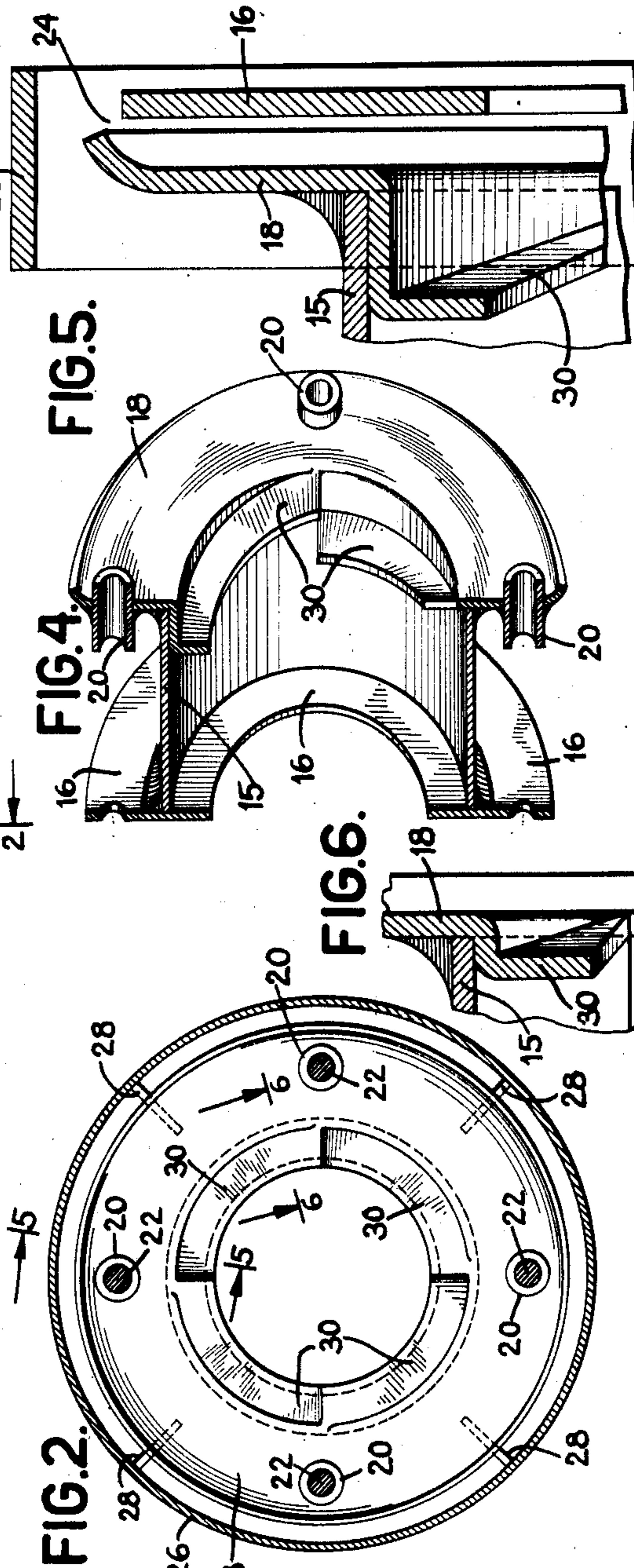
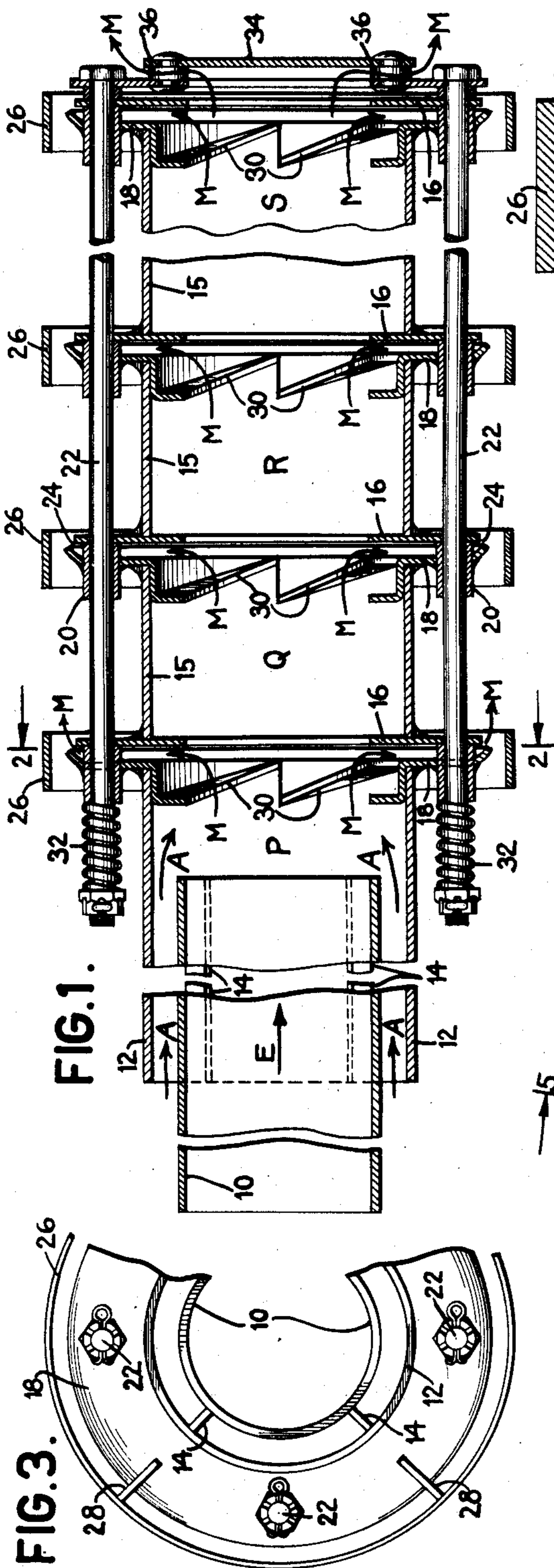


FIG. 4.

FIG. 6.

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EXHAUST MUFFLER

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9 Claims. (Cl. 137—160)

This invention pertains to exhaust mufflers for gas engines, an object of the invention being to disclose a muffler particularly adapted for use with aircraft engines.

Further and other objects and advantages will be apparent from the specification and claims, and from the accompanying drawing which illustrates what is now considered the preferred embodiment of the invention.

In the drawing,

Fig. 1 is a longitudinal cross-section of the muffler.

Fig. 2 is a cross-section on line 2—2 of Fig. 1.

Fig. 3 is an end view of Fig. 1.

Fig. 4 is an isometric view of one of the muffler chambers.

Fig. 5 is an enlarged view of a portion of Fig. 1 on line 5—5 of Fig. 2.

Fig. 6 is an enlarged detail on line 6—6 of Fig. 2.

The muffler is preferably mounted on an airplane engine in such position that there will be a strong current of air moving from left to right (Fig. 1) either from the slip stream of the propeller, or from movement of the muffler through the air from right to left while the airplane is in flight.

Exhaust gas enters the muffler through pipe 10, the gas moving in the direction of arrow E. A current of air (due to the above mentioned air movements and to the induction by the high-speed exhaust gas) enters through the annular space between tube 10 and an external concentric tube 12, spaced from tube 10 by longitudinal ribs 14. The course of this air current is indicated by arrows A.

The body of the muffler comprises one or more drum-like mixing chambers such as P, Q, R, S, etc., each chamber having an annular wall 15, the partitions between the chambers being formed by the drum heads, or parallel disks 16 and 18, and spaced apart by sleeves 20, which, as shown, are welded to disks 18, the disks being welded to the muffler walls as indicated. Bolts 22 passing through sleeves 20 serve to hold the chambers in proper relationship. Disks 16 and 18 are perforated, preferably with central openings in axial alignment with tube 10. Disks 16 are flat, while disks 18 are of somewhat larger external diameter and have their outer edges flanged, as is best shown in Fig. 5, to provide an annular opening 24 for the exit of gas after the gas has passed through the narrow space between the disks. The convex sides of disks 18 are toward the front of the muffler, while open-

ings 24 face to the rear and outwardly. Surrounding each pair of disks 16—18 is a ring 26, supported by ribs 28, to aid in deflecting the emerging gas toward the rear.

With the above structure in mind, the operation of the device will be readily understood. The exhaust gas, mixing with the stream of air in chambers P, Q, R and S, is cooled, and the mixture finds its way out of the muffler as indicated by arrows marked M at an obtuse angle with the air stream. Air from the slip stream passing the outer edges of disks 16 and 18 has an aspirating effect which tends to suck the gaseous mixture out of openings 24, thus tending to reduce back pressure on the engine.

Under certain conditions it is advantageous to give the mixture a whirling motion to force it toward outlets 24. This may be done by shaping the inner edge of disk 18 in the form of screw-shaped vanes 30.

Bolts 22 are each provided with a compression spring 32 which automatically compensates for lengthwise expansion or contraction of the muffler due to temperature changes, and also serves to automatically permit disks 16 and 18 to separate further than normal in case of unusual pressure within the muffler, thus temporarily enlarging openings 24 to quickly relieve the extra pressure.

The end of the muffler opposite the inlet end is provided with a disk 34, spaced from the end plate of the device by collars 36 to provide another annular outlet, around the rim of disk 34, for any gaseous mixture that reaches that end of the device.

I claim:

1. A muffler comprising, in combination, a series of interconnected chambers through which gas may successively pass, an inlet for exhaust gas at one end of the series, and outlet passages for gas between said chambers, each of said passages being formed by a pair of closely adjacent spaced-apart disks, the outer edges of which provide circumferential exits so arranged as to discharge the gas in a direction generally away from said inlet.

2. The invention set forth in claim 1 in which an individual ring is placed around, but spaced from, each of said exits for deflecting the exit gas still farther away from said inlet.

3. A muffler comprising, in combination, a series of interconnected mixing chambers through which gas may successively pass, an inlet for exhaust gas at one end of the series, an air inlet adjacent said gas inlet, and outlet pas-

sages for mixed gas and air between said chambers, each of said passages being formed by a pair of closely adjacent spaced-apart disks, the outer edges of which provide circumferential exits so arranged as to discharge the mixture in a direction generally away from said inlet.

4. The invention set forth in claim 3 in which said air inlet comprises a passage surrounding said gas inlet, substantially as set forth.

5. A muffler comprising, in combination, a series of drum-shaped chambers each with two perforated heads, means for holding said chambers in axial alignment, with their heads spaced slightly apart, and means for introducing exhaust gas into said chambers, the spaces between said heads serving as outlet passages for the gas.

6. The invention set forth in claim 5 in which said chambers are resiliently held in position whereby a gas pressure higher than normal may force the chambers apart to increase the outlet spaces between them.

7. The invention set forth in claim 5 in which the means for holding the chambers in alignment comprises a plurality of parallel rods having springs thereon whereby a gas pressure high-

er than normal may force the chambers apart to increase the outlet spaces between them.

8. A muffler comprising, in combination, a mixing chamber, an exhaust pipe entering said chamber, a passage adjacent said exhaust pipe through which a portion of a current of air blowing past the muffler may enter said chamber to mix therein with exhaust gas, and an annular outlet for discharging the mixture from said chamber at an obtuse angle with the direction of the air current, a ring being provided around said discharge outlet and spaced therefrom for deflecting the discharged mixture to a direction more nearly parallel with the air current.

9. A muffler comprising, in combination, a cylindrical mixing chamber, means for admitting gas into said chamber, an outlet from said chamber in the form of a pair of spaced-apart disks between which the gas escapes radially, a circumferential outlet from said disks to the open air, and resilient means for pressing said disks toward each other, whereby an increase in pressure within said chamber may separate said disks to automatically enlarge the outlet opening.

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