a variable cycle third stream fan flow stream deployed. That is, the two dimensional secondary nozzle **12** may be a third stream exhaust nozzle which regulates a third flow stream selectively sourced from the fan section **101** and/or the compressor section **102**. Notably, performance of engine **100** can be affected by regulating the secondary flow S by varying the two dimensional secondary nozzle **12**.

In this regard, reference is made to FIG. **3**, which depicts nozzle assembly **10** and the incorporated sliding door **16**. As shown in FIG. **3**, sliding door **16** is configured to be translated across a passage **18** of the generally planar secondary nozzle **12** and thereby influence gas directed along secondary flow path **26**.

In at least one embodiment, the nozzle assembly **10** is a third stream exhaust nozzle that is operative to regulate gas accelerated by a tertiary fan **101**B (e.g., a tip fan located radially outboard of a fan stage; FIG. **1**). A third stream nozzle facilitates a variable engine cycle. By way of example, by closing the third stream nozzle area, the third stream duct experiences increased backpressure and the fan air normally flowing into the third stream duct diverts into the secondary/primary flow stream. Notably, the flow streams communicate just aft of the fan section **101**. A third stream splitter, which can be located several inches aft of the fan, for example, leaves a large enough area for effective flow stream communication. However, in other embodiments, a nozzle assembly can be used for varying the flow characteristics of gas directed along one or more other gas paths.

The sliding door **16** is configured to be variably positioned along a range of positions between a full open position, at which the generally planar secondary nozzle **12** exhibits a maximum exit area, and a full closed position, at which the generally planar secondary nozzle **12** exhibits a minimum exit area. As the sliding door **16** is variably positioned, gas directed along secondary flow path **26** is regulated.

In the embodiment of FIG. **3**, the sliding door **16** exhibits a low section area relative to a direction of travel associated with gas directed along secondary flow path **26**. Such a configuration and orientation tends to result in a low actuation load, i.e., the load required to be overcome for positioning of the sliding door **16**. In this regard, the nozzle assembly **10** also incorporates an actuator **20** that engages sliding door **16**. The actuator **20** is attached to the sliding door **16** and is configured to operatively translate the sliding door **16** in both a fore and aft direction, generally parallel to the engine axis A as indicated by arrow D. The actuator **20** can be an air motor driven direct actuated ball screw ram, direct actuated hydraulic ram, and air or hydraulic driven mechanisms. Actuator **20** may be singular or a plurality of synchronized actuators. For example, the actuator **20** includes air motor driven direct actuated ball screw rams (such as linear motion cylindrical actuators or rotary motion actuators), synchronized via flex drive cables (a commonly used actuation configuration in various commercial nacelle reverser cowlings). The actuator **20** can be located unobtrusively in an area **22** of the nozzle assembly **10** between the secondary duct **110** and the primary duct **112**.

In some embodiments, the nozzle assembly **10** may incorporate a pressurized plenum. Such a pressurized plenum can be configured to provide pressure balancing to the nozzle assembly thereby reducing actuation loads. If the loads are predicted to be reacted primarily by the tracks, a plenum may not be required. However, when a plenum is utilized (such as in association with area **22** in this embodiment), the plenum can be a direct acting plenum placed, for example, on the forward face of the sliding door **16**. Alternatively, a remote balance chamber can be utilized.

The nozzle assembly **10** also incorporates a rail **24** for the sliding door **16**. The rail **24** facilitates the translation of the sliding door **16**. In particular, the rail **24** provides a track on which the sliding door **16** is translated. The rail **24** also is configured to provide alignment and structural stability to the sliding door **16**. In at least one embodiment, more than one rail **24** may be utilized. In other embodiments, the rail **24** includes one or more bearings to facilitate a smoother translation of the sliding door **16** along the rail **24**. In yet another embodiment, the tracks of the rail **24** can be embedded in the fixed structure ahead of the sliding door **16**, and/or along sides of the sliding door **16**, such that sliding door **16** is cantilevered aft and the tracks are hidden from the flowpath.

The nozzle assembly **10** also incorporates a plurality of stiffening ribs **28** to control deflection of the sliding door as the sliding door **16** is variably opened and closed. For example, as the sliding door **16** is variably closed, pressure increases within the secondary duct **110**. The plurality of stiffening ribs **28**, located behind the interior wall of the secondary duct **110**, reduces deflection of area **22**. The plurality of stiffening ribs **28** also provides structural support to the sliding door **16** as the door translates across the passage **18**.

As shown in FIG. **4**, the actuator **20** is connected to the sliding door **16** and is configured to operatively translate the sliding door **16** in both a fore and aft direction, as indicated by arrow D, thus varying the flow through the generally planar secondary nozzle **12** of the nozzle assembly **10**. In operation, the sliding door **16** is variably opened and closed, by translating in both a fore and aft direction. In other embodiments, more complex motion of the sliding door can be used. Regardless of the particular motion involved, positioning of the sliding door **16** varies the nozzle assembly **10** and thereby affects one or more of various engine performance characteristics.

It should be emphasized that the above-described embodiments are merely possible examples of implementations set forth for a clear understanding of the principles of this disclosure. Many variations and modifications may be made to the above-described embodiments without departing substantially from the spirit and principles of the disclosure. By way of example, in some embodiments, a sliding door can be configured to alter a nozzle throat asymmetrically in order to affect yaw vectoring of the flow. In some embodiments, this can be accomplished by the use of differential actuation of multiple actuators. All such modifications and variations are intended to be included herein within the scope of this disclosure and protected by the accompanying claims.

The invention claimed is:

1. A nozzle assembly for a gas turbine engine, the nozzle assembly comprising:

a door operative to selectively increase and decrease an effective size of the nozzle exit area;

a secondary flow duct with a two dimensional secondary nozzle to communicate a secondary flow therethrough;

a primary flow duct with a two dimensional primary nozzle to communicate primary flow therethrough, said two dimensional primary nozzle adjacent to said two dimensional secondary nozzle;

said door axially slidable relative to a passage adjacent a secondary flow path for said secondary flow and a primary flow path for said primary flow, said door axially slidable relative to a passage in communication with said secondary flow path; and