WHAT IS CLAIMED IS:

An earth-boring drill bit for drilling a bore hole in an earthen formation, the bit comprising:

a bit body configured at its upper extent for connection to a drillstring, the bit body having a central axis and a bit face comprising a cone region, a nose region, a shoulder region, and a radially outermost gage region;

at least one fixed blade extending downward from the bit body in the axial direction, the at least one fixed blade having a leading and a trailing edge;

a plurality of fixed-blade cutting elements arranged on the at least one fixed blade;

at least one rolling cutter mounted for rotation on the bit body; and

a plurality of rolling cutter cutting elements arranged on the at least one rolling cutter;

wherein at least one fixed blade is in angular alignment with at least one rolling cutter.

2. The drill bit of claim 1, wherein at least one fixed blade has a convex cutting face or leading edge.

3. The drill bit of claim 1, wherein the at least one fixed blade extends radially along the bit face from the gage region to the nose region.

4. The drill bit of claim 1, wherein the at least one fixed blade extends radially along the bit face from the gage region to the shoulder region.

5. The drill bit of claim 1, wherein the at least one fixed blade extends radially along the bit face from the gage region to the cone region.

6. The drill bit of claim 1, wherein at least one of the fixed blades extends radially outward along the bit face from proximate the central axis toward

the nose region, intermediate between the cone region and the shoulder region.

7. The drill bit of claim 6, wherein the fixed blade extends radially along the face and the terminal end of the blade is disposed in the nose region.

8. The drill bit of claim 1, wherein at least one of the fixed blades extends radially outward along the bit face from proximate the central axis towards the gage region, and has a terminal end of the blade disposed in the shoulder region.

9. The drill bit of claim 1, wherein at least one of the fixed blades extends radially outward along the bit face from proximate the central axis of the bit to the nose region, and wherein at least one of the rolling cutters extends inwardly towards the fixed blade in an aligned manner.

10. The hybrid drill bit of claim 1, wherein the drill bit is a hybrid pilot reamer type bit.

11. A method of drilling a well bore in a subterranean formation, the method comprising:

drilling a well bore into a subterranean formation using the earth boring drill bit of claim 1.

12. A drill bit for drilling a borehole in earthen formations, the drill bit comprising:

a bit body configured at its upper extent for connection to a drillstring, the bit body having a central axis and a bit face including a cone region, a nose region, a shoulder region, and a radially outermost gage region;

at least one primary fixed blade cutter extending downward from the bit body in the axial direction, the at least one primary fixed blade cutter having a leading and a trailing edge and extending

radially along the bit face from the shoulder region to the gage region;

a plurality of fixed-blade cutting elements arranged on the leading edge of the at least one primary fixed blade;

at least one secondary fixed blade cutter extending downward from the bit body in the axial direction and having a leading and a trailing edge, the secondary fixed blade cutter extending radially outward along the bit face from proximate the bit axis through the cone region;

at least one rolling cutter mounted on a bit leg for rotation on the bit body; and

a plurality of rolling-cutter cutting elements arranged on the exterior of the at least one rolling cutter;

wherein the at least one secondary fixed blade cutter is in angular alignment with the at least one rolling cutter.

13. The drill bit of claim 12, further comprising a bearing shaft within the rolling cutter, the bearing shaft extending from the bit leg through the rolling cutter, wherein the bearing shaft extends through the top face of the rolling cutter.

14. The drill bit of claim 13, wherein at least one end of the bearing shaft is affixed to the bit body.

15. The drill bit of claim 13, wherein at least one end of the bearing shaft is affixed to the a fixed cutter blade.

16. The drill bit of claim 13, wherein at least one end of the bearing shaft is affixed to the roller cone leg.

17. The drill bit of claim 13, wherein at least one end of the bearing shaft extends into a recess formed in a saddle mount assembly.

18. The drill bit of claim 17, wherein the saddle mount assembly is integral with a terminal end region of the at least one secondary fixed blade cutter.

19. The drill bit of claim 13, wherein a distal end of the bearing shaft extends through the rolling cutter and is removably secured, and the proximal end of the bearing shaft is removably secured to the bit leg.

20. The drill bit of claim 13, wherein the bearing shaft is a spindle for the rolling cutter.

21. The drill bit of claim 13, wherein the bearing shaft is tapered.

22. The drill bit of claim 12, wherein at least one of the primary fixed blade cutters has an arcuate leading cutting edge.

Claims

What is claimed is:

1. An earth-boring drill bit for drilling a bore hole in an earthen formation, the bit comprising:

a bit body configured at its upper extent for connection to a drillstring, the bit body having a central axis and a bit face comprising a cone region, a nose region, a shoulder region, and a radially outermost gage region;

at least one fixed blade extending downward from the bit body in the axial direction, the at least one fixed blade having a leading and a trailing edge;

a plurality of fixed-blade cutting elements arranged on the at least one fixed blade;

at least one rolling cutter mounted for rotation on the bit body; and

a plurality of rolling-cutter cutting elements arranged on the at least one rolling cutter;

wherein the at least one fixed blade is in angular alignment with at least one rolling cutter between the outermost gage region and the centerline axis.

2. The drill bit of claim 1, wherein the at least one fixed blade has a convex cutting face or leading edge.

3. The drill bit of claim 1, wherein the at least one fixed blade extends radially along the bit face from the gage region to the nose region.

4. The drill bit of claim 1, wherein the at least one fixed blade extends radially along the bit face from the gage region to the shoulder region.

5. The drill bit of claim 1, wherein the at least one fixed blade extends radially along the bit face from the gage region to the cone region.

6. The drill bit of claim 1, wherein the at least one fixed blade extends radially outward along the bit face from proximate the central axis towards the nose region, intermediate between the cone region and the shoulder region.

7. The drill bit of claim 6, wherein the at least one fixed blade extends radially along the face and the terminal end of the blade is disposed in the nose region.

8. The drill bit of claim 1, wherein the at least one fixed blade extends radially outward along the bit face from proximate the central axis towards the gage region, and has a terminal end of the blade disposed in the shoulder region.

9. The drill bit of claim 1, wherein the at least one fixed blade extends radially outward along the bit face from proximate the central axis of the bit to the nose region, and wherein at least one of the rolling cutters extends inwardly towards the fixed blade in an aligned manner.

10. The drill bit of claim 1, wherein the drill bit is a hybrid pilot reamer type bit.

11. A method of drilling a well bore in a subterranean formation, the method comprising: drilling a well bore into a subterranean formation using the earth boring drill bit of claim 1.

12. A drill bit for drilling a borehole in earthen formations, the drill bit comprising:

a bit body configured at its upper extent for connection to a drillstring, the bit body having a central axis and a bit face including a cone region, a nose region, a shoulder region, and a radially outermost gage region;

at least one primary fixed blade cutter extending downward from the bit body in the axial direction, the at least one primary fixed blade cutter having a leading and a trailing edge and extending radially along the bit face from the shoulder region to the gage region;

a plurality of fixed-blade cutting elements arranged on the leading edge of the at least one primary fixed blade;

at least one secondary fixed blade cutter extending downward from the bit body in the axial direction and having a leading and a trailing edge, the secondary fixed blade cutter extending radially outward along the bit face from proximate the bit axis through the cone region;

at least one rolling cutter mounted on a bit leg for rotation on the bit body; and

a plurality of rolling-cutter cutting elements arranged on the exterior of the at least one rolling cutter;

wherein the at least one secondary fixed blade cutter is in angular alignment with the at least one rolling cutter between the outermost gage region and the centerline axis.

13. The drill bit of claim 12, further comprising a bearing shaft within the rolling cutter, the bearing shaft extending from the bit leg through the rolling cutter, wherein the bearing shaft extends through the top face of the rolling cutter.

14. The drill bit of claim 13, wherein at least one end of the bearing shaft is affixed to the bit body.

15. The drill bit of claim 13, wherein at least one end of the bearing shaft is affixed to the secondary fixed blade cutter.

16. The drill bit of claim 13, wherein at least one end of the bearing shaft is affixed to the bit leg.

17. The drill bit of claim 13, wherein at least one end of the bearing shaft extends into a recess formed in a saddle mount assembly.

18. The drill bit of claim 17, wherein the saddle mount assembly is integral with a terminal end region of the at least one secondary fixed blade cutter.

19. The drill bit of claim 13, wherein a distal end of the bearing shaft extends through the rolling cutter and is removably secured, and the proximal end of the bearing shaft is removably secured to the bit leg.

20. The drill bit of claim 13, wherein the bearing shaft is a spindle for the rolling cutter.

21. The drill bit of claim 13, wherein the bearing shaft is tapered.

22. The drill bit of claim 12, wherein at least one of the primary fixed blade cutters has an arcuate leading cutting edge.