CLAIMS

1. A gas cutting method comprising:

mixing hydrogen gas and hydrocarbon gas to acquire fuel gas;

ejecting a preheating flame, which is formed by mixing and igniting the fuel gas and preheating oxygen gas, from an end of a cutting tip to heat a workpiece; and

ejecting cutting hydrogen gas to the heated workpiece to cut the workpiece,

wherein the content of the hydrocarbon gas in the fuel gas is more than 0 vol% and equal to or less than 4 vol%.

2. The gas cutting method according to claim 1, wherein the hydrocarbon gas is propane, and

wherein the content of propane in the fuel gas is equal to or more than 0.4 vol% and equal to or less than 4 vol%.

3. The gas cutting method according to claim 1, wherein the hydrocarbon gas is methane, and

wherein the content of methane in the fuel gas is equal to or more than 3 vol% and equal to or less than 4 vol%.

4. The gas cutting method according to claim 1, wherein the hydrocarbon gas is butane, and

wherein the content of butane in the fuel gas is equal to or more than 0.2 vol% and equal to or less than 4 vol%.

5. The gas cutting method according to claim 1, wherein the fuel gas and the preheating oxygen gas are mixed inside a cutting blowpipe, inside the cutting tip, or at an end of the cutting tip.

6. The gas cutting method according to claim 1, wherein when the preheating flame is ejected from an end of the cutting tip to the workpiece, the preheating flame is tilted toward the center in the axis direction of the cutting tip.

7. The gas cutting method according to claim 1, wherein the hydrogen gas and the preheating oxygen gas are supplied from a water-splitting apparatus, and

wherein an oxygen component in the hydrogen gas supplied from the water-splitting apparatus and a hydrogen component in the preheating oxygen gas supplied from the water-splitting apparatus are less than a lower explosion limit.

8. A gas cutting machine comprising:

a mixer that mixes hydrogen gas and hydrocarbon gas to acquire fuel gas;

a cutting tip that includes a preheating hole used to form a preheating flame using the fuel gas and preheating oxygen gas and a cutting oxygen hole used to eject cutting oxygen gas to cut a workpiece;

a cutting blowpipe that has the cutting tip disposed at an end thereof;

a fuel gas pipeline that supplies the fuel gas to the cutting blowpipe or the cutting tip;

a preheating oxygen gas pipeline that supplies the preheating oxygen gas to the cutting blowpipe or the cutting tip;

a hydrogen gas supply source that supplies the hydrogen gas to the mixer;

a hydrocarbon gas supply source that supplies the hydrocarbon gas to the pipeline; and

an oxygen gas supply source that supplies the preheating oxygen gas to the preheating oxygen gas pipeline,

wherein the content of the hydrocarbon gas in the fuel gas is more than 0 vol% and equal to or less than 4 vol%, and

wherein the fuel gas pipeline and the preheating oxygen gas pipeline join inside the cutting blowpipe, inside the cutting tip, or outside the cutting tip.

9. A cutting tip of a gas cutting machine, comprising:

a cutting oxygen gas flow channel that passes through the center in the axis direction of the cutting tip;

a preheating gas flow channel that is formed by joining a fuel gas flow channel and a preheating oxygen gas flow channel and that is disposed outside the cutting oxygen gas flow channel;

a cutting oxygen hole that is disposed at an end of the cutting oxygen gas flow channel; and

a preheating hole that is disposed at an end of the preheating gas flow channel,

wherein the end of the preheating gas flow channel is tilted to an extension of the cutting oxygen gas flow channel.

10. The cutting tip according to claim 9, wherein the distance from a junction of an extension from an end of the preheating gas flow channel and an extension of the cutting oxygen gas flow channel to the end of the cutting tip is in the range of 10 to 20 mm.

11. A cutting tip of a gas cutting machine, comprising:

a cutting oxygen gas flow channel that passes through the center in the axis direction of the cutting tip;

a fuel gas flow channel that is disposed outside the cutting oxygen gas flow channel;

a preheating oxygen gas flow channel that is disposed outside the cutting oxygen gas flow channel;

a cutting oxygen hole that is disposed at an end of the cutting oxygen gas flow channel;

a preheating hole that is disposed at an end of the fuel gas flow channel; and

a preheating hole that is disposed at an end of the preheating oxygen gas flow channel,

wherein the fuel gas flow channel and the preheating oxygen gas flow channel are independent of each other in the cutting tip, and

wherein the end of the fuel gas flow channel and the end of the preheating oxygen gas flow channel are tilted to an extension of the cutting oxygen gas flow channel.

CLAIMS

1. A gas cutting method comprising: mixing hydrogen gas and hydrocarbon gas to acquire fuel gas; ejecting a preheating flame, which is formed by mixing and igniting the fuel gas and preheating oxygen gas, from an end of a cutting tip to heat a workpiece; and ejecting cutting hydrogen gas to the heated workpiece to cut the workpiece, wherein the content of the hydrocarbon gas in the fuel gas is more than 0 vol % and equal to or less than 4 vol %.

2. The gas cutting method according to claim 1, wherein the hydrocarbon gas is propane, and wherein the content of propane in the fuel gas is equal to or more than 0.4 vol % and equal to or less than 4 vol %.

3. The gas cutting method according to claim 1, wherein the hydrocarbon gas is methane, and wherein the content of methane in the fuel gas is equal to or more than 3 vol % and equal to or less than 4 vol %.

4. The gas cutting method according to claim 1, wherein the hydrocarbon gas is butane, and wherein the content of butane in the fuel gas is equal to or more than 0.2 vol % and equal to or less than 4 vol %.

5. The gas cutting method according to claim 1, wherein the fuel gas and the preheating oxygen gas are mixed inside a cutting blowpipe, inside the cutting tip, or at an end of the cutting tip.

6. The gas cutting method according to claim 1, wherein when the preheating flame is ejected from an end of the cutting tip to the workpiece, the preheating flame is tilted toward the center in the axis direction of the cutting tip.

7. The gas cutting method according to claim 1, wherein the hydrogen gas and the preheating oxygen gas are supplied from a water-splitting apparatus, and wherein an oxygen component in the hydrogen gas supplied from the water-splitting apparatus and a hydrogen component in the preheating oxygen gas supplied from the water-splitting apparatus are less than a lower

explosion limit.

8. A gas cutting machine comprising:

a mixer that mixes hydrogen gas and hydrocarbon gas to acquire fuel gas, in which the content of the hydrocarbon gas is more than 0 vol % and equal to or less than 4 vol %;

a cutting tip that includes a preheating hole used to form a preheating flame using the fuel gas and preheating oxygen gas and a cutting oxygen hole used to eject cutting oxygen gas to cut a workpiece;

a cutting blowpipe that has the cutting tip disposed at an end thereof;

a fuel gas pipeline that supplies the fuel gas to the cutting blowpipe or the cutting tip;

a preheating oxygen gas pipeline that supplies the preheating oxygen gas to the cutting blowpipe or the cutting tip;

a hydrogen gas supply source that supplies the hydrogen gas to the mixer;

a hydrocarbon gas supply source that supplies the hydrocarbon gas to the pipeline; and

an oxygen gas supply source that supplies the preheating oxygen gas to the preheating oxygen gas pipeline, wherein the fuel gas pipeline and the preheating oxygen gas pipeline join inside the cutting blowpipe, inside the cutting tip, or outside the cutting tip.

9. A cutting tip of a gas cutting machine, comprising:

a cutting oxygen gas flow channel that passes through the center in the axis direction of the cutting tip;

a preheating gas flow channel that is formed by joining a fuel gas flow channel and a preheating oxygen gas flow channel and that is disposed outside the cutting oxygen gas flow channel;

a cutting oxygen hole that is disposed at an end of the cutting oxygen gas flow channel; and

a preheating hole that is disposed at an end of the preheating gas flow channel, wherein

the end of the preheating gas flow channel is tilted to an extension of the cutting oxygen gas flow channel, and

the distance from a junction of an extension from an end of the preheating gas flow

channel and an extension of the cutting oxygen gas flow channel to the end of the cutting tip is in the range of 10 to 20 mm.

10. A cutting tip of a gas cutting machine, comprising:

a cutting oxygen gas flow channel that passes through the center in the axis direction of the cutting tip;

a fuel gas flow channel that is disposed outside the cutting oxygen gas flow channel;

a preheating oxygen gas flow channel that is disposed outside the cutting oxygen gas flow channel;

a cutting oxygen hole that is disposed at an end of the cutting oxygen gas flow channel;

a preheating hole that is disposed at an end of the fuel gas flow channel; and

a preheating hole that is disposed at an end of the preheating oxygen gas flow channel, wherein

the fuel gas flow channel and the preheating oxygen gas flow channel are independent of each other in the cutting tip, and wherein the end of the fuel gas flow channel and the end of the preheating oxygen gas flow channel are tilted to an extension of the cutting oxygen gas flow channel.