UNITED STATES PATENT OFFICE.

FREDERICK M. BECKET, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO ELECTRO METALLURGICAL COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF WEST VIRGINIA.

ALLOY CONTAINING IRON, COBALT, AND SILICON.

1,247,206. Specification of Letters Patent. Patented Nov. 20, 1917.

No Drawing. Application filed April 19, 1915. Serial No. 22,389.

To all whom it may concern:

Be it known that I, FREDERICK M. BECKET, a subject of the King of Great Britain, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Alloys Containing Iron, Cobalt, and Silicon, of which the following is a specification.

This invention relates to a novel alloy comprising essentially iron, cobalt and silicon, proportioned to yield a composition having certain valuable mechanical and electrical or electromagnetic characteristics, as hereinafter described.

An illustrative embodiment of my invention, as applied to an alloy which has particular advantages for use in connection with transformers, dynamos, and other electromagnetic apparatus, comprises iron and cobalt in approximately the relative proportions indicated by the formula Fe_2Co, associated with a material proportion of silicon, say two to six per cent. or somewhat more of the total weight of the alloy, whereby there is produced a product characterized by low hysteresis and high magnetic saturation values.

For example, typical alloys in accordance with this invention may comprise—

	I.	II.
Iron	60.60%	62.93%
Cobalt	37.00	32.05
Silicon	3.06	4.69
Carbon	0.09	0.33

The hysteresis of these alloys is very low and their magnetic saturation value is high, from which their adaptability to such uses as are above indicated will be apparent. Within certain limits at least, these valuable properties increase with an increasing silicon-content, and it is therefore regarded as desirable for such purposes to incorporate in the alloy as large a proportion of silicon as is practicable without destroying the malleability of the alloy or increasing to too great an extent the difficulty of rolling it into sheets or laminæ.

The relative proportion between the iron and cobalt contents of the alloy may be varied without departing from the invention. It is now regarded as desirable however that the iron should always be in a larger proportion by weight than the cobalt; and in the preferred composition the iron is in larger proportion than the combined cobalt and silicon contents. Carbon is kept as low as practicable, and should preferably not exceed 0.5 per cent. Nickel is usually present in small proportions as an impurity, and may in some cases replace a small proportion of the cobalt. For certain purposes a relatively small proportion of copper may be a desirable addition.

The alloy may be prepared by various methods, among which may be mentioned, the direct melting of the component metals in a crucible or pot; the reduction, preferably in an electric furnace, of cobalt oxid by the proper excess of silicon in presence of the necessary quantity of iron; or the reduction of cobalt oxid by ferrosilicon, used in proper proportions and having the proper composition to give the desired alloy product.

I claim:—

1. An alloy comprising iron, cobalt and a material proportion of silicon.

2. An alloy comprising iron, cobalt and a material proportion of silicon, the iron in greater proportion than the cobalt.

3. An alloy comprising iron, cobalt and a material proportion of silicon, the iron in greater proportion than the combined cobalt and silicon.

4. An alloy comprising iron, cobalt and a material proportion of silicon, the iron and cobalt in approximately the proportion represented by the formula Fe_2Co.

5. An alloy containing about 55–65 per cent. of iron, 30–40 per cent. of cobalt, and 3–6 per cent. of silicon.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK M. BECKET.

Witnesses:

ELIZABETH M. DURKIN,

F. B. MORGAN.