

L183.462



PATENT SPECIFICATION

NO DRAWINGS

L183.462

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Date of filing Complete Specification: 29 Sept., 1967.

Date of Application (No. 44483/67): 1 Nov., 1966.

Complete Specification Published: 4 March, 1970.

Index at acceptance:—B3 R32G; C7 M(202, 205, 208, 22Y, 225, 228, 23Y, 235, 238, 25Y, 252, 26Y, 262, 27Y, 272, 275, 278, 28Y, 282, 30Y, 305, 308, 35Y, 36Y, 40Y, 41Y, 42Y, 46Y, 466, 469, 483, 486, 489, 506, 509, 516, 556, 586, 633, 643, 683, 693, 703, 771, 780, 781, 782)

International Classification:—B 23 k 35/30

COMPLETE SPECIFICATION

Improvements in Arc Welding Electrodes

We, MUREX WELDING PROCESSES LIMITED, of Hertford Road, Waltham Cross, Hertfordshire, a British Company, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention provides a continuous electrode capable of use for automatic or semi-automatic welding without a submerged arc flux or a shielding gas and consisting of a mild steel sheath enclosing a core, constituting 30—40% by weight of the electrode and of the following composition in percentages by weight:—

	Iron powder	0—40%
	Aluminium powder	4—30%
	Manganese oxide	0—15%
	Silica	0—15%
20	Potassium titanate	0—10%
	Carbonate, as herein defined	0—10%
	Fluoride, as herein defined	10—40%
25	Oxide or chromium, and/or molybdenum and/or nickel	8—65%

the total amount of metal oxide plus silica being at least 20% and the total amount of fluoride plus carbonate being at least 15%.

The core of the electrode may also contain 0—15% ferromanganese. When the electrode is used to deposit high tensile strength weld metal, the amount of oxide of chromium, and/or molybdenum and/or nickel in the core is preferably 8—40%.

Electrodes according to the invention deposit weld metal containing 0.05—0.8% by weight of aluminium. The silica may be present as such or in mineral form, e.g. as feldspar or wollastonite. The fluoride in the core is herein defined as being calcium fluoride, or a mixture of calcium fluoride and cryolite containing 7—35% by weight of cryolite, with the proviso that sodium fluoride may replace up to 20% of the calcium fluoride or cryolite, potassium fluoride may replace up to 7% of the calcium fluoride or cryolite and potassium silicofluoride may replace up to 12% of the calcium fluoride or cryolite. The carbonate in the core is calcium carbonate, herein defined as being one or more of the following carbonates, barium carbonate, strontium carbonate or magnesium carbonate. Calcium carbonate is preferred. The potassium titanate in the core acts as an arc stabilizer.

The following are examples of electrodes according to the invention. In each example the sheath is of mild steel, the core constitutes 30—33% by weight of the electrode and the proportions given are proportions by weight of the core:—

Hard Facing Electrodes

	Electrode depositing metal of 250 V.P.N. Hardness		Electrode depositing metal of 350 V.P.N. Hardness		Electrode depositing metal of 450 V.P.N. Hardness		Electrode depositing metal of 650 V.P.N. Hardness	
	Working Range in Percent	Specific Example in Percent	Working Range in Percent	Specific Example in Percent	Working Range in Percent	Specific Example in Percent	Working Range in Percent	Specific Example in Percent
Iron Powder	5—35	28	0—25	2	0—20	0	0—20	—
Aluminium Powder	8—20	14	14—25	20	15—30	22	15—30	23
Mn ₂ O ₃	3—10	7	4—10	7	2—10	3	0—10	2
SiO ₂	3—10	7	3—10	7	3—10	7	3—10	4
Potassium Titanate	1—7	4	1—6	3	1—5	2	1—5	1
CaCO ₃	2—8	3	2—8	3	0—6	2	0—6	2
CaF ₂	15—30	25	15—30	25	12—25	20	10—20	10
Cr ₂ O ₃	8—12	10	16—30	22	25—40	32	30—50	36
Mo O ₃	—		8—12	9	6—10	8	6—12	10
Fe-Mn-C (78% Mn 6% C								
Balance Fe)	0—4	2	0—4	2	2—8	4	5—15	12

Electrodes depositing high tensile strength weld metal

	Electrode depositing 1½% chromium & ½% molybdenum		Electrode depositing 2¼% chromium & 1% molybdenum		Electrode depositing 45 tpi UTS weld metal		Electrode depositing 45 tpi UTS weld metal	
	Working Range in Percent	Specific Example in Percent	Working Range in Percent	Specific Example in Percent	Working Range in Percent	Specific Example in Percent	Working Range in Percent	Specific Example in Percent
Iron powder	5—35	26	0—25	9	10—30	20	0—30	14
Aluminium powder	8—20	14	12—25	18	8—22	16	8—30	18
Mn ₂ O ₃	3—10	8	3—10	8	5—15	10	5—15	10
SiO ₂	3—10	7	3—10	7	3—10	7	3—10	7
Potassium Titanate	1—7	3	1—7	2	1—7	3	1—7	3
CaCO ₃	2—8	3	2—8	3	2—8	3	2—8	3
CaF ₂	15—30	25	15—30	25	15—30	25	15—30	25
Cr ₂ O ₃	8—12	10	14—25	19	3—6	4	6—12	8
MoO ₃	4—6	4	8—12	9	3—6	4	3—6	4
NiO	—	—	—	—	6—10	8	6—10	8

WHAT WE CLAIM IS:—

1. A continuous electrode capable of use for automatic or semi-automatic welding without a submerged arc flux or a shielding gas and consisting of a mild steel sheath enclosing a core, constituting 30—40% by weight of the electrodes and of the following composition in percentages by weight:—

5	Iron powder	0—40%
10	Aluminium powder	4—30%
	Manganese oxide	0—15%
	Silica	0—15%
	Potassium titanate	0—10%
15	Carbonate, as herein defined	0—10%
	Fluoride, as herein defined	10—40%
20	Oxide of chromium, and/or molybdenum and/or nickel	8—65%

the total amount of metal oxide plus silica being at least 20% and the total amount of fluoride plus carbonate being at least 15%.

2. An electrode as claimed in claim 1, in which the amount of oxide of chromium, and/or molybdenum and/or nickel in the core is 8—40%.

3. An electrode as claimed in claim 1, in which the core contains 0—15% ferromanganese.

4. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

35	Iron powder	5—35
	Aluminium powder	14—25
	Mn ₂ O ₃	3—10
	SiO ₂	3—10
	Potassium titanate	1—7
40	Ca CO ₃	2—8
	Ca F ₂	15—30
	Cr ₂ O ₃	8—12
45	Ferromanganese (78% Mn, 6% C, Balance Fe)	0—4

5. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

50	Iron powder	0—25
	Aluminium powder	14—25
	Mn ₂ O ₃	4—10
	SiO ₂	3—10
	Potassium titanate	1—6
55	CaCO ₃	2—8
	CaF ₂	15—30
	Cr ₂ O ₃	16—30
	Mo O ₃	8—12
60	Ferromanganese (78% Mn, 6% C, balance Fe)	0—4

6. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

Iron powder	0—20	65
Aluminium powder	15—30	
Mn ₂ O ₃	2—10	
SiO ₂	3—10	
Potassium titanate	1—5	70
CaCO ₃	0—6	
CaF ₂	12—25	
Cr ₂ O ₃	25—40	
Mo O ₃	6—10	
Ferromanganese (78% Mn, 6% C, balance Fe)	2—8	75

7. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

Iron powder	0—20	
Aluminium powder	15—30	
Mn ₂ O ₃	0—10	
SiO ₂	3—10	85
Potassium titanate	1—5	
CaCO ₃	0—6	
CaF ₂	10—20	
Cr ₂ O ₃	30—50	
Mo O ₃	6—12	90
Ferromanganese (78% Mn, 6% C, balance Fe)	5—15	

8. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

Iron powder	5—35	
Aluminium powder	8—20	
Mn ₂ O ₃	3—10	100
SiO ₂	3—10	
Potassium titanate	1—7	
CaCO ₃	2—8	
CaF ₂	15—30	
Cr ₂ O ₃	8—12	105
Mo O ₃	4—6	

9. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

Iron powder	0—25	110
Aluminium powder	12—25	
Mn ₂ O ₃	3—10	
SiO ₂	3—10	
Potassium titanate	1—7	115
CaCO ₃	2—8	
CaF ₂	15—30	
Cr ₂ O ₃	14—25	
MoO ₃	8—12	



10. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

10	Iron powder	10—30
	Aluminium powder	8—22
	Mn ₂ O ₃	5—15
	SiO ₂	3—10
	Potassium titanate	1—7
	CaCO ₃	2—8
	CaF ₂	15—30
	Cr ₂ O ₃	3—6
	MoO ₃	3—6
	NiO	6—10

15 11. An electrode as claimed in claim 1, in which the core constitutes 30—33% by weight of the electrode and contains, in percentages by weight:—

Iron powder	0—30	20
Aluminium powder	8—30	
Mn ₂ O ₃	5—15	
SiO ₂	3—10	
Potassium titanate	1—7	25
CaCO ₃	2—8	
CaF ₂	15—30	
Cr ₂ O ₃	6—12	
MoO ₃	3—6	
NiO	6—10	

12. An electrode as claimed in claim 1, substantially as described with reference to any 30 of the foregoing specific Examples.

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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1970.
Published by the Patent Office, 25 Southampton Buildings, London, W.C.2, from which
copies may be obtained.



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