TABLE 5

The influence of the molybdenum content upon the critical pitting temperature

Alloy No	Mo %	Critical temp °C.
2	6.31	80
3	7.30	above boiling point
4	8.28	above boiling point
5	9.35	boiling point
17	8.65	97.5
18	15.43	above boiling point

Steel No. 3 and No. 4, which contain 7.30, and 8.28% molybdenum, respectively, have the highest critical temperatures. These steels, which have a composition according to the invention, have a higher critical temperature than the nickel base alloy No. 17 and the same resistance as the nickel alloy No. 18 even at the boiling point.

The effect of chromium upon the crevice corrosion resistance is shown in Table 6.

TABLE 6

The influence of the content of chromium upon the critical crevice corrosion temperature

Alloy No	Cr %	Critical temp °C.
3	21.9	62.5
6	23.0	65
7	24.0	65
17	21.5	17.5
18	15.81	37.5

As is apparant by a comparison between alloys No. 3 and No. 6 in Table 6, an increased chromium content has a favourable effect upon the corrosion resistance, but the whole effect has been achieved already at a content of 23% chromium in the alloy. Any further improvement therefore is not gained by alloying the steel with further amounts of chromium, alloy No. 7. The nickel base alloys No. 17 and No. 18 have significantly lower critical temperatures than the alloys of the invention.

The effect of the content of manganese upon the resistance against crevice corrosion is shown in Table 7.

TABLE 7

The influence of the content of manganese upon the critical crevice corrosion temperature

Alloy No.	Mn %	Critical temp °C.
16	2.0	60
3	4.1	62.5
12	7.8	45

Steel No. 12, which has a high content of manganese, has a significantly lower critical temperature than steel No. 3. The latter steel has a manganese content according to the invention but as far as other elements are concerned it has essentially the same alloy composition and essentially the same PRE-value as steel No. 12.

The effect of the content of copper upon the resistance against pitting is shown in Table 8.

TABLE 8

The influence of the content of copper upon the critical pitting temperature

Alloy No.	Cu %	Critical temp °C.
3	0.12	above boiling point
8	0.49	above boiling point
9	0.96	boiling point

TABLE 8-continued

The influence of the content of copper upon the critical pitting temperature

Alloy No.	Cu %	Critical temp °C.
10	1.46	97.5

Steels having higher contents of copper than 0.49% thus have a lower critical temperature than steels having lower contents. The impairment of the corrosion resistance is particularly great in the content range between 0.96 and 1.46% Cu.

The effect of copper upon the resistance against general corrosion in acids is shown in Table 9, where the mean value and the variation of two measurements are shown.

TABLE 9

The influence of the content of copper upon the passivation current densities in different acids

Ally No.	Cu %	Passivation current density $\mu A/cm^2$ H_2SO_4 20%	H_2SO_4 70%	H_3PO_4
3	0.12	114 ± 35	135 ± 5	80 ± 4
8	0.49	122 ± 8	75 ± 8	97 ± 23
9	0.96	112 ± 7	65 ± 2	104 ± 5
10	1.46	120 ± 3	63 ± 2	104 ± 10

Copper has no significant effect upon the passivation features in 20% H_2SO_4 but has a favourable effect in 70% H_2SO_4. In the latter case, however, the major part of the improvement has been achieved already at 0.49% Cu. In phosphoric acid, the effect of copper is unfavourable.

The alloy according to the invention therefore has optimal corrosion features at a copper content of about 0.5% since:

- the resistance against crevice corrosion and pitting has not been impaired as compared to the resistance at lower contents of copper;
- the resistance against 70% H_2SO_4 has been significantly improved in comparison with the resistance at lower copper contents; and
- the resistance against phosphoric acid has not been impaired as much as at a higher copper contents.

We claim:

1. Austenitic stainless steel having a high tensile strength, a high impact strength, a good weldability and a high corrosion resistance, particularly a high resistance to pitting and crevice corrosion, said steel consisting essentially of in weight-%:

max 0.08 C
max 1.0 Si
more than 0.5 but less than 6 Mn
more than 19 but not more than 28 Cr
more than 17 but not more than 25 Ni
more than 7 but not more than 10 Mo
0.4–0.7 N
from traces up to 2 Cu
0–0.2 Ce
balance essentially only iron, impurities and accessory elements in normal amounts.

2. Steel according to claim 1, consisting essentially of max 0.05 C.

3. Steel according to claim 1, consisting essentially of max 0.03 C.

4. Steel according to claim 1, consisting essentially of 1.0–5.0 Mn.