

ALIEN PROPERTY CUSTODIAN

HIGH SPEED STEEL

Franz Rapatz and Hans Pollack, Buderich/Dusseldorf, Germany; vested in the Alien Property Custodian

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Tests run with the object of substituting tungsten in high speed steels by molybdenum disclosed the applicability of the thumb rule, that 1% molybdenum can replace 2% tungsten. There are e. g. steel grades known, containing about 8-9% molybdenum instead of 18% tungsten, yet showing an equally good cutting ability. Particularly well-known are the results of steels with approximately 0.7% carbon, 8-9% molybdenum, 3-4% chromium, 0.5-1.0% vanadium, offering the same ability to hold the cutting power as steels with 18% tungsten and otherwise same alloying constituents.

According to the invention, it is by no means necessary to maintain a molybdenum-tungsten ratio of 1:2. Steels equalling in quality the tungsten steel grade are obtained already at considerably lower molybdenum contents. According to the invention these steels are composed of 3-4% molybdenum and eventual additions of tungsten up to 3%, vanadium up to 3%, cobalt up to 20%. An example is quoted hereafter indicating that as a result of comparative tests a steel with

| | |
|------------------|----------|
| | Per cent |
| Carbon | 0.79 |
| Silicon | 0.18 |
| Manganese | 0.27 |
| Chromium | 3.66 |
| Tungsten | 1.84 |
| Vanadium | 0.64 |
| Molybdenum | 3.45 |

offered favourable results as compared with a steel composed of

| | |
|----------------|----------|
| | Per cent |
| Carbon | 0.68 |
| Chromium | 3.68 |
| Tungsten | 15.00 |
| Vanadium | 0.54 |

A practical comparison test revealed the following service life:

| | Strength of material | Hardening temp. | Depth of cut | Feed | Speed | Service life |
|----|------------------------|-----------------|--------------|------------|---------------|--------------|
| 10 | | | | | | |
| | <i>1st test series</i> | <i>°C.</i> | <i>Mm.</i> | <i>Mm.</i> | <i>M/min.</i> | |
| | W-Steel..... | 93 { 1270/80 | 3 | 2.12 | 12 | 63' 30" |
| 15 | Mo-Steel... | 93 { 1210/80 | 3 | 2.12 | 12 | 82' 20" |
| | <i>2nd test series</i> | 93 { 1260/70 | | | | 82' 00" |
| | W-Steel..... | 93 { 1270/80 | 3 | 2.12 | 14 | 36' 00" |
| | Mo-Steel... | 93 { 1220/80 | 3 | 2.12 | 14 | 35' 45" |
| 20 | <i>3rd test series</i> | 93 { 1250/60 | | | | 36' 20" |
| | W-Steel... | 93 { 1280/60 | 3 | 2.12 | 15 | 22' 05" |
| | Mo-Steel... | 93 { 1225/40 | 3 | 2.12 | 15 | 24' 00" |

The steels offer the further advantage that they can be hardened within a temperature range of 1200-1260° C without noting, practically speaking, an influence upon the cutting power, whereas in the case of other High Speed Steels including the Molybdenum Steel referred to herebefore, variations in temperature of 10-20° C have a great bearing on the ability to hold the cutting power.

The substitution of large quantities of tungsten by a small amount of Molybdenum is of vital importance to countries lacking the said raw materials.

FRANZ RAPATZ.
HANS POLLACK.