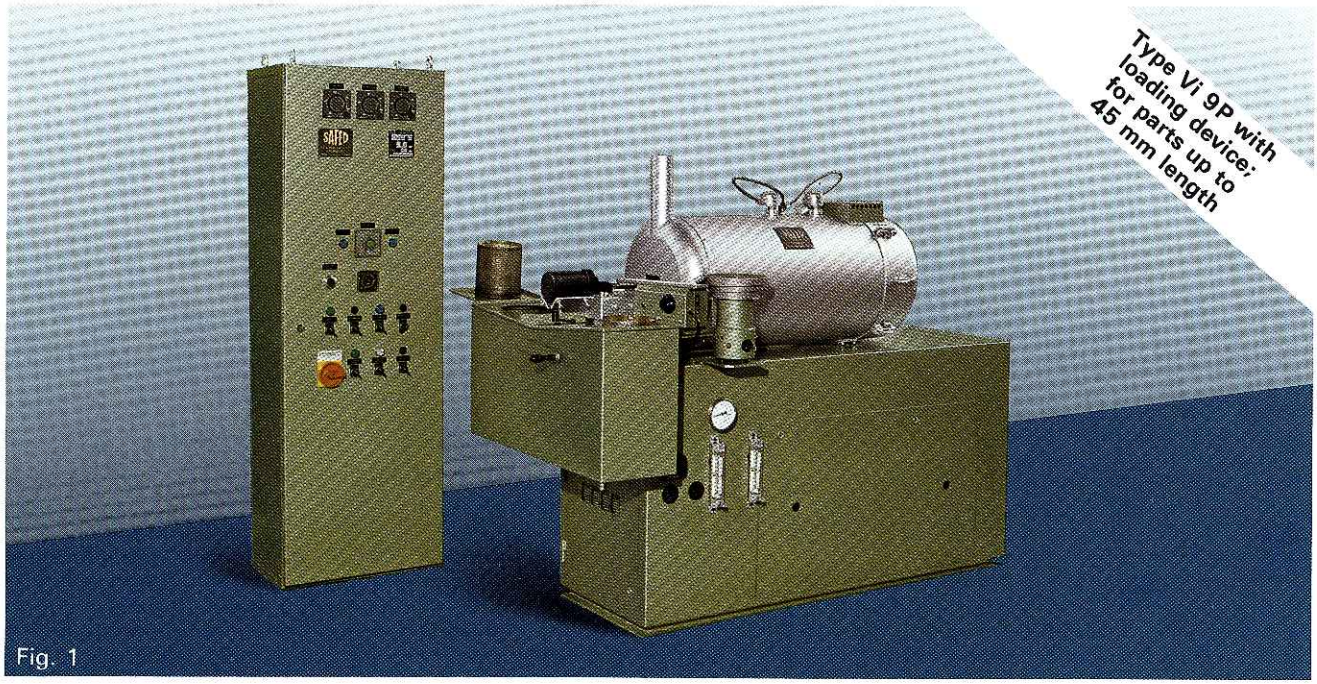
IC-59-A

S.A. du Four Electrique Delémont
Delémont, Switzerland

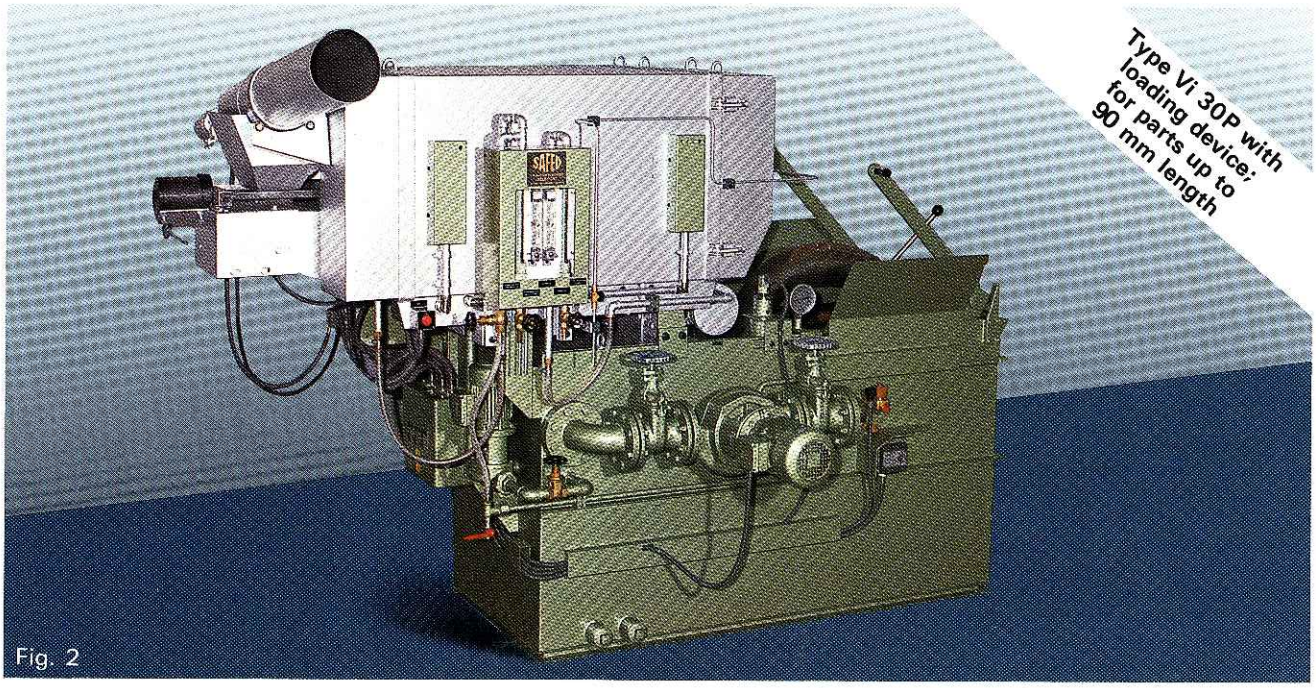
Shaker hearth furnaces type Vi for heat treatment of small parts,

with integrated quench tank.



Type Vi 9P with loading device; for parts up to 45 mm length

Fig. 1



Type Vi 30P with loading device; for parts up to 90 mm length

Fig. 2

Vi 9P

1. Gas inlets
2. Shaker system
3. Drive motor
4. Oil level
5. Recuperation baskets
6. Extraction tube
7. Loading zone
8. Thermal insulation
9. Support balls
10. Movable hearth
11. Pyrometric tubes
12. Heating elements
13. Tight muffle
14. Over-flow tank
15. Oil filter
16. Oil circulation pump
17. Flame curtain

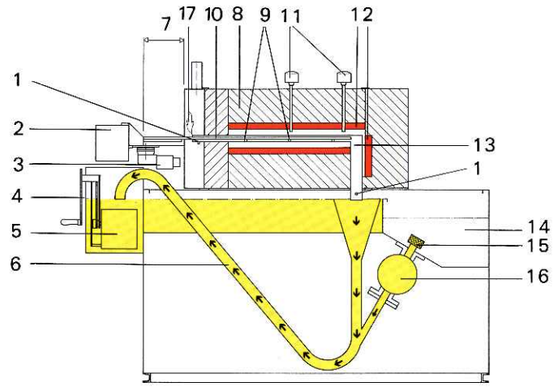


Fig. 3

Vi 20 – 30P

1. Drive motor
2. Shaker system
3. Gas inlets
4. Loading zone
5. Movable hearth
6. Support balls
7. Pyrometric tubes
8. Thermal insulation
9. Tight muffle
10. Heating elements
11. Oil circulation pump
12. Oil level
13. Recuperation baskets
14. Extraction tube
15. Flame curtain

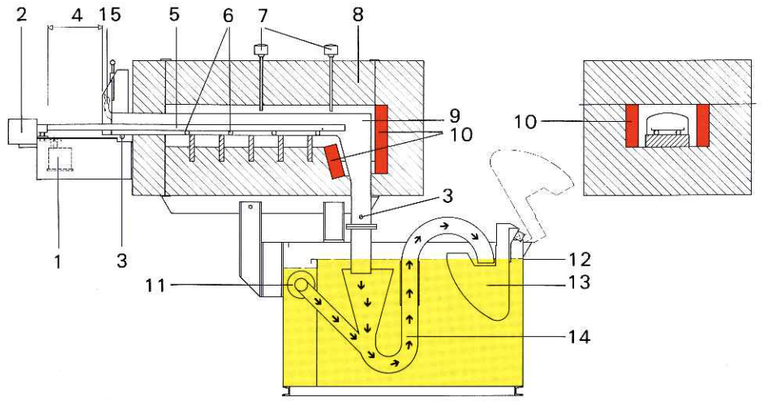


Fig. 4

Heat treatment in shaker hearth furnace type Vi

- Gas carburizing and carbonitriding followed by water or oil quenching.
- Hardening with oil or water quenching.
- Austempering or martempering with oil or salt bath quenching.

All treatments are conducted under controlled atmosphere.

...ideally suited for:

- Watch parts
- Fine mechanical parts
- Springs
- Fine pressings
- Machined parts
- Drive chains: links, bushings, pins
- Sewing and knitting needles
- Etc.

See fig. 6 and 7

Applications

Furnaces type Vi are designed for continuous heat treatment of small and medium size parts. Precision and regularity of treatment offer a wide range of uses, especially for parts designed to meet highest metallurgical and mechanical requirements.

Basic concept

A shaker transport system with reciprocating hearth movement ensures a consistent passage time of parts through the furnace. The passage time is adjustable.

Workpieces are heated up progressively inside a gas tight metallic muffle. They are maintained for the necessary time at required temperature before dropping into the integral quench tank.

A constant flow of protective or treatment gas is maintained through the muffle.

All heat treatment parameters are precisely controlled:
- temperature profile:
- processing time of workpieces;
- protective atmosphere (gas supply, composition);
- quenchant (temperature, level).

Heating chamber. Temperature control

The heating chamber is divided into several heating zones separately controlled by high quality electronic temperature controllers. The required temperature profile is obtained by individual setting of the temperature in each zone.

The heating elements consist of long life electrical resistance windings. An additional heating element installed at the muffle chute prevents any temperature drop in the parts before quenching.

Quench tanks

Various quench tanks may be used according to the type of treatment or parts with following quenchants:
- oil at 80 °C
- hot oil at 200 °C
- water with additive
- molten salt max. 400 °C.

The quenchant level is held constant by an overflow weir and feed pump. One or two pumps ensure proper agitation. Heating and cooling systems are also provided depending on the quenchant used.

Tank, type P (SAFED patent)
Suitable for oil or water. Parts drop into an "S" shaped tube located in the quenchant. A high quenchant flow pumped into the tube conveys the parts to two tilting baskets which are emptied in turn. Due to strong quenchant agitation this system ensures excellent quenching uniformity.

Tank, type G
Suitable for oil or water. Equipped with bucket chain conveyor. At the conveyor discharge end the buckets tip over and dump their load. As an alternative the tank can be equipped with magnetic or mesh belt conveyor.

Tanks, type GS and GH
Tank designed for isothermal quench in molten salt (GS) or hot oil (GH), provided with thermal insulation. Equipped with bucket chain conveyor and covered by a heated and insulated hood to keep the molten salt at temperature.

Tank, type PA
Suitable for all quenchants. Equipped with two receiving baskets which are alternately placed under the chute and removed at regular intervals to be emptied.

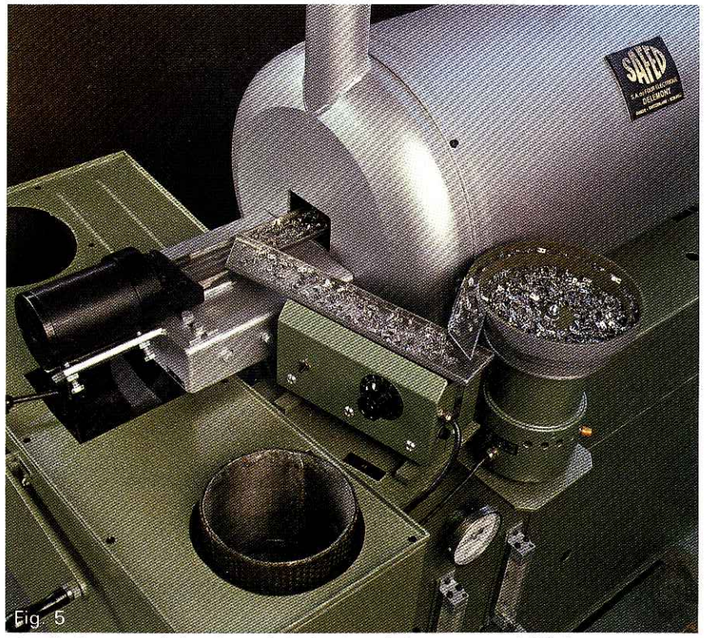


Fig. 5

Detail of automatic loading of shaker hearth furnace type Vi 9P.

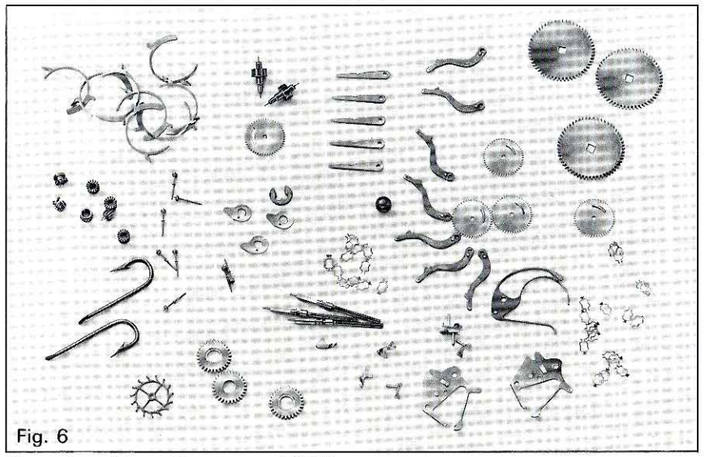


Fig. 6

Examples of treated parts type Vi 9P.

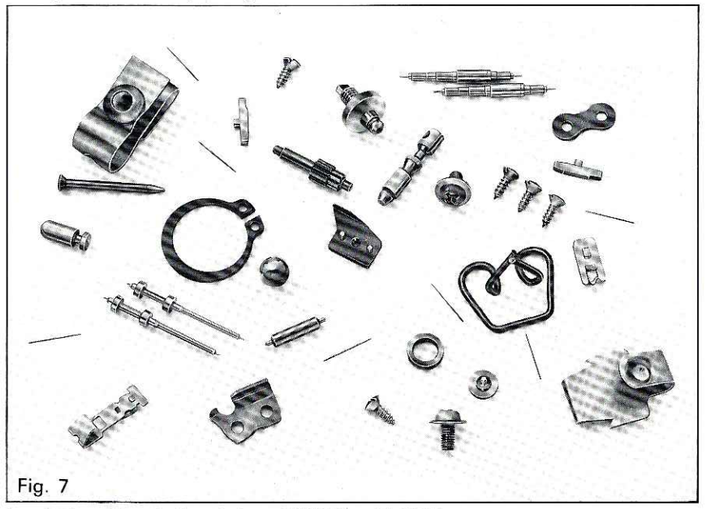


Fig. 7

Examples of treated parts type Vi 20P or Vi 30P.

Technical data

Specifications may be changed without notice

Type	Useful dimensions mm		Heatings length-mm	Approx. production*-kg/h		Protective gas consumption m³/h		Power rating kW
	Width	Height		Hardening	Carburizing 0.1 mm	Met	Prop	
Vi 9	55	15	600	3-6	1-3	0.45	0.50	5.6
Vi 20	140	40	900	7-16	4-10	1	1.5	11
Vi 30	240	40	900	14-28	8-18	1.5	2	15

Maximum operating temperature: 950 °C.
* Production may vary depending on type of parts and treatment conditions.

Controlled atmosphere

Several types of SAFED gas generators are available for protective gas supply. Endothermic atmosphere from propane or natural gas and dissociated Methanol are the most common. It is also possible to produce a gas atmosphere in the furnace by direct gas injection (Injector-M process).

A flowmeter set mounted on the furnace allows precise control of carrier and additional gases according to the type of heat treatment required.

The same furnace can be used for several different types of heat treatment such as straight-hardening, case-hardening and carbonitriding.

Measurement and control of the carbon potential

Several systems can be installed depending on heat treatment requirements, based on dew-point or CO^2 measurement.

SAFED Manufacturing programme

Mesh belt conveyor furnace with integral quench tank (type T).

Continuous heat treatment furnace with turbo-circulation of the atmosphere (type T-Turbo).

Mesh belt conveyor furnace with water-jacket cooling under protective atmosphere (type Bd).

Mesh belt conveyor furnace with forced air circulation heating (type BdL).

Vacuum furnace.

Automatic shaker-hearth furnace with integral quench tank (type Vi).

Pit furnace with or without protective atmosphere (type SN-SR).

Muffle furnace (type M).

Air circulation furnace (type SL).

Endothermic gas generator (type PROP-NAT).

Dissociated methanol generator (type MET).

Ammonia cracker (type NIT).

Continuous washing machine with rotary drum and alkaline solutions (type TR-TP).

Ancillary equipment

Ancillary equipment available from SAFED helps to increase the operation efficiency of continuous furnaces and allows easy integration into continuous production lines.

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