

# Design Aspects and Execution of the Extensible Deflector

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## Abstract

*In this paper, we propose, in an original way, to design and execute an extensible deflector, which can be mounted on the inlet of the mechanical or hydraulic breathing valve, on a vertical cylindrical fixed roof tank, used for atmospheric storage of petroleum products. The role of the deflector is to reduce significantly the losses of petroleum products if high vapor pressure petroleum products are stored, and the costs.*

**Key words:** *extensible deflector, design, reducing losses*

## Generalities

In order to reduce losses of petroleum products when they are stored in cylindrical vertical fixed roof tanks, it is designed and executed an extensible deflector.

Considering the drawings in Figure 1, a...f, and design, functional and operational overview, the deflector has the following characteristics:

- it can be inserted and extracted in / from the tank through the mechanical or hydraulic breathing valve according to the drawings from the sketches in Figure 1,a and 1,f;
- it can be safely screwed in and screwed off according to the sketches in Figure 1,b and 1,e;
- it can be glided axially in both directions in order to adjust the flowing according to the sketches in Figure 1,c and 1,d;
- it can be installed both on new and still functional tanks, without being stopped, in safety conditions, according to SSM and PCI standards;
- it is made from welded, resistant to corrosion materials, it has a small weight, it does not require demanding manufacturing technologies and it costs cheaply;
- it significantly reduces losses of petroleum products for the storage of high vapor pressure petroleum products, achieving important savings.

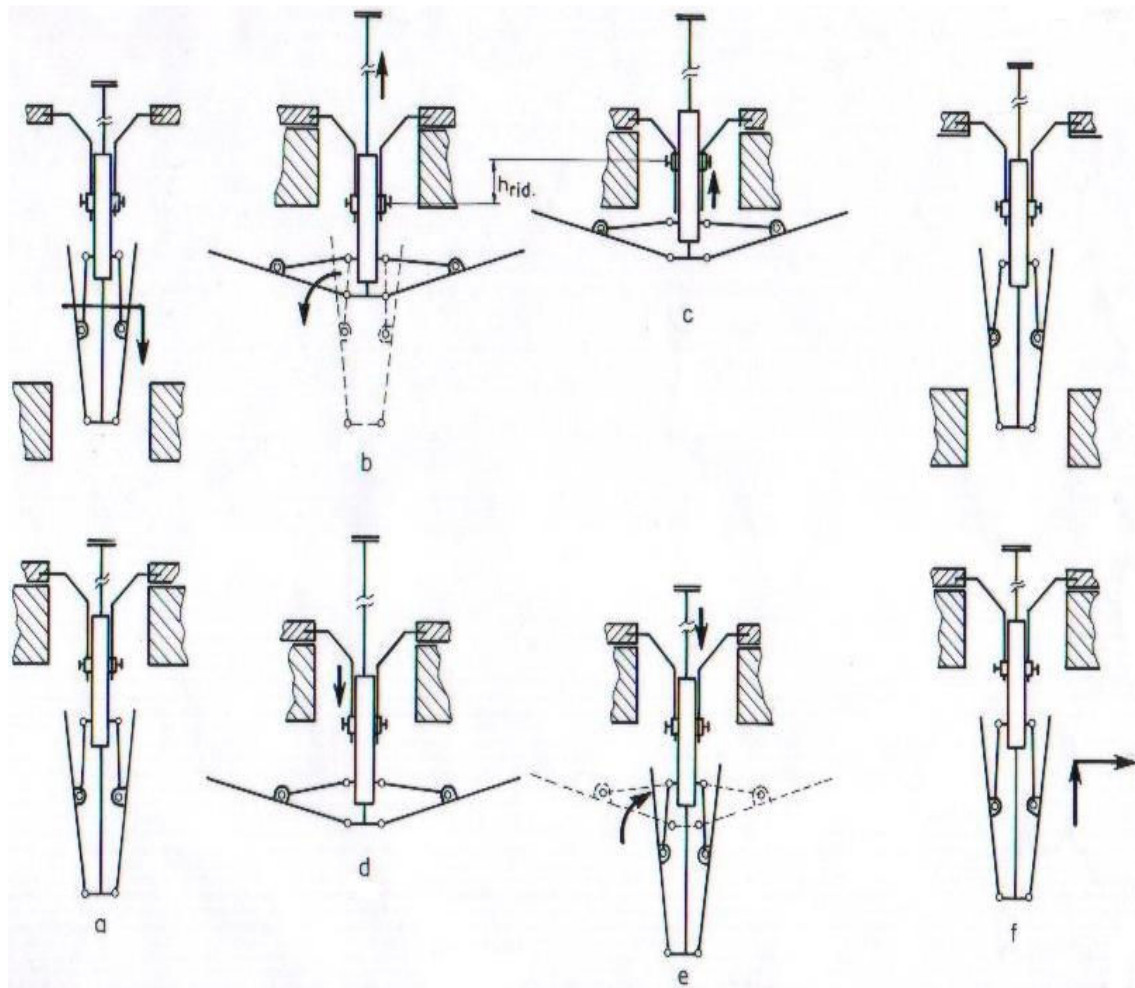


Fig. 1. The operating way of the deflector

## Component Elements

Referring to the notations in Figure 2, the components are shown in Table 1.

Table 1.

Unit number	Unit name	Built-in elements	Observations
I	opening-closing support device	1.1; 1.2; 2.1; 2.2; 3	
II	port-membrane device	4; 5; 6	
III	fitting-sealing device for the tank's nozzle	10; 11; 12	
IV	cover membrane	13; 14; 15	
V	input, extracting and locking device	7; 8; 9; 16; 17	
VI	gliding device to adjust jet speed	18; 19; 20	

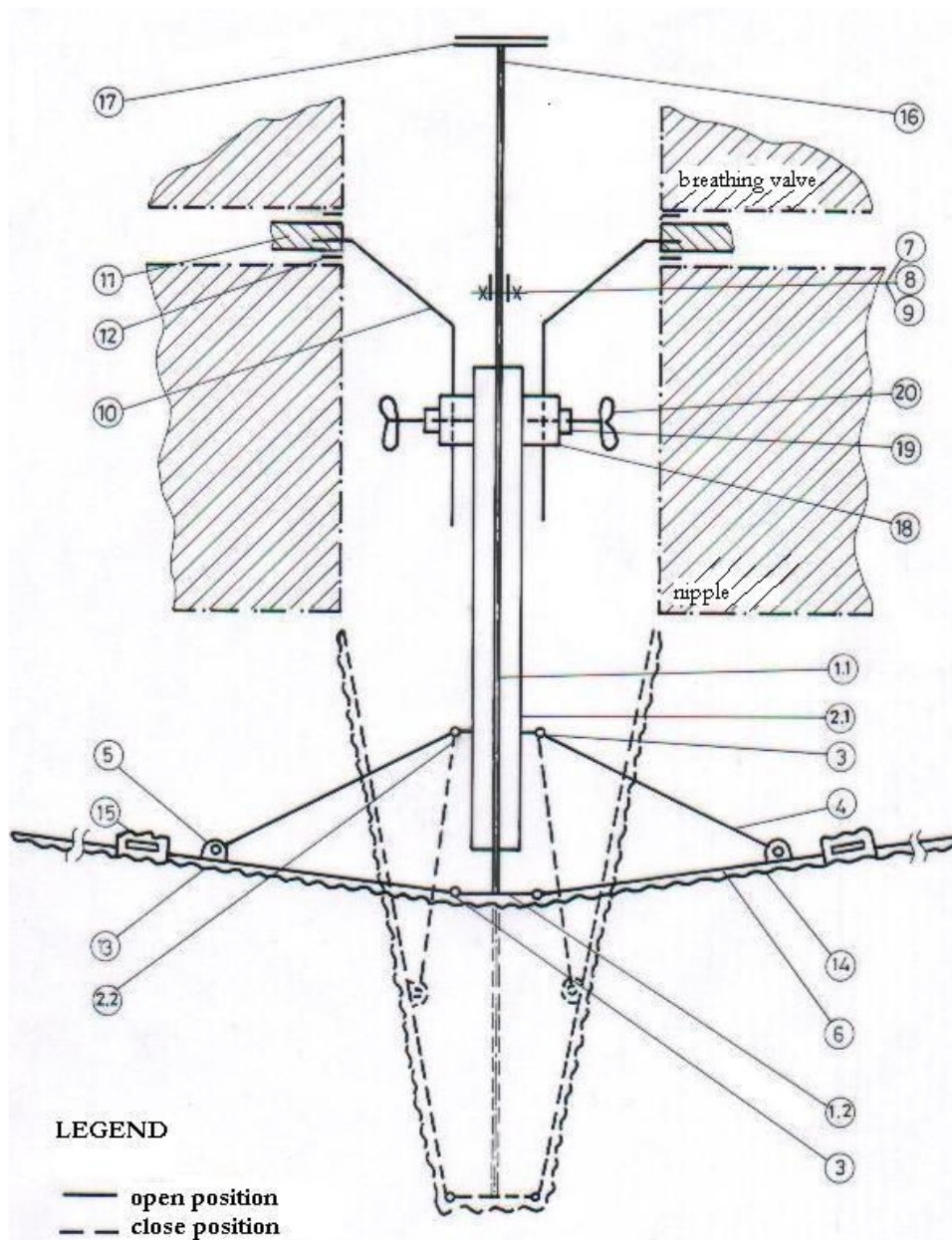


Fig. 2 Extensible deflector

## Constructive and Execution Elements

The designed and executed extensible deflector is shown with its components and construction in Figures 1 and 2 and in Table 1.

The main constructive elements may be underlined:

- deflector's membrane (parts 13, 14, 15) was made of rubber sheet having textile insertion resistant to petroleum products' corrosion, with a thickness  $s = 0,4$  m;
- all built-in elements (1.1; 1.2; 2.1; 2.2; 3; 4; 5; 6; 7; 8; 9; 10; 18; 19; 20) are made of CuZn37 material;

- protected against the corrosion, the elements (14, 16, 17) are made of carbon steel S235. Gaskets (12) are not special ones but ISO type;
- all metal elements are made of semi-rolled (sheet-metal, pipes) executed by cutting;
- a prototype has been developed for a deflector that can be installed on an inlet of a mechanical breathing valve DN200.

## Conclusions

As final assessment, we can mention:

- we aimed to use proper materials in conditions of corrosion and to find constructive solutions with a high reliability; all these having as a result a simple technology and low cost;
- although, in terms of theory, the extensible deflector does not belong to the category of highly complex achievements, conceiving and designing it required important knowledge of mechanisms theory, mechanics, strength of materials;
- taking into account the first points mentioned above, the reducing of petroleum products losses, and the savings made by using this deflector. Thus, such devices are highly recommended for industrial use, in the future because they can realize large savings in storage of petroleum products from mining, petrochemical and chemical industry.

## References

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## Aspecte de proiectare și realizare fizică a deflectorului de tip extensibil

### Rezumat

*În prezenta lucrare se propune, cu caracter original, conceperea și realizarea fizică a unui deflector de tip extensibil, ce se poate monta pe racordul supapei de respirație mecanică sau hidraulică, la un rezervor cilindric vertical cu capac fix, utilizat la depozitarea atmosferică a produselor petroliere. Scopul deflectorului este de a micșora semnificativ pierderile de produse petroliere în cazul stocării produselor petroliere cu tensiuni de vapori ridicate, realizând, astfel, însemnate economii valorice.*