In these instances the designer must at least inform those who may be affected that the problem will occur, and that it must be controlled during construction. He should also indicate how he assumed the problem would be tackled. The contractor may need to provide temporary works (see also Section 4.2.4) to support the frame or members during erection, such as:

- wire pullers (Tirfors)
- push-pull props
- scaffolding
- military trestles
- job specific items (temporary bracing, fabricated trestles).

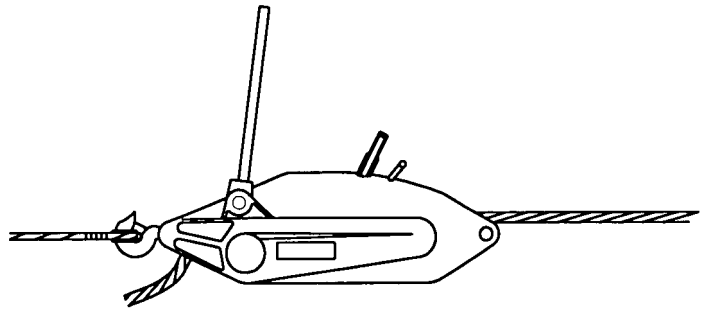

Figure 5.1 *Tirfor wire puller*

5.4.2 Working at height

Although working at height is undoubtedly hazardous, it must not be forgotten that steel erectors are experienced specialists. The regulations only permit the appointment of competent contractors.

The designer must consider if there are any features of the design which are unusual, or unduly onerous for erection at height. Features falling in this category may include items which are difficult to handle and locate, or connections which are difficult to access. Similarly, it may be possible to omit some work at height altogether, for example sag bars between purlins are not always necessary, depending on the choice of purlin section.

Prefabrication may be used in order to reduce the time spent working at height. However, a prefabricated unit may be more difficult to handle, particularly on site. Storage and lifting of bulky items should be considered. Items which are significantly heavier than the average piece weight may have an onerous effect on the cranage requirements in terms of speed and cost. The provision of properly designed lifting points should be considered for unorthodox or unwieldy items (see Section 4.2.2).

A number of options are available to reduce the risk to erectors working at height including:

- the provision of holes for girder grip (‘man lock’) safety devices
- the erection of steelwork using remote release shackles
- the provision of seating arrangements for positive location of major components
- erection of items with hooks, walkways, ladders or safety wires already attached

- provision for temporary access platforms
- access from man riding cages, or from mobile elevated working platforms (MEWPs, commonly called 'cherry pickers' or 'scissor lifts').

Prefabricated stairs, when programmed for early installation, provide safe access to the frame for following trades.

5.4.3 Site cutting / welding

Site cutting and welding involve a number of hazards, including gas, electricity, sparks, noise, the welding arc and debris. However, the risks must be weighed against the engineering and other advantages of site cutting and welding. These operations can be carried out safely. Ways to reduce the risk and to protect include:

- prefabrication
- the provision of access platforms
- protection from the elements
- protection of others
- personal protection of the operatives.

5.4.4 Harmful substances

Potentially harmful substances include certain paints, fire protection and grouts. Safer alternative products may be specified, or in some cases the treatment can be applied off-site under more controlled conditions. To reduce the risk, less hazardous methods of application may be chosen, such as brush applied paint systems instead of sprayed systems. Measures to protect may include personal protection for the operative, and exclusion of other staff. Adoption of alternative systems must recognise the potential effect on the construction programme.

ACTIONS - Health and safety - CDM

Safety concerns all parties involved in a construction project. The principal actions to be undertaken by a designer are listed below.

- Make the client aware of his responsibilities.
- Give due regard to health and safety issues, so that risks can be avoided, reduced or controlled.
- Provide information which a competent contractor would not necessarily know.
- Co-operate with the Planning Supervisor and other designers.