HIGH - COUNTRY FENCING

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HIGH COUNTRY FENCING

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"Tight fences and good musterers"—one high-countryman's recipe for successful runholding.

1. FENCING

Fencing is now recognised as a major aid towards improved management of runs. With costs of both materials and labour high and rising, it is essential that all fences erected be well planned, and well constructed of the best but most economical materials for the site. This booklet will discuss materials, siting and construction of fences on hill and high country. The aim should be to build fences that are:

(i) stock proof
(ii) low in maintenance
(iii) reasonable in first cost with longest life.

1.1 ELECTRIC FENCING

A new and specialised type of fence that will be dealt with in a future publication. At this stage the opinion is offered that, broadly speaking, electric fencing is satisfactory on open accessible country or where a large amount of sub-division has to be done in a short time with limited finance. Elsewhere, permanent, low-maintenance fencing is desirable. The advantages, however, of installing low-cost electric fencing which can be later strengthened to permanent non-electric fencing should be kept firmly in mind.

2.0 SITING

Contrary to the often-expressed opinion, the old-time fencers were not always adept at finding good fence lines. Those which we see today are those which survived. (Boundary fences, of course, on a surveyed line, were an unavoidable case by themselves.) The best owners and managers studied the line for a proposed fence for years before they built it. What was the fence for? Where did the snow lie? Where did it drift? Where did it slide? What was the danger from falling rocks? From mountain torrents? Where did the sheep move when mustered? Where did the men move? Would a fence on that line help or hinder mustering? These questions are not out of date. They must be answered before the first standard is driven.

The following points are worthy of note in reaching a decision. Many are obvious but bear repetition.

(i) Fence lines straight up and down a slope suffer least from snow and boulders.

(ii) Where slopes must be crossed, look for natural glacial ridges, for old terraces, for changes of slope, for anything which will break or divert the slide of snow or the avalanche of rock. Strangely enough, fences crossing shingle scree frequently suffer less than those in dense snow tussock. Perhaps this is due to snow sliding on shingle when it is less deep than when it is held by snow tussock until a critical amount builds up.

(iii) A fence right on a ridgetop can often be seen by musterers on adjacent ridges and the area thus checked for sheep. Where the fence lies just out of sight over the ridge, or disappears from view a while to leave blind pockets, much time can be wasted if the conscientious musterer has to move across to the fence ridge itself to check.

(iv) Unfortunately, the exposed ridgetop, where it lies across the prevailing snow wind, is just where a fence suffers most from driven snow. In the lee of the ridge (but sited free from cornices) the fence may be protected if routed through basins with deep but non-sliding snow in winter.

(v) The ridgetop fence is usually the easiest traversed (except of course for the valley fence) for maintenance, inspection, and repair.

(vi) The ridgetop can generally be fenced with fewer undulations and hence fewer tie downs than the slope. Apparently smooth slopes are often deceptive. The fewer the tie downs, the less the maintenance.

(vii) A fence line that can be bulldozed may halve the transport and maintenance costs.

(viii) The shortest fence line is not necessarily the best fence line if it means crossing a face.

(ix) Cross streams at gorges or narrow confined points, not where they can meander.

(x) For preference, blocks should be all sunny or all dark-lying; no sunny corners for sheep to concentrate on, leaving untouched an otherwise shady aspect on the balance of the block. The fence, where possible, should separate different classes of land one from the other.

(xi) Sheep naturally follow certain draws, tracks and saddles when being mustered. Note should be taken of this. The fence should, all things being equal, aid, and not hamper, mustering. When grazing, sheep tend to favour certain areas. The fence should be sited to control and spread that grazing.

(xii) Think hard and seek other opinions—it may save you money.

3.0 MATERIALS

In high-country fencing, labour costs for erection and transport costs to put materials on the site are an extremely high proportion of the final cost, compared with the fence erected at lower altitudes. Maintenance is frequently difficult and expensive for the same reasons and because of labour shortage itself. The high-country fence must withstand severe physical conditions. The cost of fence failure can be high if sheep escape to die in snow or if extra mustering to clear an adjoining block is needed.

Thus it is essential that the best materials which can be afforded are used and the utmost care is given to construction. The cheap fence does not last.

In the following discussion, the general case of the subdivision fence will be considered; the special case of the boundary fence is referred to in paragraph 6.0.

3.1 POSTS

3.11 Wood.

3.111 Heart Totara has very high durability in the ground particularly when charred, but is almost impossible to obtain. Somewhat brittle.

3.112 Heart Silver pine has high durability in the ground except in very warm dry sites. In limited supply, but grade and type variable—lots should be inspected before purchase. Strong—bending strength similar to Pinus (see 3.117) but slightly heavier. Strainers—7ft x 7in—25/-, 8ft x 8in—33/-; Posts 6ft x 4in—8/6, 6ft x 5in—10/6, 6ft x 6in—12/6.

3.113 Heart Red beech (brown birch) strong and reasonably durable on well drained land. Quality and type highly variable and again lots should be inspected. Good supply. As with other native timbers mentioned, all sapwood must be removed. Posts 8/- each.

3.114 Black beech. Heartwood of good but varying durability.

3.115 Mountain beech heartwood has low to moderate durability.

3.116 Jarrah, strong and extremely durable. This and similar woods much more durable than V.D.L. and other eucalypts. Timber £10 per 100 superficial, or 'board', or 'super' feet. (One super foot is the unit of board measure and is the volume of a piece of timber 1 foot long by 12 inches wide by 1 inch thick—or a multiple of these, say 1 foot by 4 inches by 3 inches—and is thus 144 cubic inches of timber.)

Cost example: Post 4in x 3in x 6ft—12/-; Strainer 6in x 6in x 7in—42/-.

3.117 Pinus (radiata and nigra). When treated with an approved preservative to the standards of the Timber Preservation Authority, posts can be expected to last for at least 30 years. Farm cold-creosote-soaked posts may last 15 to 20 years. Untreated posts have very low durability, six or seven years. Light—35-45lb when dry. Strong—5in diameter post has three to four times the bending strength of a prestressed concrete post and four to five times that of a 3in x 5in reinforced concrete post.

Pinus radiata and Pinus nigra (Corsican pine) are almost all sapwood at post size. Consequently preservative can be forced right through them. Immediately after cutting, posts are debarked, stacked (preferably under cover) and air-dried for three to four months or until moisture content is below 30 per cent (of oven dried weight) and preferably close to the 20-25 per cent moisture content of air-dry pine wood in summer. By this stage all cracking (checking) that is likely to take place in the life of the post should have occurred. Treatment is by impregnating with creosote, pentachlorphenol or arsenates (green salts). The pentachlorphenol is oil based and the arsenates water based but fixing to an insoluble compound. Posts commercially available are generally treated with either 8lb of pentachlorphenol per cubic foot of post by the hot and cold bath method, or 3lb of arsenate per cubic foot of post by pressure impregnation, to protect against the fungal attack which causes decay.

Costs: Arsenate (greensalt) treated. (ex Christchurch)—Strainers 8ft x 8in—31/6, 7ft x 7in—25/-; Posts 6ft x 4in 8/6, 6ft x 5in—9/6, 6ft x 6in—11/6.

Pentachlorphenol treated (ex Hanmer)—Strainers 8ft x 8in—35/-, 7ft x 6½in—19/-; Posts 6ft x 4in—7/-, 6ft x 5in—9/-, 6ft x 6in—10/-.

Note (i)—Only examples quoted—a much wider range is available.

Note (ii)—Farmers can have their own post lengths treated by the greensalt process at a cost of 2/6 to 3/- per post if they are prepared to deliver to the treatment plant.

3.116 Larch. Larch and Douglas Fir have a much higher percentage of heartwood at post size than Pinus radiata or P. nigra and only, perhaps, one inch of sapwood. Since preservative, even under pressure, scarcely penetrates heartwood, treatment aims at impregnating the sapwood to form a protective shell around the heartwood. As with the pines, checking (radial cracking) is encouraged by air drying to 20-25 per cent moisture content before treatment. The onset of decay is less rapid with larch than with the pines when seasoning. Larch posts available in the South Island are usually those which have been pentachlorphenol treated at 8lb per cubic foot by the 20-hour hot and cold bath method.

If the treated sapwood shell of pine and larch posts is broken by boring, cutting or notching, the untreated heartwood is exposed and the life of the post becomes the life of the heartwood, consequently, although it is not usually possible to have boring, etc., done before treatment, care should be taken to see that the shell is restored by thoroughly hand treating all such openings for decay.

The durability of well-seasoned treated larch is said to be similar to that of the treated pines.

Severe seasoning checks are a much more common feature of larch and fir than of the post pines.

Untreated larch posts can also be purchased. They have an expected average life of 10 to 12 years in the ground. Larch posts are somewhat stronger than pine posts.

Costs. Treated. Price list as for pentachlorphenol treated pine posts (ex Hanmer)—Strainers 8ft x 8in—31/6, 7ft x 7in—25/-; Posts 6ft x 4in—8/6, 6ft x 5in—9/6, 6ft x 6in—11/6.

Note: Only examples quoted.

Untreated posts 6ft x 5in about £12 per 100.

Weights: Douglas fir, Pinus, larch, approx. weight untreated.

Post diameter small end inches	Weight 6ft lb.	Weight 6ft 6in lb.
3½	14	15
4	18	20
4½	23	25
5	29	31
5½	34	37
6	40	43
6½	46	50
7	53	57

Preservative adds ¾lb per cubic foot with 'green salt arsenate'; 6 to 8lb with oil based pentachlorphenol.

Note: 5½in diameter post 6ft long contains about one cubic foot of wood.

3.12 Steel.

3.121 Railway rail. Supply variable. Wide variety of weights, those in general use being up to 70lb per yard (140lb for 6ft post). Price also very variable but reckon on 3/6 to 4/- per foot. Excellent posts if weight is not a deterrent. Can be driven.

3.122 Angle irons (L section). Can be made to order but are not recommended. Very difficult to drive vertically and liable to twist.

3.123 T irons. When pointed, are a sound proposition, but can be expensive in heavy sizes.

Price: 2½in x 2½in x 5/16in x 6ft 6in—35/-; 1¾in x 1¾in x ¼in x 5ft 6in—15/6.

This represents size and price at each end of accepted range for posts. Sizes obtainable ex stock vary, but steel can generally be cut, punched and pointed to order in chosen weight and length. On soft ground they should always be fitted with a plate.

'T' Steel sizes and weights.

Size (inches)		Thickness (inches)	Weight (lb/ft)	Weight 6ft Post (lb)
1½ x 1½	x	3/16	1.81	11
	x	¼	2.36	14
	x	5/10	2.86	15
1¾ x 1¾	x	3/16	2.10	12½
	x	¼	2.79	16¾
2 x 2	x	¼	3.21	19¼
	x	5/16	3.94	23½
2½ x 2½	x	¼	4.07	24½
	x	5/16	5.00	30

3.13 Concrete.

Standard reinforced concrete posts are considered to be too heavy at 75 to 90lb, and too brittle for high-country fencing. A good standard post will fail at 300lb loading applied at right angles to the top when there is 3ft 6in projecting above the ground (cantilever testing). Heavy posts fail at 400lb and strainers (unstayed) at 1000lb minimum. These figures are the minimum test loads being set by the Standards Institute but are average figures in practice. By contrast the 5in to 6in diameter pine-post will take a loading of 1400lb or more.

Pre-stressed concrete posts are half as strong again as standard posts—their failing load being about 450lb—and are lighter in weight (at 58lb for a 6ft post) by a third than the standard post. They are said to be capable of being dropped from aircraft without damage under reasonable conditions. Their cross section is only 3in x 3¼in (ex Christchurch) but a concrete collar can be supplied to increase bearing surface at ground level.

The life of all concrete posts depends on their being made of first-grade materials, well mixed, well vibrated, the reinforcing well placed, and the product well cured. Pre-stressed posts differ from normal concrete posts in that their reinforcing is six No. 10 gauge high-tensile wires stretched under extreme load as the post is being formed. When set, the material of the post is actually held in compression by the stress of the wires, thus resisting bending of the post.

Costs (examples only): Reinforced concrete—Strainers 7ft and 8ft x 6in x 6in—34/- (weight 7ft 210lb), 7ft and 8ft x 7in x 7in—40/- (weight 7ft 310lb), 7ft and 8ft x 8in x 8in—48/- (weight 7ft 415lb, 8ft 475lb).

Stay 9ft—16/6.

Posts 6ft—10/6 each, £52/10/- per 100. 6ft 6in 'cattle' type—14/- each, £70 per 100.

(Note: Medium posts vary from £45 to £55 per 100 depending on type and supplier.)

Pre-stressed concrete: Laminated strainer (two 7ft x 3in x 3¼in posts bolted together)—35/6 complete (weight 200lb). Posts (all 3in x 3¼in) 5ft—10/3 (weight 48lb), 5ft 6in—10/3 (weight 52lb), 6ft—10/9 (weight 58lb), 6ft 6in—11/9 (weight 63lb).

Stay 9ft—16/- (weight 84lb).

3.14 Summary

From experience, the choice would seem to lie between silver pine, treated pine or larch and iron posts, although pre-stressed concrete and jarrah deserve consideration for special purposes. T-iron posts are very durable, are speedily erected by driving and of course are fire resistant. However they are not recommended for fencing across sideling or across slope nor elsewhere where there is likely to be great weight of snow against the fence. Their bearing surface in the ground is small compared with a wooden post and thus where the ground is soft they are easily pushed out of alignment. Where the ground is firm they can be bent by weight of snow on the fence and cannot be straightened on the site. With extra work, they can, however, be braced to a tieback. Desirable lengths are 5ft 6in and 6ft. Steel plates 4in x 6in or 6in x 6in of ¼in or 5/16in thickness are recommended for keying to iron posts to prevent sinking in soft ground. Price 6in x 4in x ¼in—1/7 each.

When wooden posts are used they should be carefully selected for quality before delivery. Commercially treated posts are a uniform guaranteed product, of good durability, are light, strong and reasonably cheap. The pre-stressed concrete post is highly durable but weight is greater and bending strength less than a wooden post.

Number of posts per mile.

Spacing of Posts (ft)	No. per chain	No. per mile	Spacing of Posts (ft)	No. per chain	No. per mile
8		660	18		293
9		586	20		264
10		528	22	3	240
11	6	480	24		220
12		440	33	2	160
15		352	36		147
16½	4	320	66	1	80

No allowance made for strainers—deduct number required.

3.15 Stays

Stays should be at least 9ft long and preferably longer. On steel fences, angle iron or steam (or ammonia) pipe is quite suitable.

3.2 Wire.

3.21 Plain. Although 12½ gauge high-tensile wire has twice the length of No. 8 gauge for a similar weight and almost similar price, it has not the 'give' of normal wire and seems prone to snap under very cold conditions, or unusual strain, particularly at knots. For this reason its value is suspect for fences subject to very low temperatures. No. 9 gauge wire is 25 per cent longer than No. 8 gauge wire for the same weight and a similar price. It is suggested that wider use could be made of it. Its disadvantages are:

(i) a smaller cross section than No. 8 predisposing it to earlier fracture by corrosion where there is repeated burning of vegetation, or a high exposure to salt, or contact with organic matter.

(ii) A 25 per cent lower breaking strain than No. 8 wire. These disadvantages are not considered to be particularly important.

It is suggested that if the two bottom plain wires be of No. 8 gauge, the balance could be of No. 9 gauge, with consequent saving in cost and little loss of strength.

Great care must be taken when straining high-tensile wire that it does not overstrain and snap. Severe injuries have been caused to men unpractised in its characteristics.

3.22 Barbed wire. A barbed wire, if it serves no other purpose, keeps the droppers or standards of a fence in place, particularly on steep slopes. It should not be discarded. There seems to be no doubt that a barbed top-wire does have a deterrent effect on cattle. Whether it should be a 3in or a 6in spaced barb is a matter of opinion. The 6in is cheaper and much easier to handle.

3.23 Tie-down wire. The first place where the average hill fence fails is at the tie-downs. A tie-down is strongest when the holding standard is driven right home into the ground, but in this position the wire rots quickly. Consideration should be given to using rustproof stainless steel wire for tie-downs. It is available in soft or hard qualities—the first-named being recommended for the purpose. It has three times the tensile strength of similar gauge standard galvanised wire and thus 10 gauge S.S. wire is quite suitable. At 3d per foot or a total cost of 6d for the 2ft of wire of each average tie-down, it is well worth the cost.

3.24 Wire costs (variable but representative costs are quoted).

Gauge	Unit Weight	Price
No. 8	½ cwt coil	£80 0 0 ton
No. 9	½ cwt coil	£81 5 0 ton
No. 10	½ cwt coil	£82 0 0 ton
No. 12½	½ cwt coil	£95 0 0 ton
No. 12 barbed	½ cwt coil	£105 0 0 ton
No. 14 lacing wire	14lb	18s 6d
	7lb	10s 6d
No. 16 lacing wire	7lb	11s 0d

3.25 Weights and lengths of fencing wire. (See page 8.)

3.26 Quantity of wire for one mile of fencing

Gauge	1 wire cwt	2 wires cwt	3 wires cwt	4 wires cwt	5 wires cwt	6 wires cwt
8	3¼	6¼	9½	12½	15½	18¾
9	2½	5	7½	10	12½	15¼
10	2	4	6	8	10	12
12½	1¼	2½	3¾	5	6¼	7½

Note: Quantity may vary slightly with different brands, e.g., a common brand has only 12½ chains of wire in a 56lb coil of No. 8. The gauge is nominal only and weight of galvanising varies.

3.27 Breaking strain of wire

Gauge	Breaking tensile strain (lb)
8	1351
9	1094
12½ H.T.	1350

3.25 Weights and lengths of fencing wire.

No. or Gauge of Wire	Diameter	Weight of one Wire 100yds	20 chains or ¼ mile	80 chains or 1 mile	Length of 56lb coil		Length of 1 ton		
S.W.G.	inches	lb	lb	cwt	yards	chains	chains	miles	chains
7	0.176	24	106	3¾	233	10½	424½	5	24½
8	0.160	20	88	3¼	283	13	514½	6	34½
9	0.144	16	72	2½	350	16½	636¼	7	76¼
10	0.128	13	53	2	441	20	802	10	2
12½ H.T.	0.098	7½	33	1¼	729	33	1325½	16	45½
12 gauge x 6in barb		21	92	3¼	266	12	484	6	4
12 gauge x 3in barb		25	110	4	224	10¼	407½	5	7½
12½ gauge x 3in barb		21	92	3¼	266	12	484	6	4
12½ gauge x 6in barb		19	84	3	300	13½	545½	6	65½
14 gauge x 6in barb		16	72	2½	355	16	645½	8	5½

Note: Lengths and weights may vary slightly with different brands.

3.3 Standards.

3.31 'Y'-type. These standards have come into prominence since the war. There are two sources of supply—England and Australia. Those made from English steel are widely variable in quality, some being fabricated from steel with such a high carbon content that, when erected in firm ground, they readily break off at ground level or at the bottom wire hole when given a firm lateral blow similar to animal impact. This could be an expensive failing in an erected fence.

Those made from Australian B.H.P. steel under a common trade name are generally of heavier material and made from a steel which is not brittle.

The great virtue of all 'Y'-pattern standards is their rigidity in a fence. However, it must be remembered that their thickness is only ⅛in on the ribs and it would be reasonable to expect their life in the ground to be very much shorter than that of a common 5/16in thickness flat standard. The effect of the black protective coating would not be great. For this reason, they are not recommended by the writer for use in new permanent fencing, although they are excellent for repair of existing fences. The extra length of a 6ft standard is no real advantage.

English 'Y' bars are available in sizes 4ft 6in to 6ft. Australian B.H.P. are available in sizes 5ft 6in and 6ft only.

3.311 Weight per bundle of 10 (lb).

Brand	4′ 6″	5′ 0″	5′ 6″	6′ 0″
English 'Y' bars	58	63	71	78
Australian B.H.P.	—	—	73	84

3.312 Number of 'Y' standards per ton (approx.).

Brand	4′ 6″	5′ 0″	5′ 6″	6′ 0″
English 'Y' bars (1¼lb/ft)	383	358	325	300
Australian B.H.P. (1½lb/ft)	—	—	307	267

3.313 Price (at April 1962)

Brand	4′ 6″	5′ 0″	5′ 6″	6′ 0″
English 'Y' Bar	4/10	5/3	5/5	5/6
Australian B.H.P.	—	—	5/2	5/4

3.32 H. Pattern standards.

These are not recommended since their rigidity in the line of the fence is little better than that of a flat standard and the thickness of the web is generally ⅛in only.

It must be remembered that the life of a steel standard or post depends on the thickness of metal in contact with the ground and the *minimum* thickness is that which is critical.

3.33 Flat standards.

The common size (to varying lengths) is made from 1¼in x 5-16in mild steel or wrought iron. Occasional lots are made in ¼in material but this size of standard is recommended for use only as a dropper, where little strength is required. The merchant's price for both mild steel and wrought iron is about £70 per ton and no price difference is thus quoted between standards of these two materials.

Experience has shown that the higher the carbon content of steel the faster it rusts. Wrought iron has a carbon content of about 0.1 per cent and mild steel about 0.2 to 0.3 per cent. It would seem preferable therefore to use standards of wrought iron and this is borne out by observation.

The flat standard is an extremely versatile fencing unit, particularly adapted to fencing on difficult country, and its continued use cannot be too highly recommended.

Three-sixteenth and quarter-inch plates are available for keying to the standard to prevent sinking. Their use, even at every second or third standard, will materially reduce maintenance and increase fence life. They cost 1/3 to 1/8 each, but can be easily home made by a farmer with gas-welding equipment.

3.331 No. of flat fencing standards per ton.

Size	4′ 10″	4′ 6″	5′ 0″	5′ 6″
1¼in x ¼in	520	485	430	—
1¼in x 5/16in	—	390	350	320
Bundle of 10. 1¼in x 5/16in.	—	60	65	

3.332 No. standards per mile and per chain.

Spacing of standards (ft)	No. per chain	No. per mile	Spacing (ft)	No. per chain	No. per mile
6	11	880	12	5.5	440
7	9.4	770	13	5.1	406
8	8.3	660	14	4.7	377
9	7.4	587	15	4.4	352
10	6.6	528	16	4.1	330
11	6	480	16½	4	320

No allowance made for posts—deduct number per chain or per mile required.

Most sites can be adequately coped with by ordering half 4ft 6in and half 5ft standards.

Cost: 4ft 6in x 5/16in—4/9, 5ft x 5/16in—5/2.

3.34.

A system of fencing based on the use of galvanised 'angle iron' of 1¾in x 3/16in section has been developed for use in hill country and has found some acceptance in the North Island.

Strainer posts are made by clamping four sections (of 12lb weight each) together with special shackles. Corner posts and stays are each formed from two clamped sections. Intermediate posts are one 6ft 6in section. Post sections are double punched at each wire and the running wire caught with a wire staple. Galvanised droppers (of 1⅛lb weight) are used between posts. The system appears satisfactory subject to the disadvantages of angle iron for driven posts (see 3.122), the disadvantages of fences with high dropper to post ratios (see 3.43), and high cost. The angle sections each cost 12/- and droppers £6 per hundred.

3.4 Droppers

Most existing high-country fences have been built without droppers or battens. They can, however, be a useful means of strengthening a fence at pressure points and can permit extended spacing of standards or posts where there is little stock pressure and the lay of the country is easy.

Requirements of a good dropper:

(i) Cheap.

(ii) Easily fitted.

(iii) Does not restrict freedom of running wire unduly. This is of little consequence on short-strain paddock fences but is of major importance on run fences. Many commercial droppers fail on this point.

(iv) Is flexible, or can be straightened after being deformed. Droppers formed from U or channel steel invariably have their backs broken when hit by falling rocks, by stock impact or when the fence wires are otherwise subjected to unequal lateral pressure. Wooden battens also frequently fail for this reason.

(v) Gives added strength to a fence. Rigidity is not necessarily required. In fact a flexible fence is often the one that survives.

(vi) Is light in weight.

3.41 Channel or U steel.

Their principal failing has been dealt with in (iv) above. Some types are easily fitted but others require laborious binding or other attachment methods restricting wire movement.

3.42 Wood

Usually fairly cheap but when small in section most battens readily split and staples fall out. Impregnated soft woods hold staples well. (All wooden battens are prone to destruction by fire.) Some battens of Malayan hardwood with drilled holes seem to ooze gum and make wire pulling through them a very difficult task. Beech (or birch) is probably the most satisfactory of the available native timbers. Wooden droppers should not be allowed to rest on the ground when in position. Common batten sizes are 2in x 1in, 2in x 1½in, 2in x 2in. Treated pine battens are obtainable in 2in x 1½in size.

3.43 Chain.

A new type of dropper is that formed by lengths of 12 gauge or 9 gauge chain clipped to the wires of the fence. The 'S'-clip allows freedom of movement for individual fence wires and is quickly fixed in place. The special top and bottom locking clips could be displaced with a sharp blow, however, and a short tie of lacing wire could well be substituted.

It must be remembered that with all droppers there is no contact with the ground and thus the fence relies for its lateral strength on the posts and to some extent on any standards. The greater the ratio of droppers to posts (or to standards), the less strength has the fence. Ground surface must also be fairly regular for their use in any quantity.

Chain droppers, although extremely permanent, have the disadvantage that they do no prevent stock 'tunnelling' under a fence if the wires are slack. They are, however, cheap.

There are about 165 3ft droppers per roll of 12 gauge chain and 80 droppers per roll of 9 gauge chain. The 12 gauge is quite strong enough for any but severe tie-downs. Patented stainless steel tie-down wires and dogs can be purchased.

3.44 Wire droppers.

Crimped wire droppers, although flexible, generally have to be fixed to the running wires with ties. Spiral wire droppers, however (consisting of 8 gauge wire which is placed against the fence wires and locked into place by a straight locking wire dropped through its loops), have all the advantages of flexibility, long life, quick fixing, freedom for running wires and cheapness, and are recommended where droppers are to be used.

3.45 Prices (approximate only)

Spiral wires	36in	£3 15 0	per 100
	39in	£4 0 0	,, ,,
Chain	12 gauge	£3 15 0	,, ,,
	9 gauge	£6 5 0	,, ,,
Hardwood bored	2in x 1in	£6 10 0	,, ,,
Red beech unbored	2in x 1in	£3 15 0	,, ,,
,, ,, unbored	2in x 1½in	£5 0 0	,, ,,
,, ,, bored	2in x 1½in	£6 0 0	,, ,,
,, ,, unbored	2in x 2in	£6 0 0	,, ,,
Treated pine unbored ..	2in x 1½in	£4 15 0	,, ,,
Crimped wire (various lengths)		£1 12 0 - £2 10 0	per 100
U pattern steel (various brands and types)			
Black		£7 15 0 - £11 15 0	per 100
Galvanised		£8 10 0 - £13 15 0	per 100
Weights. Spiral wire (50)		30lb bundle.	
U pattern (25)		30-40lb bundle.	

3.5 Netting

3.51 Small-mesh netting was formerly widely used for rabbit netting. Australian Government regulations required the use of 1½in mesh or less for this purpose. Range of wire gauges 16 to 19, with 17 and 18 standard rabbit gauges. Widths 36in and 42in. Can be fixed to running wires with clips applied by patent 'gun' with great saving of time compared with hand tying. Small-mesh netting is useful for lamb paddocks and where rabbit control has reached the intense policing stage.

Cost: 50 yard roll—£3/15/- - £4. Weight: about 60lb.

3.52. Heavier-gauge fabricated fence netting (with horizontal running wires), often of high-tensile steel, of 8 to 12 gauge, and vertical stay wires of 10 to 14 gauge) has received publicity of recent years.

Advantages:

(i) Fence stays sheep proof as long as it is erect. Thus it is ideal for fencing rocky sites and river crossings.
(ii) Necessity for strong standards reduced.
(iii) Need not follow straight lines; corners formed more readily.
(iv) Requires fewer supports (e.g. posts, standards) and no droppers.
(v) Good resistance to stock impact.

Disadvantages:

(i) Unwieldy bulk in rolls; not easy to pay out on difficult sites.
(ii) Difficult to strain over uneven ground.
(iii) Because of density of wires, prone to blockage and displacement by snow or rocks.
(iv) Small-gauge wires (compared with conventional fence) may not last as long.

If the basic posts and standards are to be the same for conventional fence and netting fence then cost comparison for wire and netting of one chain of fence is (disregarding barbed wire):

(a) 6 x No. 8 wire 12 chain per coil, half coil at £2—£1 per chain;
or (b) quarter coil heavy netting at £6/10/- coil—£1/12/- per chain;
or (b) one-fifth coil medium netting at £7/5/- coil—£1/9/- per chain.

Thus there would need to be a saving on the netting fence of 9/- to 12/- per chain to make costs comparable. That could be represented by two or three standards fewer per chain, or the value, on a per-chain basis, of less annual maintenance, or perhaps lower cost of erection.

Thus it can be seen that the advantages and disadvantages closely balance each other. It is the writer's opinion that it forms the most desirable type of fence on broken, benchy or rocky outcrop sites. Where there can be high side pressure of snow, netting securely fastened to a double top-wire and only lightly clipped to a bottom wire, will swing free and can be later reclipped. Another method is to fasten the netting to swinging bars pivoting from the bottom of posts, but any bottom-fastened snow fence can also be laid flat by rocks. (See Fig. 9.)

Prices vary with height of netting, gauge of wires, number of wires and spacing of stays.

Four chain coils (heavy weight) £5/15/- - £8/10/-; 5 chain coils £6/5/- - £10.

Weights. Wide range—an average figure is 125lb (4 chain heavy gauge coil).

3.6 Wire strainers.

Cog type permanent wire strainers are recommended for all fences. They simplify the initial tightening of the wires and subsequent maintenance. Cost 3/6 each.

4.0 COSTS OF TYPICAL FENCES

Example: 1 T iron post per chain, flat standards at 3yd intervals, 2 wires No. 8, 3 wires No. 9, 1 barb. strainer every 12 chains. No droppers.

Materials for one mile.

	£	s.	d.
7 T iron strainers at 35/- each	12	5	0
10 stays at say £1 each	10	0	0
73 T iron intermediates at 15/6 each	56	11	6
257 flat standards (5ft) at 5/2 each	66	8	0
250 flat standards (4ft 6in) at 4/9 each	59	7	6
6¼cwt plain galvanised No. 8 wire at £4 cwt	25	0	0
7½cwt plain galvanised No. 9 wire at £4/1/- cwt	30	8	0
3¼cwt barbed wire at £5/5/- cwt	17	1	0
80 flat standards for tie-downs at 4/9	19	0	0
Cost of materials for 1 mile	£296	1	0
Cost materials for 1 chain	£3	14	0

Labour: Add £140 to £180 per mile; 35/- to 45/- per chain.

Transport: Weight materials for one mile of this fence about 2½ tons. Allow at least 1/- per ton mile transport by truck; 5/- per ton mile transport by 4-wheel-drive vehicle; perhaps £20 to £30 per ton by helicopter (extremely variable figure); 10 loads per ton by pack horse.

Variations from example. Extra material per mile.

—160ft stainless steel wire for tie-downs at 4d, add £2/13/-

—Extra No. 8 wire (then 6 plain 1 barb) 3¼cwt at £4, add £13.

—All No. 8 wires (no No. 9) 5 wires 15½cwt at £4, add £6/12/-.
6 wires 18¾cwt at £4, add £19/12/-.

If substitute preservatised wood posts for T-iron posts.

7 strainers at 25/-	£8	15	0
73 intermediates at 9/6	£34	14	0
	£43	9	0 or reduce by £25 8 0

(Note: Labour cost could increase to balance.)

If substitute heavy boundary netting for wire.

20 coils (29in high) at £5/16/-, add £60/12/-.

(Note: Standards would be probably spaced further apart. This could well cancel out the increased wire cost.)

5.0 TOOLS

Recommended tools for use on all types of fencing are as follows:

Shovel—with hickory or ash handle.

Jointed shovel—for clearing digger holes and removing material from bottom of deep holes.

Crowbar—6ft x 1in or 1¼in high grade steel. Old truck drive shafts—now rare—are ideal.

Rammer—commercial type with one flat face, one half-round face, of good weight and will fit between post and machine-dug post-hole edge.

Sledge hammer—12lb or preferably 14lb for T-iron.

Standard hammer—about 5½lb weight with one end slotted for standard twisting. Wooden handle—old dray spoke is good.

Wire cutters (i)—adjustable double-acting bolt cutters capable of cutting a 5/16in bolt. Ideal for dismantling fences and general wire cutting.

Wire cutters (ii)—small double-acting pocket size, sprung.

Wire strainers—three desirable. Chain-and-grip type most versatile. Remove springs for easier working.

Fencing pliers—best quality parrot beak.

Hand pliers—heavy quality with side cutters.

Wire key—for twisting ends. Can be made from mower knife bar cut to suitable length.

Standard lifter—heavy pattern.

Wire jenny—collapsible and light. Arms supporting wire must be each 2ft in length from centre, to prevent coil over-winding and catching underneath.

Steel shears (bolt cutters)—perhaps a luxury but invaluable on big jobs on rocky country for cutting standards for tie-downs. A hacksaw can be substituted on small jobs.

Also, to suit particular jobs: chisels, augers, brace and bit, saw, claw hammer, cog strainer handle, rock drills and fuse crimper, spade, files.

6.0 TYPES OF FENCE

6.1 Legal Boundary Fence.

Where a boundary fence is being erected it is as well to note that the relevant requirements of the Act are that the fence shall be:

"A substantial post, batten, and wire fence, having not less than seven wires, not more than two of the wires being barbed; barbed wires to be placed in a position agreed upon by the persons interested, or to be omitted if those persons agree; the posts to be durable timber, metal, stone or reinforced concrete, and not more than 16ft 6in apart, and securely rammed, and, in hollows, or where subject to lifting through the strain of the wire, to be securely footed, or stayed with wire; the battens to be of durable timber or metal, evenly spaced, and not less than four in each space between the posts; the wires to have barbs spaced 6 inches apart and to be galvanised; the bottom wire to be not more than 5 inches from the ground, the three bottom wires to be not more than 5 inches apart; and the top wire to be not less than 3ft 9in from the ground; all wires to be strained tightly and fastened to or let through the battens and posts to provide a tight, durable, stock-proof fence.

Note: Posts, 4 to the chain.
Battens or Standards, 16 to the chain.
Wires, seven, not more than two barbed.
Height, not less than 3ft 9in."

6.2 Subdivision fences

Subdivision fences need not be of the boundary fence standard. For fencing on the slope, it is suggested that a six-wire fence of two No. 8 wires, three No. 9 wires and a 12½ gauge x 6in barbed wire is of quite sufficient height to hold stock at 3ft 3in. Well-managed cattle should not attempt to jump but if a beast did, it would have a better chance of clearing and leaving the fence intact than if the fence were 3in to 6in higher with seven wires. One wire fewer will also mean less strain on tie-downs and strainer posts. However, the higher the fence the more discouragement there is to jumping and seven wires should be used on flats and in areas of high stock pressure.

Strains should not be greater than 12 chains in length or even tensioning of the wires becomes difficult. On uneven ground the strain may have to be reduced to five or six chains.

Posts (steel included) should not be further than one chain apart, except in the most favourable country. However, one substantial post per chain is a reasonable standard spacing for a high-country fence away from special pressure areas. It is often desirable to allow an average number of posts per chain (say one and a half per chain) with the posts not being at rigid distances apart but spaced according to the lie of the ground. Thus the spacing might be two per chain over a ridge and one per chain on the flat, averaging out at one and a half per chain overall. Cross-slope fences need more posts than line-of-slope fences. Post density should be increased at gateways.

Standards should be spaced 9ft apart but this can be extended, on a favourable site, to 12ft if a dropper is used between each standard. Wide spacing of standards, without support in between, places too much reliance on tightness of wires to contain stock. It is rare that the ground surface would be even enough for the bottom wire not to be too close to the ground surface or too high above it if standard spacings were over 12ft apart.

No. 8 is necessary only on the bottom two wires to resist corrosion by vegetation. No. 9 is sufficient elsewhere.

7.0 TRANSPORT TO SITE

7.1.

If practicable and it can be afforded, a bulldozed track to the site will simplify laying out of materials and provide ready access for future maintenance. Grade should not be greater than 1 in 4 at any place if loaded four-wheel-drive vehicles are expected to traverse the road. Use an Abney level or get the services of a person who has one. The extra care will be well repaid.

Make sure the initial loads are light. Pack material well forward on the vehicle.

7.2

The day of the packhorse is by no means past. Laying out materials by this means may be time-consuming and laborious but at least the standards and wire arrive in good condition and usually where you want them. A good packhorse load is 200 to 250lb. Some horses will carry up to 300lb but this can rarely be done when climbing day after day and leaves no margin of safety in difficult situations. Thus four coils of wire, or two coils of wire and two bundles of standards can be considered a load. It is best when carrying standards, to have points towards the tail and each bundle carried outside (on top of) a coil of wire to allow the horse more room for movement. Barbed wire should be wrapped in a sack then placed in another sack for hooking to the saddle. Loads must be secure and critically balanced. What looks good at the homestead can appear very different when the horse is climbing out of a creek. One spooked (or spiked) horse can cause havoc among the others.

7.3.

Air dropping can be a saver of time and effort if well done. Too often, the combination of fixed-wing aircraft and unprepared materials, or bad flying conditions, could leave a heart-breaking mess strewn far and wide. Only one who has seen it happen can describe how far standards will disappear into the ground or how far wire will bounce and roll (usually into a gorge). Twenty-five per cent of materials have had to be written off on occasions, with a further 50 per cent damaged. It is little wonder that only a small amount of material is now dropped by fixed-wing aircraft. From the early days of a passenger hurling material out the door of the plane, an advance was made by the use of bomb racks. Recommendations were that the coils of wire be tied together and wedged on to steel drums for bracing, and standards laced together with strong wire and bound with sections of rubber inner tube for resilience. A Beaver aircraft can carry four 250lb bundles beneath the wings plus 750lb beneath the fuselage.

7.4.

A great advance in air dropping of fence materials has been made by the use of the helicopter. Loads of 500lb or 800lb can be carried depending on aircraft. Material should be tied in vertical stacks to prevent oscillation in transit. Thus coils of wire should be laid and bound one on top of the other like plates, and standards suspended by a strong wire from one end. Cost of lighter (500lb load) craft is £50 an hour; heavier (800lb load) craft £62/10/- an hour. (Transport costs to landing pad and return 2/- a mile up to five hours' work.) The operating costs seem particularly high but when facts are brought into perspective, a good comparison can be made with fixed-wing aircraft costs and even those of packhorse transport in these days when good packhorses are rare and good men to handle them more so. In a recent job, four trips of ten minutes each carried one and a half tons of material from 600ft to 3500ft at a flying cost of £40. One and a half tons would be 15 packhorse loads. Full loads can be carried to at least 4500ft. On another site one ton was lifted 2000ft in three loads in 22 minutes. Vertical climbing rate is 300 to 400ft per minute. It must be remembered that:

(i) All material arrives on site undamaged.
(ii) A helicopter requires only a 16ft pad with 40ft clearance for rotors. Thus, materials can usually be lifted from much closer to the fence site than from the airstrip required for conventional craft.
(iii) The helicopter does not land on site but hovers and releases when materials have touched ground. Thus, dropping can be done on a hillside.
(iv) Placing of materials is accurate.
(v) Minimum time is spent moving materials to the site.

At present there is no helicopter service available in Otago-Southland although several runholders grouping together could make it worthwhile for a machine to be brought down from Canterbury.

7.5.

For cartage of materials by truck allow at least 1/- per ton per mile.

8.0 LABOUR

If the job is a sizeable one, consider calling tenders but be careful about the lowest price.

Men should be prepared to camp out on the job in a tent if the weather is at all reasonable.

Make a good job of laying out the materials. Dump at no greater than 12 chain intervals, or less if the strains are to be shorter. Dumps should be at the tops of hills, not at the bottom. If materials are well laid out for the fencer, it can often mean a reasonable reduction in price.

9.0 CONSTRUCTION

For the purpose of discussion it will be assumed that a fence is to be built of T-iron or other posts, plain standards and plain wire with one barb. A method of construction is now described.

Strainers. These should be not further apart than 12 chains.

Strainer posts should be as far into the ground as out (that is if 3ft 6in above ground then 7ft post to be 3ft 6in in ground) and be footed. Double thickness of No. 8 wire can be cob-twitched around a suitable stone, which is dropped into a hole and free ends of the wire brought up and stapled to post or twitched firmly to the stay once post has been rammed. (See Fig 1.) Post should be set back one inch at the top to allow for pulling upright with strain. Ram well, placing a large stone at back of post at bottom and in front of the post as breast plate at top. Fill soil to higher than existing ground level to drain off water. Rain water running down a post and puddling new fill is the main reason (apart from poor ramming) for posts lifting. Driven T-iron posts should also be set back to give and be tied down with a tie-back standard driven full length; or a tie-down standard driven full length at the base of the post.

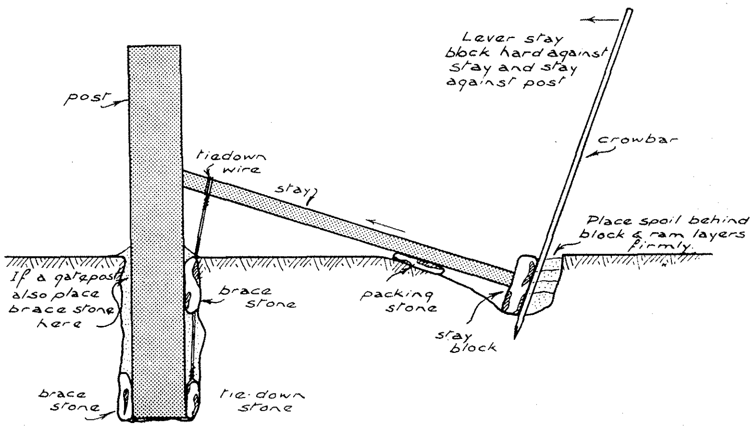

Fig.1 STAYING OF POSTS

The Stay is then fitted. The point of contact of head with post should be just below the middle wire. Use the largest flat-surfaced rock available for a stay block, but beware of thin, brittle schist slabs. Dig a generous hole for the stay and rock (stay should be in line of fence to allow support to come straight to centre of post.) Fit the stay block up to the stay butt and see that there is a rammer-width of hole behind the block. Jam the crowbar in behind the block, wedging it tight against the stay butt, hold there, pour spoil into the gap behind the stay block and ram tight. In this way a stay block can be made firmer than if it were leaning against undisturbed soil. Accurate fitting of the block is also avoided. (See Fig. 1.)

Run the barbed wire between strainers. One man can do this if a stirrup and pin have been made so the barb coil can be trundled. (See Fig. 6.) Otherwise two men and a crowbar axle are needed. Care must be taken—this is a dangerous job on broken ground.

Allow plenty of slack in barb, tie to bases of strainers, strain and line up straight. Drive temporary tie-downs in major hollows under established line. Let off most of strain, pull barb down to these main tie-downs, fix, and restrain.

A straight line over a ridge where each strainer is invisible from the other, can be obtained by the following method. Assume there is some point on the ridge from which both strainers can be seen. Lightly drive a standard at C and another at D as far apart as possible but so that man D can still see A post and man C can still see B post. Then man C moves man D and his loosened standard until standard C, standard D and post B are in line. Lightly drive standard D. Now man D moves man C with *his* loosened standard until standard D, standard C and post A are in line. By alternating moves, in a surprisingly short time, A, B, C and D are in a straight line. (See Fig. 2.)

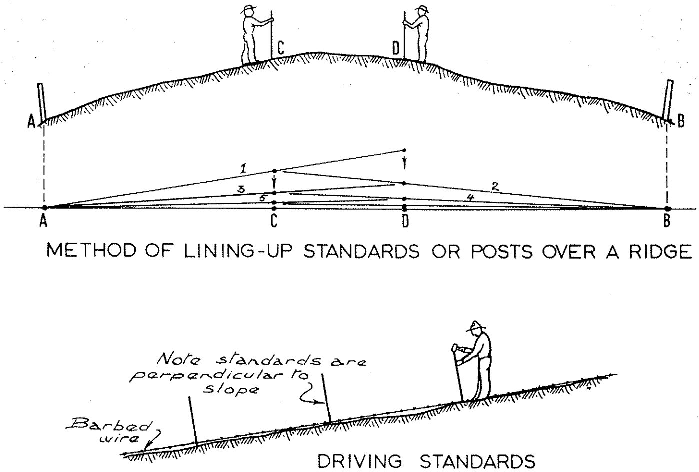

Fig. 2

If there is no point on the ridge from which both posts A and B can be seen, then two sets of two standards must be used on the ridge, one set having post A visible and the other having post B visible and each set being visible to the other. Then by an extension of the method described above, with each man lining his two standards up on his respective post, then being himself lined up by his partner in turn, a straight line can be obtained.

Now that the barb on the established line is strained and fixed reasonably close to the ground, standard driving can begin. Simply hold the standard vertically against wire and drive. If one man is driving from each end make sure that both are on the same side of the guide wire. If T-irons are being driven for posts, this can be done as the standard line proceeds. If posts are to be dug in, the point can be marked against the guide wire where the post is to be put later, and a space left before continuing with standards. The man driving the standards should do so facing the way he has come to establish that the line is indeed straight. (See Fig 2.) When working on a hillside, it is also much easier to proceed working backwards up hill than working down. The driver is then always on the top side of the standard. On a slope in line of fence, standards should be driven nearly at right angles to line of slope or it will be impossible to pull wires. When taking a fence line around a very steep face, for instance through bluffs, it is sometimes advisable to lean the fence outwards so that sheep do not get trapped between fence and face.

On hard rock underground, steel shears or a hacksaw can be used to cut the point off a standard to get correct height above ground. Where dense rock is at the surface, if a suitable crack cannot be found, a hole can be drilled with a rock drill to say 6in or 8in deep and the standard tip cut off to leave 6in or 8in stub. The standard can, if necessary, be wedged tight in the hole by jamming an old railway spike down on either side of the standard or by filling the hole with molten sulphur. Also, if necessary, a brace wire and tie-back can be run out and fixed on either side of the standard to keep it upright.

Once standards are driven, the barbed guide wire can be released and thrown clear to one side. If wooden or concrete posts are being used they are then dug in at marked points left for them, again, almost at right angles to the line of the fence.

Gelignite should be resorted to if post holes have to be dug in rock or hard pan. It is safe to use if reasonable precautions are observed. No licence would be necessary for its use for high-country fencing purposes. I.C.I. (N.Z.) Ltd. can supply a leaflet giving details of its use. Four or five ounces of A.N. 60 gelignite 8in. x $1\frac{1}{8}$in is usually required per hole. A hand tap-and-twist rock gad or star drill can be used for drilling. Alternatively, a motor rock-hammer can usually be hired if there is extensive drilling to be done.

If concrete posts are being used, it is better that wires be carried alongside and stapled to the post rather than pulled through holes in the post; the latter practice strips appreciable amounts of galvanising from the wire besides making post replacement and wire pulling difficult. If wooden posts are to be bored, then a $\frac{1}{2}$in bit should be used and great care taken to see that holes are in the line of the fence and will not jam wires.

Drop plates over standards or T-irons wherever necessary.

The bottom wire can now be run. Tie off to each strainer with a double ended loop running on each side of the stay. Fix on the wire strainer at the centre of the wire line and strain lightly; do not overstrain or standards in hollows will be jerked from the ground.

Move along the line driving or lifting heads of standards into a line wherever possible and reducing number of tie-downs to a minimum. Cut away tussocks or soil too close to the bottom wire, or loose rocks which will wedge it.

Start driving tie-down standards and tie-back standards—if necessary at corners or for strength on a sideling.

Tie-downs. (See Fig. 3.) If the strainer posts are sound, a fence stands or falls on the quality of its tie-downs. Money saved here can be money wasted. Thought must be given to the extra strain placed on tie-downs when fence wires contract with freezing, when a rock hits the fence, or when there is snow or stock pressure. It must also be remembered that dry ground holding a tie-down standard tight at construction may become saturated with rain or snow in the winter and allow that same tie-down to lift.

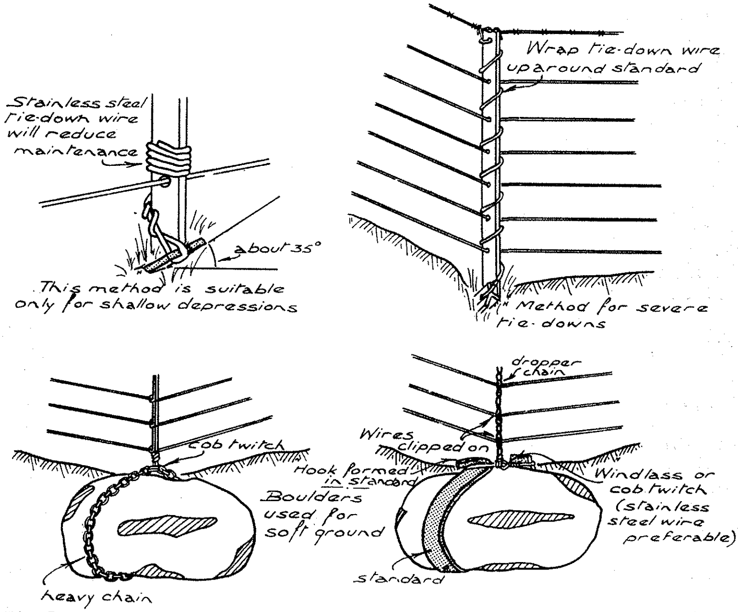

Fig.3 TIE - DOWNS

It is recommended that in all except hard rock or at the smallest lifts full length standard tie-downs be used. For even steeper lifts a more rigid Y-section or even T-section light post should be used. Where ground is too swampy to hold standard tie-downs, a satisfactory job can be made by wrapping a strong chain or a standard around a dug-in rock, and cob-twitching the two ends of standard or chain together to tighten. The point of a standard can be bent to form a tight loop with the slot of a standard hammer. Two thicknesses of No. 9 wire but not of No. 8, will pass through a normal standard hole. If stainless-steel wire is not used for this cob-twitch tie, the tie must be above ground.

From this dug-in rock, double, vertical wire loops are raised to take the running wires. It is most important that whenever this kind of loop (be it double or single) is used, it be correctly made so that when the running wire is strained, it is not jammed as it moves through a loop. (See Fig. 4.) Free running is achieved when:

(i) a sufficient number of wires are used on the vertical so that the loops do not tighten unduly and seize on the wire under strain and

(ii) when (when making the loop), the free end is taken round and brought up alongside the riser wire on the *same* side of the riser as the tying point of the particular strain will be. This is a seemingly small point but very important. Heavy-gauge chain with clips is an excellent substitute.

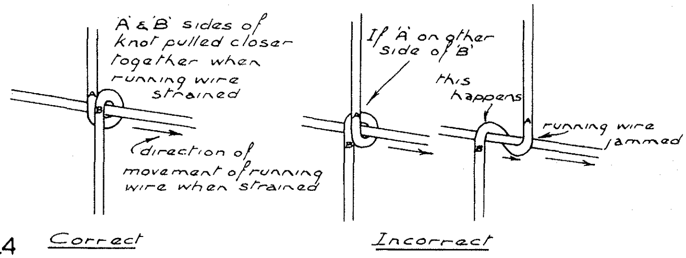

Fig.4

VERTICAL WIRE LOOPS FOR TIE-DOWNS

The tie-down standard should be driven well home and tied to the fence standard with stainless-steel wire (3d per foot). If galvanised wire be used instead, the joint must be left exposed with a reduction in tie-down strength. If the lift is only a slight one, the free end of the tie-down wire can be wrapped around the fence standard above the bottom wire. The criterion is whether or not the tie-down is likely to jam the running of the bottom wire. Every effort must be made to see that it does not. If the lift is severe, the tie-down wire should be wrapped around the fence standard (one wrap between each running wire) right up to the top and tied off through the barb hole. (See Fig. 3.) The wrapping gives rigidity to the standard and all running wires are free. Standard plates are now wedged in place or rocks placed under the bottom wire against standards wherever sinking of the standard is possible.

Running wires. With tie-down in place, the rest of the wires can now be run downhill, or to each end from the straining point, and tied off to the strainers at each end. Wherever a knot is formed in which the free end of the wire is wound back along the running wire (loop knot, strainer knot), the free end should be wound with its loops spread out along the wire. (See Fig. 5.) That is, with the loops not tight against each other as happens when a key is used for the job. When the loops are tight, if the knot is to be unwound for maintenance purposes and the wire has aged, the loops break off in a body and removal is extremely difficult. This applies also to tieing on the barb. A 'loose' wrap of loops can be done with the hand and if well done will not unwind under strain, but can be readily undone later without breaking. The standard locking knot should be used at the strainer and its direction around the post altered with every consecutive wire so that there is no tendency to twist the post with all running wires coming off the one side. (See Fig. 6.) The knot should be closed up as tightly to the post as possible. Knots in the line of the fence should be of the simple figure-eight pattern, care being taken to see that there is enough room for movement left so that the knot does not come up against a standard when strained.

It is of course common sense when putting a new coil of wire on the jenny to see that you have the free running end before starting to pull.

It is not advisable to use pointed staples to fix running wires to the wooden posts. Loosening almost always occurs, and fence strength is low. If wires are not to be run through in-line holes, then right-angle holes can be drilled through the post opposite each wire and

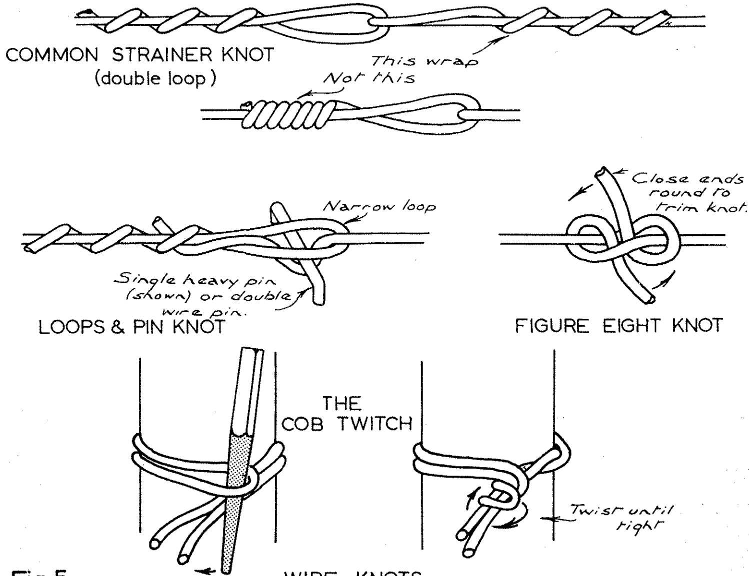

Fig.5 WIRE KNOTS

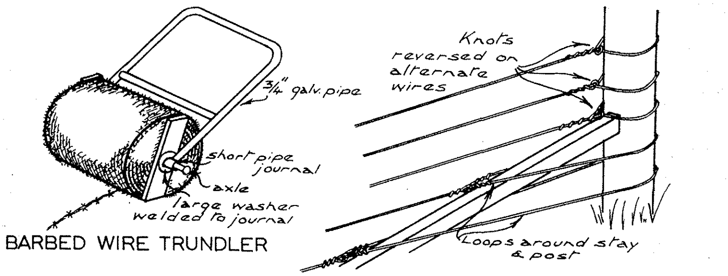

Fig.6 KNOTTING OF WIRES TO STRAINER POST

a long wire staple used, much as is done with a concrete post. This is recommended.

Repair is simplified where, when fences have been damaged and posts moved by snow or slip, the wires can be quickly removed.

With treated wooden posts, it is desirable to bore wire holes beforehand, plug the holes, lay the posts horizontally and fill the holes with liquid preservative. Some, but much less, protection is given by squirting preservative into the holes with an oil can. This can, however, be done when the posts are erected.

Straining wires. Wires can now be strained from the bottom up. Strain at the centre of a fence-length strain. It is recommended that permanent cog-type strainers be used. A chain strainer is placed across the gap, the slack taken up from the wire and the cog strainer then fitted with only two or three loops on its drum allowing for three or four feet of wire to be taken up during fence maintenance. Make sure there is room for the cog to travel between standards on either side. Always start straining from the bottom wire first.

If, when using the chain strainer, the full length of chain is taken up before the wire is tight, the chain can be easily released for a new grip by kinking one of the free ends of wire opposite the grip holding the other wire, placing the kink through the opening of the grip and locking in place with the handle of a pair of pliers. Strain on the chain can now be released although the wires remain tight. Replace the chain at a new grip point, fit chain to claws and tighten. (See Fig. 7.)

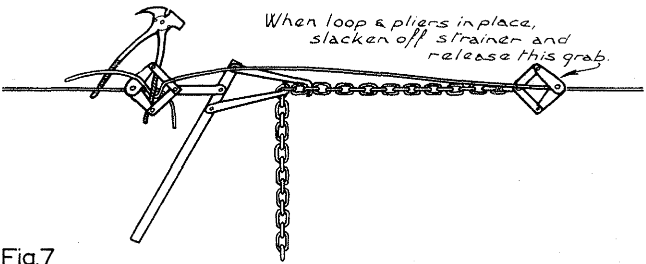

Fig.7 METHOD OF LOCKING WIRE TO RELEASE CHAIN GRAB FOR FRESH GRIP

If no cog strainer is used, at least three chain strainers should be used, holding three wires tight at once so that when the top wire is reached, there is less chance of the bottom wire now being slack. The double loop-knot can be used or alternatively the narrow, single loop, kink, and pin—this latter method allowing easy adjustment during maintenance.

Check the fence line, pinch knots tight, and see that wires are of even tension right through before finally tying off. Length of strain and quality of tie-downs are major factors here.

The Barb can now be retied to strainer posts and a fresh, light strain taken. Leave the chain strainer in place. Straining barb correctly is a matter of judgment and experience. Clip the barb wire down to all principal hollows then lift to tops of rises (it is much easier to lift the barb to a top than to pull it down to a hollow, so this sequence is advised). Work at this job from each end towards the chain strainer, adjusting this as necessary. Barb can now be tied on permanently. If No. 8 wire is used, only one loop over the barb on each side of the standard is needed. More (except on severe hollows) are unnecessary for strength and only complicate removal and tightening during maintenance.

It is not usually necessary to put a cog strainer on the barbed wire, but if this is to be done, knot in a piece of plain wire leaving the free end of the barb loose for later wrapping along the plain wire and over the cog.

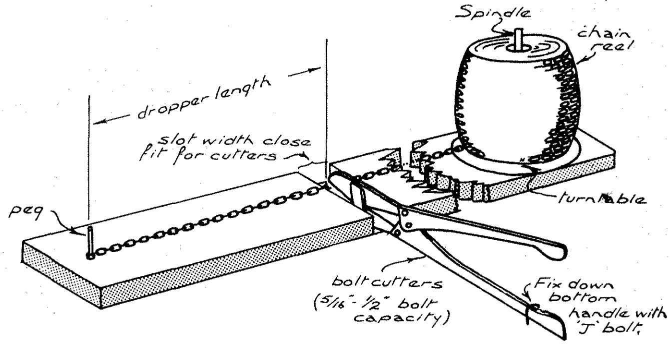

Fig. 8

JIG FOR CUTTING CHAIN DROPPERS

Droppers are now fitted, if used.

Wooden droppers should not touch the ground and should definitely not be expected to act as posts on rises, no matter how small.

Spiral wire droppers can be fitted more easily if before use they are kept protected from the weather and consequent roughening of the galvanised surface.

Chain droppers can be readily cut to size from the roll by a method shown in Fig. 8.

Tidying up. The strain is now almost completed. Move along the line filling in hollows under the bottom wire with turf or rocks, trimming protruding ends of all knots and disposing of trimmings where they will not injure stock. This is particularly important at gateways.

Many variations in the above methods can be put forward but those described have been found to be satisfactory.

10.0 BREAKING DOWN AN OLD FENCE

If wires are to be saved they must be pulled out and coiled. Barb is coiled tightly by weaving the coil from side to side as the barb is run on to it from the ground. Thus, each layer interlocks with the one below and stays in place.

If wires are not to be saved, a useful method of disposal is to cut each wire at each standard (with the bolt cutters), then gather each set of five or six wires, carry it along to the next set, pick up and carry on, then wrap to bind when a suitable size of 'sausage' has been reached. Those 'sausages' so formed, are invaluable for blocking holes under a new fence. Do not leave loose wire lying around.

Old standards are, of course, lifted with a standard lifter, or crowbar and tie.

Brittle standards can be given a new lease of life by stacking loosely on a large heap of gorse or firewood which is lit and the standards heated until at least cherry red. When allowed to cool slowly the metal becomes annealed and malleable again.

11.0 NETTING FENCES

11.1 Rabbit netting.

Only three backing wires are usually used when rabbit netting is to be fastened to a fence. Netting can, of course, be tied on with

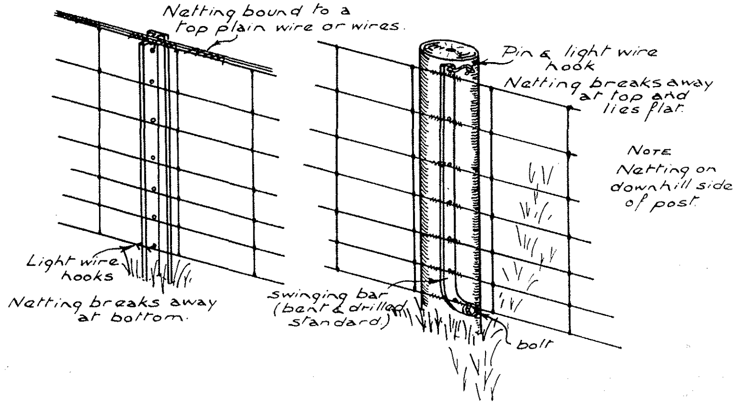

Fig.9 TWO TYPES OF BREAK-AWAY SNOW FENCE

lacing wire but ring-fastener clips applied from a special tool carrying a clip magazine, can be purchased. They are cheap and very speedily applied, but since their strength depends on the rigidity of the overlapping clip points, care should be taken to choose the strongest fastener available. Ties should be at intervals of four feet but there should be a tie within one foot of every post or standard. For rabbit proofing, the bottom of the netting should be buried six inches in the ground. On workable country the trench can be cut with a single-furrow plough. Rabbit proof gates swing close to a board or concrete sill buried and with its top edge at ground level for the full width of the gate. For a neat job, rabbit netting should be cut, overlapped and rejoined at each rise or hollow to prevent kinking.

11.2 Boundary netting.

No separate backing wires are used with this except as described in 3.52 where the netting can be suspended from a top wire to swing free under snow pressure.

Strain should be applied in the middle of the strain length. The netting can be conveniently gripped with clamp boards or, much less satisfactorily, tied off to an upended steel post. (See Figs. 10 and 11.)

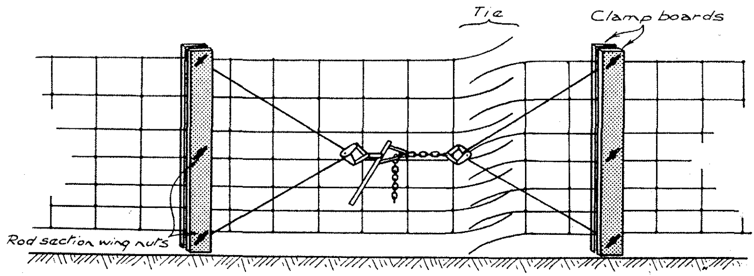

Fig.10 STRAINING NETTING

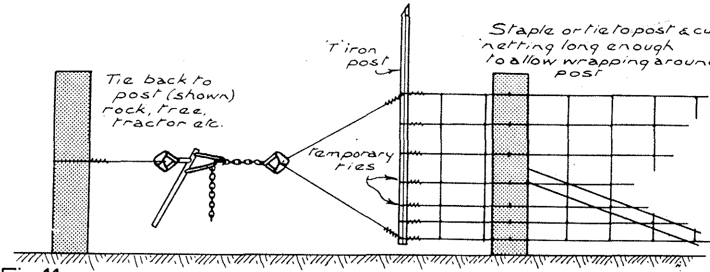

Fig.11

ANOTHER METHOD OF STRAINING NETTING

A light strain is taken at first and the netting then fastened down in gullies and lifted to ridges, working from each end towards the central straining point. Drawing the netting down to a tie-down in a hollow with a wire strainer is not recommended. In severe hollows, the vertical wire 'stays' of the netting should not be relied upon to take the upward strain of the netting unaided. Wire loops or chain droppers should be used.

12.0 FLOOD GATES

(See Fig. 12.) A flood gate must be entirely independent of the fence of which it is a part. Fence wires should be tied off to a strainer well back from the stream bank or carried right across the gully. Separate anchor posts or 'dead men' should be sunk for the floodgate cable. A cable can be either wire rope or several strands of fencing wire. It is easiest to make each loop separate and twitch all together to form a cable. If the cable is a light one and the length

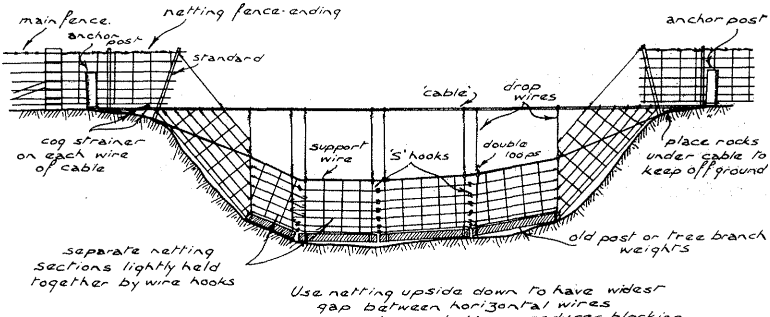

Fig. 12

A METHOD OF FLOOD-GATE CONSTRUCTION

considerable, a cog strainer can be fitted to individual wires for later tightening. Drop wires can be hung from the cable to old posts tied to their lower ends. Rocks can also be used if netting baskets are made to hold them. The drop wires should have double loop-knots at about the height of the netting or wooden battens to be used for the gate itself. A wire can then be run through these loops to which the top ends of battens or top wire of boundary-fence netting can be secured. Battens should have another wire run through them one-third of the way down their length. Netting should be fixed only at its top. The bottom can be clipped to the weights if necessary with light wire 'S'-hooks which can open out and allow the netting to swing in flood waters.

13.0 STOCK GATES

Tube-frame gates are worth more than their cost at much used gateways.

Elsewhere good wire gates can be constructed. Again, boundary-fence netting is a very suitable material, especially if pipe ends are used for permanence and double loop knots made in each wire to allow ample flexing of the gate and thereby reduce wire breakage. Cut standards make suitable gate droppers.

14.0 MAINTAINING THE FENCE

Experienced high-country men generally discount the theory that fence wires should be slackened off during the winter. A strong fence, with the wires kept tight and each component supporting the other has a much greater ability to resist snow damage than the slack fence. Posts and tie-downs should be made strong enough to resist the extra strain of wires contracting in the cold which slackening off is said to avoid.

Fences should be checked and repairs, where necessary, carried out annually. Regular maintenance will frequently reduce the need for periodic expensive rebuilding and at the same time keep the fence in stock-proof condition.