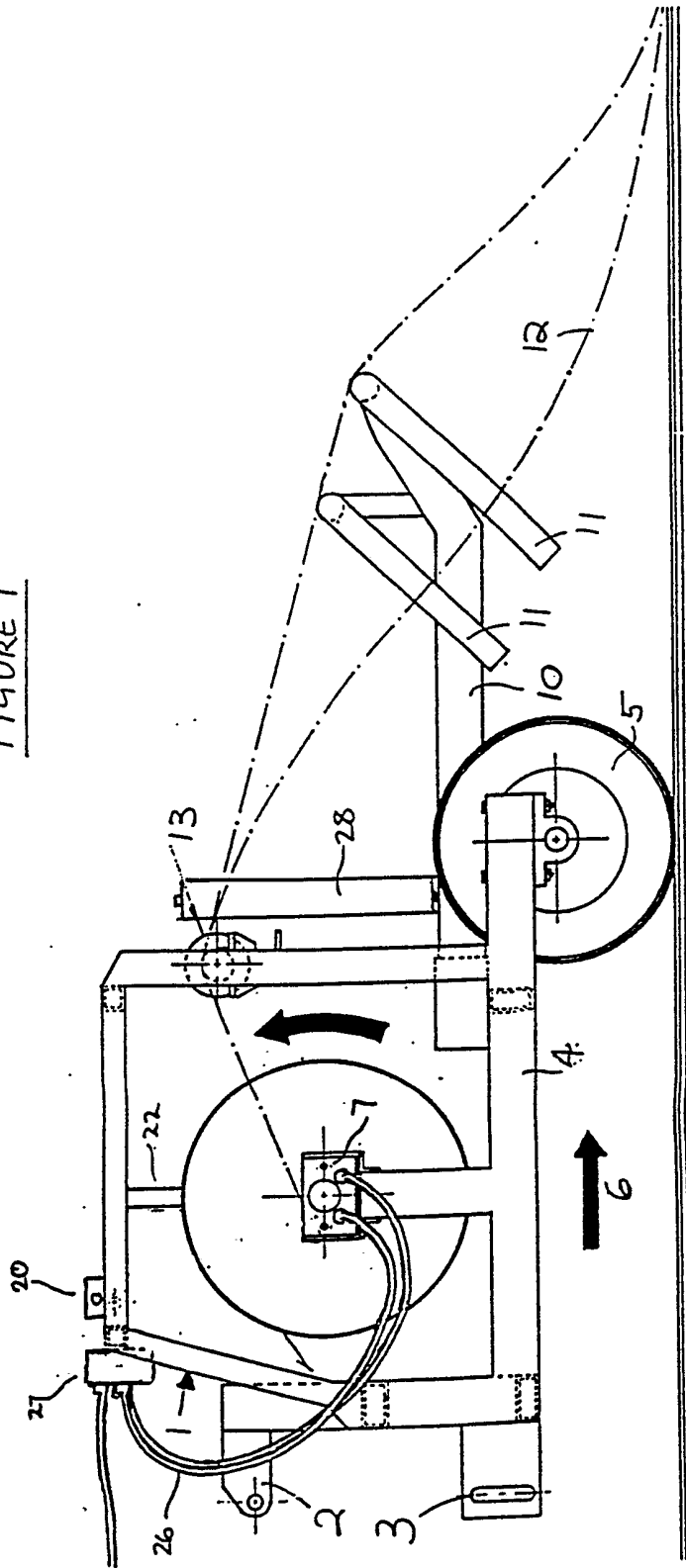


FIGURE 1



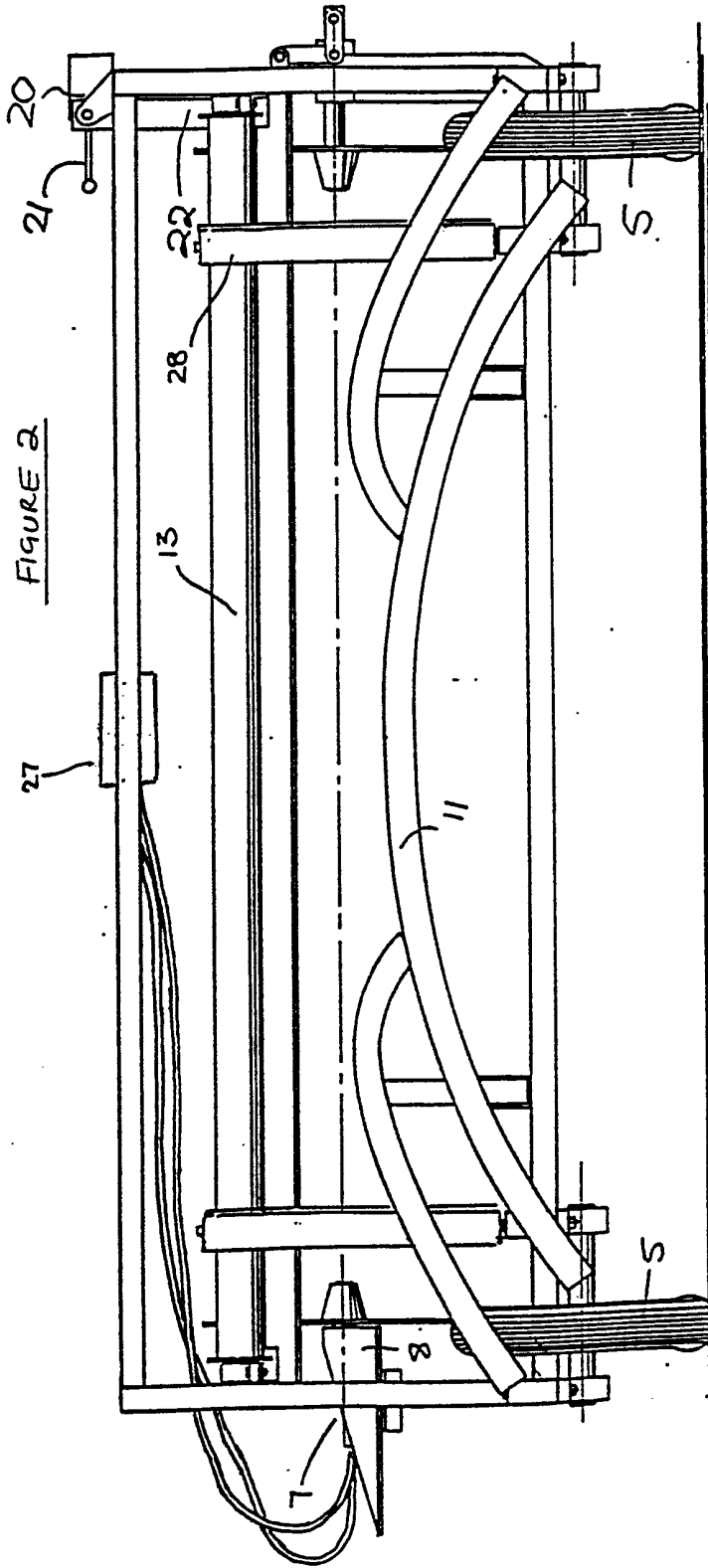


FIGURE 2

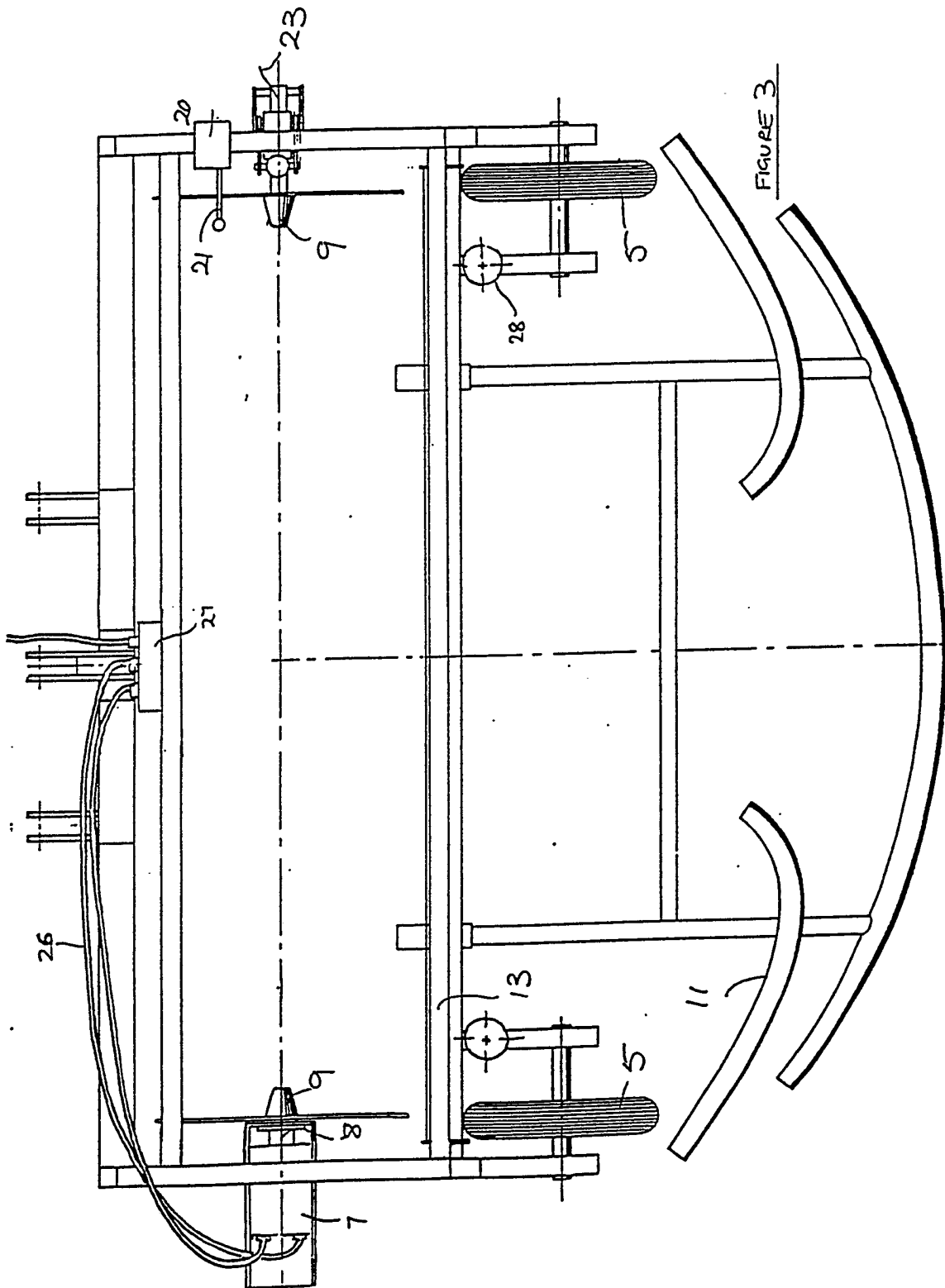
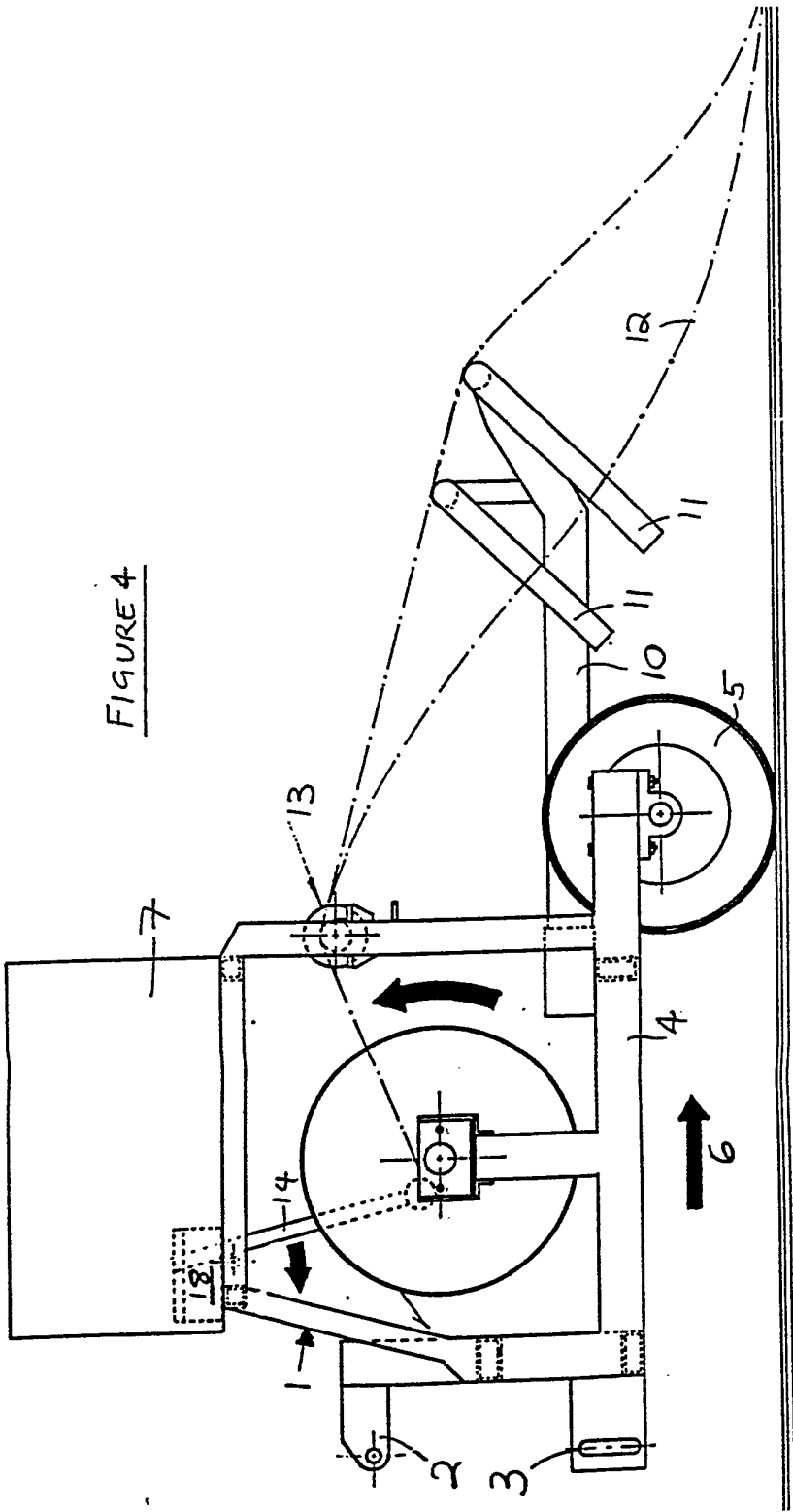


FIGURE 3

FIGURE 4



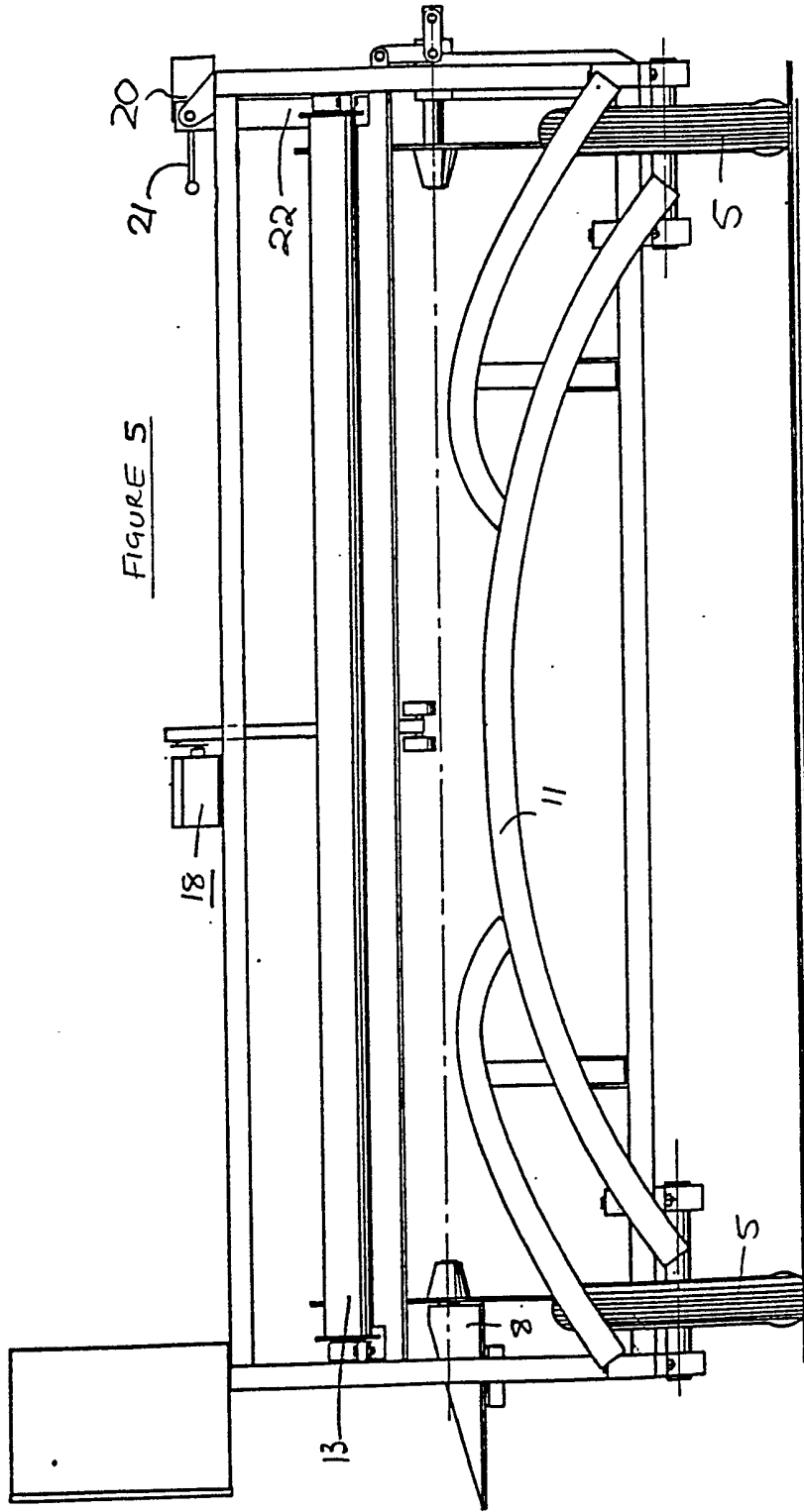


FIGURE 5

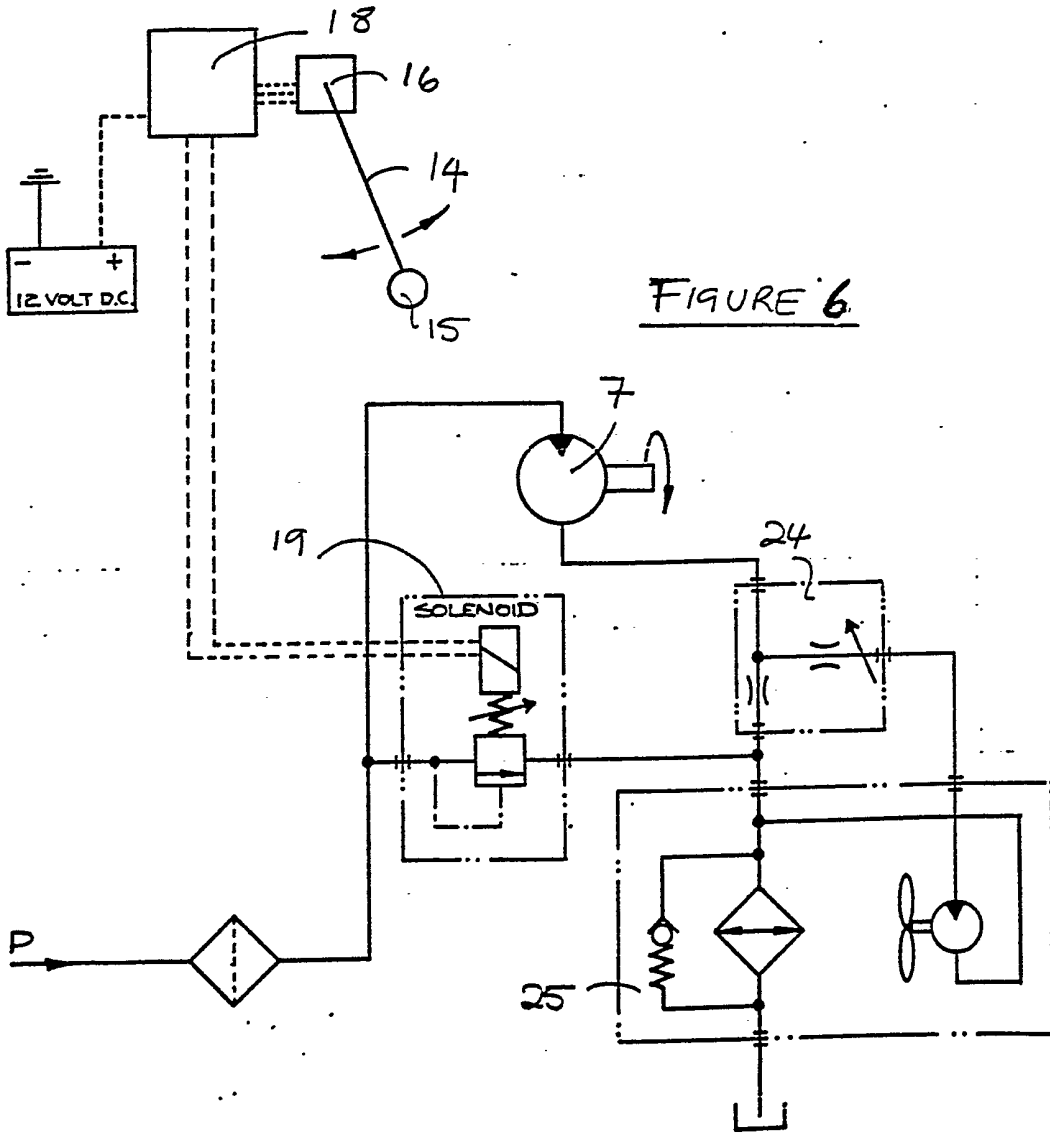


FIGURE 6

REMOVAL OF POLYTHENE SHEETING FROM A FIELDField of the Invention

This invention relates to an apparatus for removing polythene^(RTM) sheeting from a field.

5 A technique which has been developed by modern farmers to encourage early season growth is the idea of putting long lengths of polythene sheeting on a field. These sheets are usually put down on the field in late spring, early summer. The polythene sheets are supplied
10 wound on a tubular metal core and are typically two metres wide and up to a thousand metres long. They are extremely expensive because so many of them are used when trying to cover modern field acreages. The polythene sheeting is anchored to the ground by
15 ploughing over the soil along each opposite longitudinal edge of the sheet. A problem arises when the sheeting comes to be removed from the field, since it is virtually impossible to drag the sheets manually out of the ground. It is also a time consuming and extremely
20 dirty operation because the underside of the sheet brings away a large amount of dirty and heavy earth with it which clings to the sheeting. Hitherto, this polythene has either been dragged up manually and then simply stored in untidy waste piles since it cannot
25 be burned on an open site and it cannot be re-used unless it has been reeled.

Review of the Prior Art

One machine has been developed for removing the sheeting from the field which is essentially a modified form of a wire baling machine which drags the polythene off the ground into a re-usable heap. This modified wire baling machine does take away the need to draw the polythene sheeting manually from the ground but the polythene is not re-usable and it has a major drawback in that the machine can only cope with a given length of polythene at a time and so must frequently be cleared by breaking off the length of polythene.

Summary of the Invention

According to this invention there is provided apparatus for removing polythene sheeting from a field, comprising a mobile collector unit which travels across the field to collect the polythene, and which includes a drive motor, which drives a rotator unit for receiving a shaft onto which the polythene is to be wound, and scraper unit over which the polythene must pass in order to reach the shaft which removes excess soil and debris from the sheeting, so that, in use polythene is pulled off the field by the force applied by the motor driven shaft, passes over the scraper unit to be cleaned and then is wound onto the rotating shaft.

It is preferred that the shafts to be received by the rotator unit are the original spine tubes on which the polythene was originally supplied since this provides an economical unit. Thus this apparatus provides an automatic system for reeling back the polythene which allows the polythene sheeting to be re-used. After several re-uses the original manufacturers will then buy back the polythene for re-cycling since the polythene is in an easily handled form, in reels.

Preferably the rotator unit comprises a replaceable spindle having key means thereon for engaging slot means on the shaft.

Preferably the scraper unit comprises one or more bowed tubes projecting forwardly, in use, of the collector unit.

5 Preferably these one or more bowed tubes are bowed backwardly and downwardly in use. It is also preferred that the unit includes a hand operated lever which can be operated to release the shaft from the unit when the roll diameter has reached a maximum so that a new shaft may be put in its place to continue the reeling
10 of the polythene.

It may be advantageous in some circumstances for the apparatus to include means to vary the speed at which the drive motor drives the rotator unit, which means is coupled to a sensor which
15 senses the diameter of the reel of polythene, enabling the reeling speed to be automatically adjusted as the reel grows bigger. This may be important when tension on the polythene must be kept constant to avoid slack or conversely tearing of the polythene.

Where a reel size-dependent speed regulator is provided, it is preferred that the sensor is an arm spring-loaded onto the shaft.
20 As the reel diameter increases the sensor arm swings back in an arc.

Although the mobile collector unit may be a motorised self-contained unit, the unit is preferably an attachment for a tractor.

25 Preferably the collector unit is arranged to be attached to the front of the tractor and be pushed ahead of the tractor to collect the polythene.

Brief Description of the Drawings

Apparatus in accordance with the invention will now be described by way of example only with reference to the accompanying drawings, wherein:

5 Figure 1 is a side elevation of a preferred embodiment of the apparatus;

Figure 2 is a front elevation of the apparatus of figure 1;

Figure 3 is a plan view of the apparatus of figure 1;

10 Figure 4 is a side elevation of an alternative embodiment of the apparatus;

Figure 5 is a front elevation of the apparatus of figure 4;

and figure 6 is a hydraulic circuit diagram.

Description of the Preferred Embodiment

15 The apparatus 1 described is designed for attachment to a tractor via mountings 2 and 3 to the floating 3-point linkage on the front of a tractor. The apparatus comprises a mobile collector unit 4 which travels across a field to pick up polythene. The collector unit has two wheels 5 and is pushed in the direction 6 by a tractor.

20 The collector unit 4 includes a hydraulic drive motor 7 powered by pressurised fluid from the hydraulic system of the tractor. The fluid is delivered to the motor 7 via delivery lines 26 extending from a hydraulic distributor unit 27 fitted to the rear in use of the collector unit 4. The distributor unit 27 incorporates a filter
25 and means for regulating the speed of the drive motor 7.

The drive motor 7 drives a rotator unit 8 which comprises two axially opposed spindles 9 which receive a spine tube (not shown) on which the polythene sheeting is originally supplied. The collector unit 4 also includes a scraper unit 10 comprising 3 bow tubes 11 which project forwardly of the collector unit 4 and are bowed downwardly and backwardly toward their ends. The rounded and angled design of the scraper unit 4 assists in minimising sheer stress applied to the polythene sheeting while pressing sufficiently firmly against the polythene to dislodge clods of soil as the polythene is drawn over the scraper unit 10. The path of the polythene is shown by a broken dotted line 12 on figure 1.

Before starting movement of the collector unit the end of the polythene 12 is wound onto the spine tube for a few turns to secure it into position. As the collector unit 4 moves forward the drive motor 7 operates the rotator unit 8 to rotate the spine tube to pull the polythene 12. The polythene is shaken clean of a substantial proportion of any loosely clinging soil for a distance of about 2 - 3 metres and then passes over bow tubes 11 to have any further soil clods scraped from it. The polythene 12 then passes between a pair of vertically extending rollers 28, positioned near the opposing sides of the collector unit 4, and then passes over an idler roller 13 before being wound onto the reel. In absence of the vertical rollers 28 the polythene is liable to drift laterally and become caught in the spindles 9.

A release mechanism is situated at the end of the collector unit 4 remote from the drive motor 7. The mechanism comprises a valve 20 which is operated by a hand operated lever 21 when the reel diameter has reached a maximum, which diverts oil into hydraulic cylinder 22 which pushes downwards and operates linkage 23 to push the drive lug 9 outwards to allow the full roll to be dropped out through the bottom of the machine.

In an alternative embodiment of the invention, illustrated in figures 4, 5 and 6, the collector unit 4 is provided with a reel size-dependent speed regulator. A sensor arm 14 is spring biased towards the spine tube in line with the spindles 9 and has rollers 15 at its end to allow its end to roll with respect to the tube. At the end 16 of the sensor arm 14 at the other side of the pivot 17 the sensor arm 14 is coupled to a potentiometer in electronic control box 18. This changes DC voltage supply to a proportional pressure relief valve 19 in the drive motor 7 which enables the output torque from the spindle drive motor to be increased as reel diameter increases. This slows revolution of the spindle and reduces the risk of tearing of the polythene. However, it has been found, in practise, that the reel size-dependent speed regulator dissipates the momentum of the reel such as to effectively reduce the maximum weight of polythene reel that can be turned by the motor 7, ^{and} to reduce the efficiency of the re-reeling operation. Thus, this regulator is ^{un}suitable for many circumstances.

A flow control valve 24 is fitted to the output oil flow from the motor 7 providing oil to a cooling fan matrix unit 25 so as to dissipate the excess heat generated by the continual flow of oil across the pressure relief valve 19.

Although the present invention has been described with respect to two embodiments above, numerous other embodiments are possible. It is to be understood that the term polythene, as used herein, is intended to encompass any analagous polymeric materials which are used in sheet form as a field covering for protecting and stimulating crop growth.

CLAIMS:

(RTM)

1. Apparatus for removing polythene_λ sheeting from a field, comprising a mobile collector unit which travels across the field to collect the polythene, and which includes a drive motor, which
5 drives a rotator unit for receiving a shaft onto which the polythene is to be wound, and a scraper unit over which the polythene must pass in order to reach the shaft which removes excess soil and debris from the sheeting, so that, in use, polythene is pulled off the field by a force applied by the motor
10 driven shaft, passes over the scraper unit to be cleaned and then is wound onto the rotating shaft.

2. Apparatus for removing polythene sheeting from a field according to Claim 1, further characterised in that the rotator unit comprises at least one replaceable spindle having key means
15 thereon for engaging slot means on the shaft.

3. Apparatus for removing polythene sheeting from a field according to Claim 1 or Claim 2 and further characterised in that the scraper unit comprises one or more bowed tubes projecting forwardly, in use, of the collector unit.

- 20 4. Apparatus for removing polythene sheeting from a field according to Claim 3 and further characterised in that the one or more bowed tubes are bowed backwardly and downwardly, in use.

- 25 5. Apparatus for removing polythene sheeting from a field according to any of Claims 1 to 4, further characterised in that the apparatus further comprises a horizontally extending idler roller over which the polythene must pass in order to reach the shaft.

- 30 6. Apparatus for removing polythene sheeting from a field according to any of Claims 1 to 5 further characterised in that the apparatus further comprises a pair of vertically extending

rollers between which the polythene sheeting must pass in order to reach the shaft.

5 7. Apparatus for removing polythene from a field according to any of the preceding Claims and further characterised by further comprising a hand operated lever which can be operated to release the shaft from the unit when the roll diameter has reached a suitable size.

10 8. Apparatus for removing polythene from a field according to any preceding Claim and further characterised by comprising means to vary the speed at which the drive motor drives the rotator unit, which is coupled to a sensor which senses the diameter of the reel of polythene.

15 9. Apparatus for removing polythene sheeting from a field according to any preceding Claim and further characterised in that the mobile collector unit is adapted to be attached to the front of a tractor.