Oct. 23, 1956 W. E. W. NICOLLS 2,767,808

STARTING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 8, 1953 2 Sheets-Sheet 1

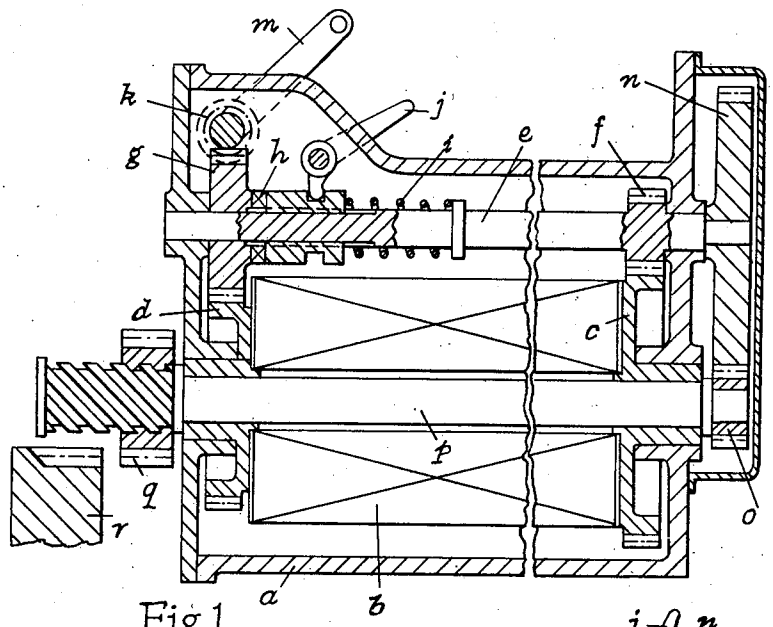


Fig.1

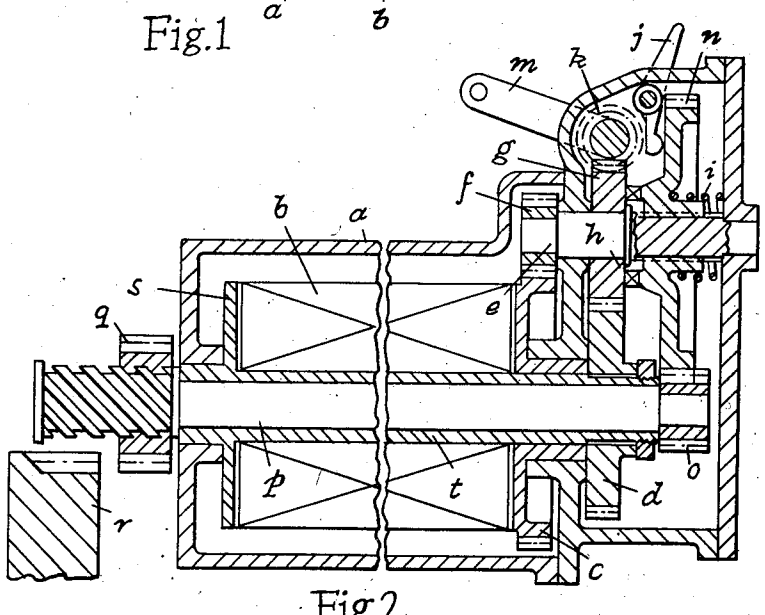


Fig.2

Inventor
W. E. W. Nicolls
By Glascock Downing Seibold
Attys

Oct. 23, 1956 W. E. W. NICOLLS 2,767,808

STARTING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 8, 1953 2 Sheets-Sheet 2

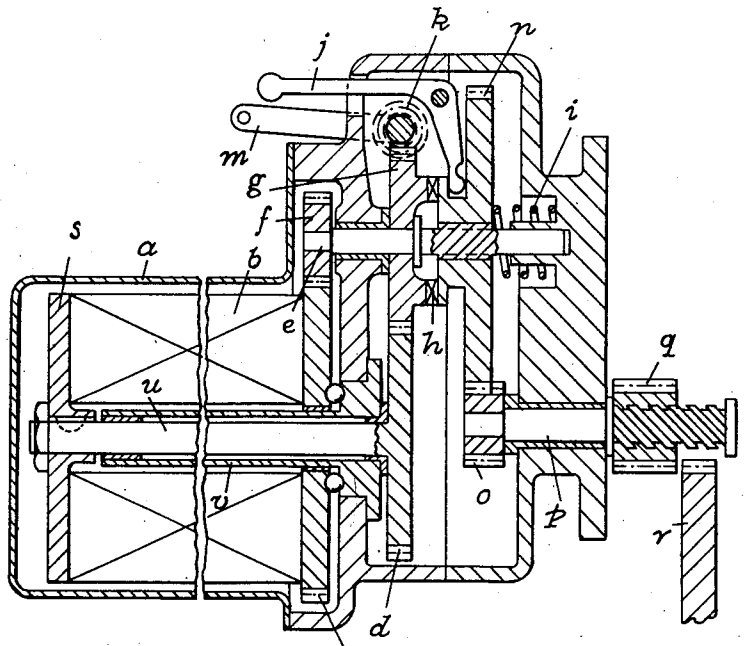


Fig.3

Inventor
W. E. W. Nicolls
By Glascock Downing Seebold
Attys.

United States Patent Office

2,767,808

Patented Oct. 23, 1956

2,767,808

STARTING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Wilfrid Edward Walter Nicolls, Pinner, England, assignor to C. A. V. Limited, London, England

Application December 8, 1953, Serial No. 396,985

1 Claim. (Cl. 185—39)

This invention has for its object to provide in a convenient form a robust starting mechanism for an internal combustion engine.

A starting mechanism in accordance with the invention comprises the combination of an elastic energy-storing component, an arrangement of manually-operable gearing for imparting relative torsional movements to the ends of the energy-storing component, a pinion for detachable engagement with a wheel on the engine and operable by the said component, and a controlling clutch associated with the said gearing.

In the accompanying drawings:

Figures 1, 2 and 3 are sectional side elevations respectively illustrating three typical embodiments of the invention.

Referring to Figure 1 there is contained within a convenient housing *a* an energy-storing component *b* of cylindrical form made from rubber or rubber-like material, this component having an axial bore. To one end of the said component is bonded a gear wheel *c*, and to the other end is bonded another gear wheel *d* of smaller diameter. The two wheels are interconnected by a lay-shaft *e* carrying pinions *f*, *g* of different diameters engaging the said wheels, the pinion *g* being connectible to the lay shaft *e* by a clutch *h*. The clutch is loaded by a spring *i* and is operable by a hand lever *j*. The pinion *g* is rotatable by a worm *k* operable by a hand lever *m*. Also to the lay shaft is secured a gear wheel *n* which engages a relatively small pinion *o* on an output shaft *p* which extends through the bore of the energy-storing component, and carries at one end a pinion *q* which by axial movement relatively to the shaft can be engaged with a wheel *r* on the engine. This pinion may have (as shown) a helical connection with the shaft such that by rotation of the output shaft the pinion can be moved automatically into engagement with the engine wheel, and can be disengaged by rotation of the said wheel.

The arrangement is such that with the clutch held in action by the spring, rotation of the worm wheel *k* imparts relative angular movements to the ends of the energy-storing component through the wheels *c*, *d*, and

thereby produces a torsional strain in the said component. At the same time the pinion *q* is caused to engage the engine wheel and impart slow preparatory rotation of the engine prior to the release of the clutch. On release of the clutch, the stored energy is transmitted to the output shaft for starting the engine.

In the example shown in Figure 2, which is essentially similar to that above described, the whole of the gearing is arranged at one end of the energy-storing component and the various components are identified by the same reference letters as those applied to Figure 1. The arrangement differs in that a plate *s* bonded to the remote end of the said component is conneced to the wheel *d* of the gearing through a tubular bush *t* extending through the bore of the said component. In this example the clutch is situated between the worm-driven wheel *g* and the wheel *n* which engages the associated pinion on the output shaft.

In the example shown in Figure 3, which is essentially similar to that shown in Figure 2, the output shaft *p* is arranged adjacent to one end of a shaft *u* which interconnects the wheel *d* and a plate *s* bonded to the remote end of the energy-storing component, and which passes through a fixed tubular bearing member *v* extending along the bore of the said component.

Mechanisms as above described are especially suitable for starting the engines of agricultural tractors, or other analogous uses for which the conventional electric starting motor is for various reasons inconvenient. The invention is not, however, restricted to an energy-storing component made from rubber or the like, as any other elastic component may be used, such as a metal spring or springs.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

An engine-starting mechanism comprising in combination a rotatable shaft, an axially and rotationally movable pinion mounted on and having a helical connection with the shaft, a torsionally strainable elastic member, manually-operable gearing connected to one end of the elastic member, and a clutch and additional gearing for connecting the manually-operable gearing to the other end of the elastic member and the shaft so that, when the clutch is in action, actuation of the manually-operable gearing not only causes relative angular movements to be imparted to the ends of the elastic member for torisonally straining the latter, but also causes rotation of the shaft for effecting engagement of the pinion with the engine and slowly rotating the latter prior to release of the clutch when the energy stored in the torsionally strained member is transmitted to the shaft for starting the engine.

References Cited in the file of this patent

FOREIGN PATENTS

995,405 France ---------- Aug. 22, 1951