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SLEEVE EXTRACTOR
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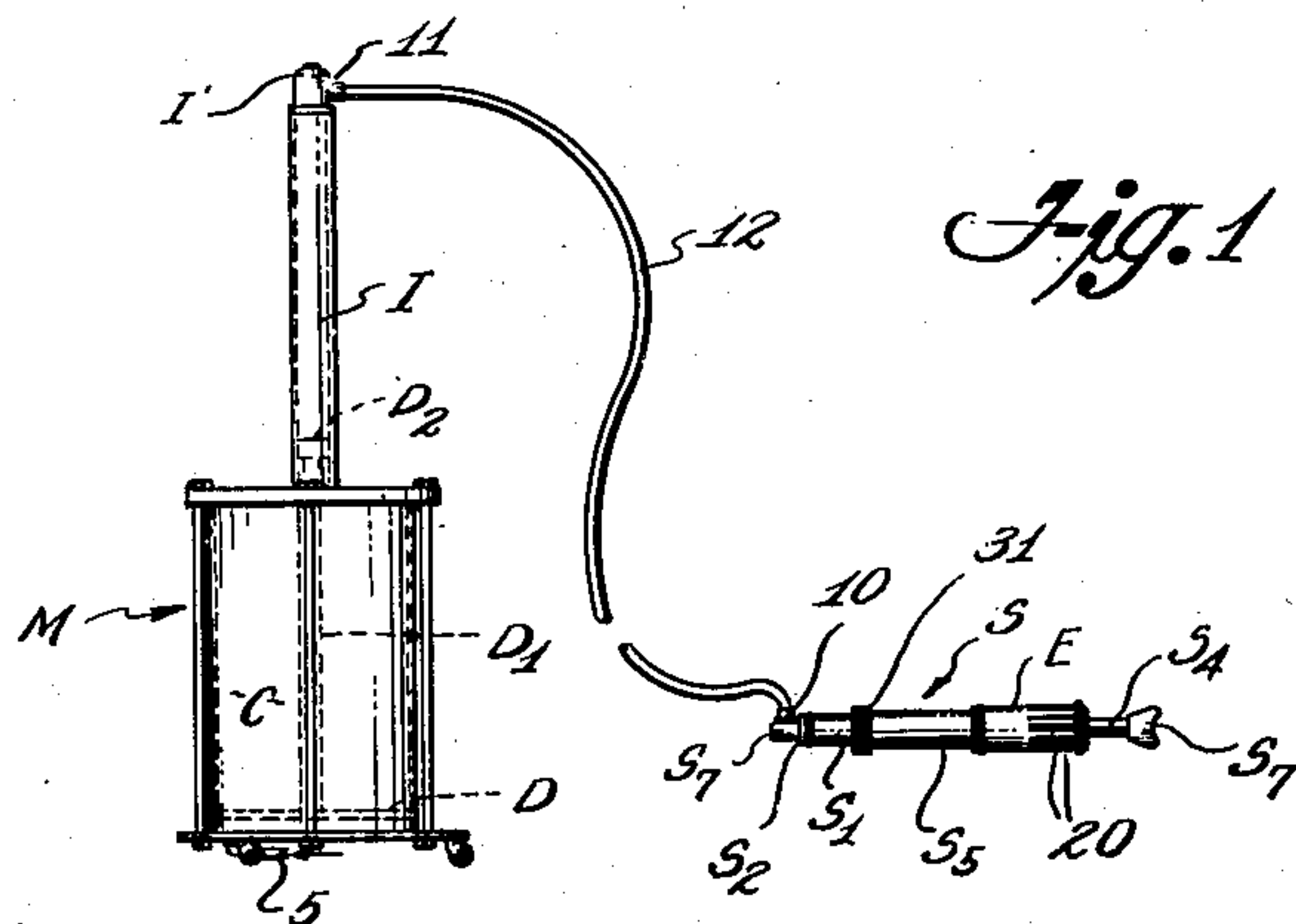


Fig. 1

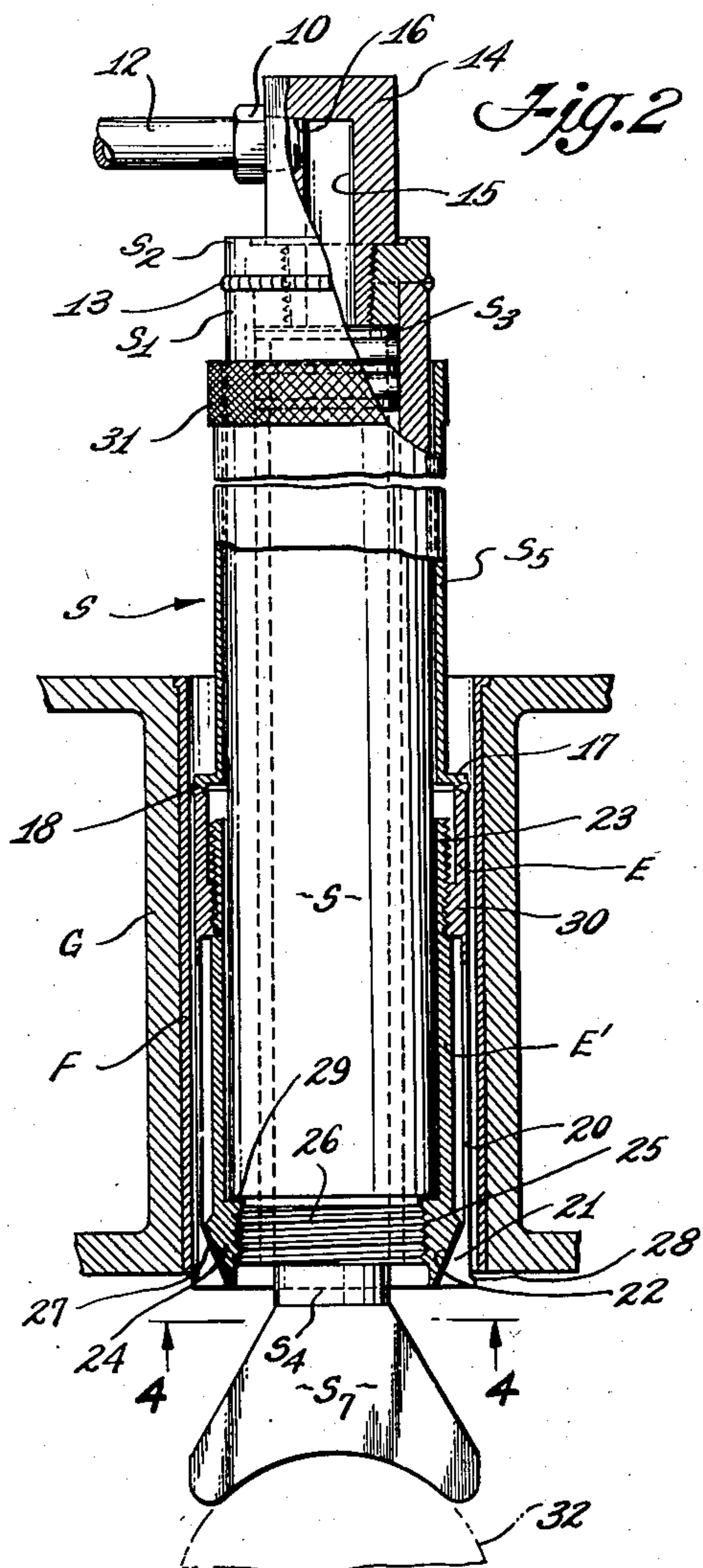


Fig. 2

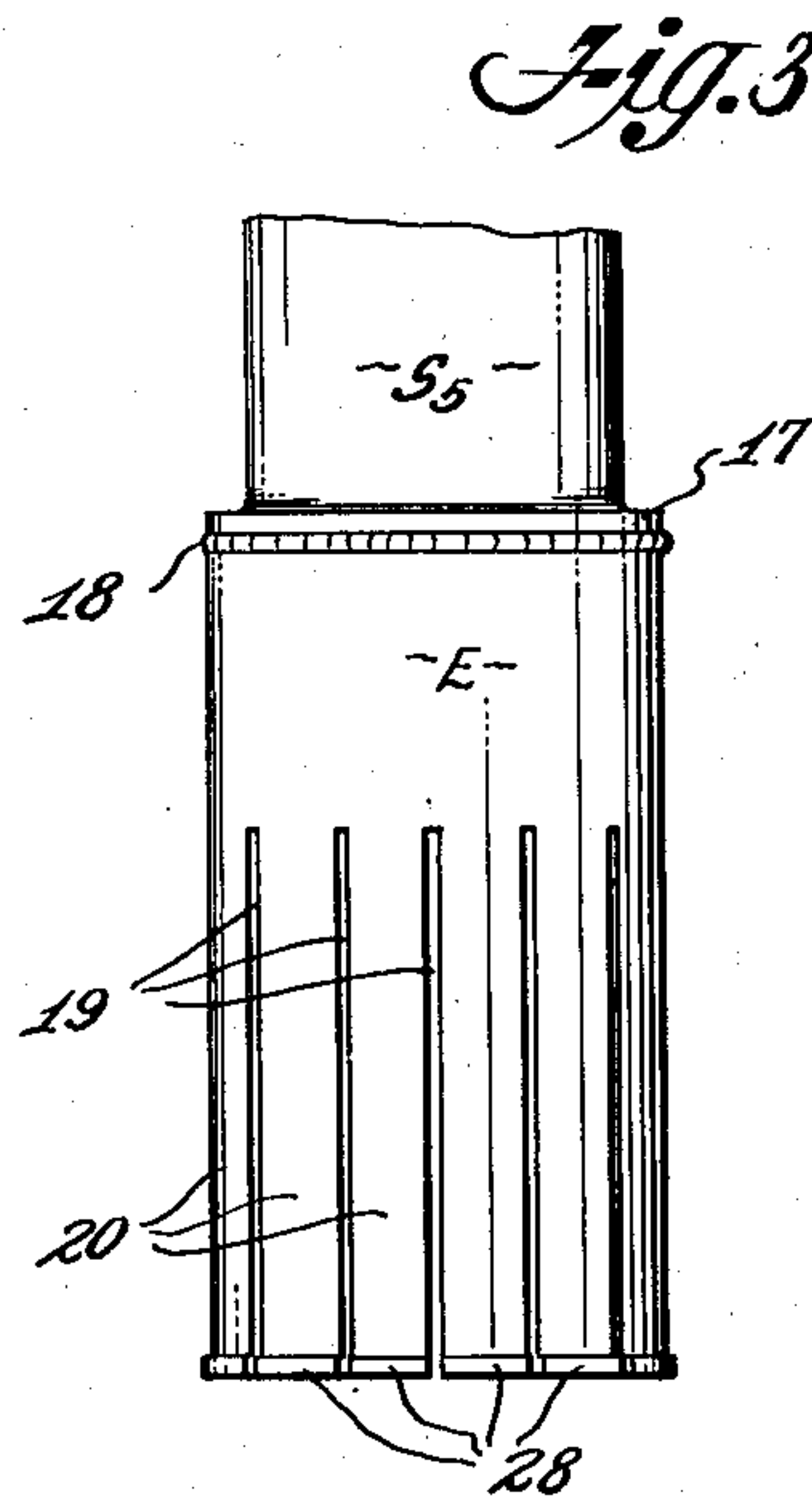


Fig. 3

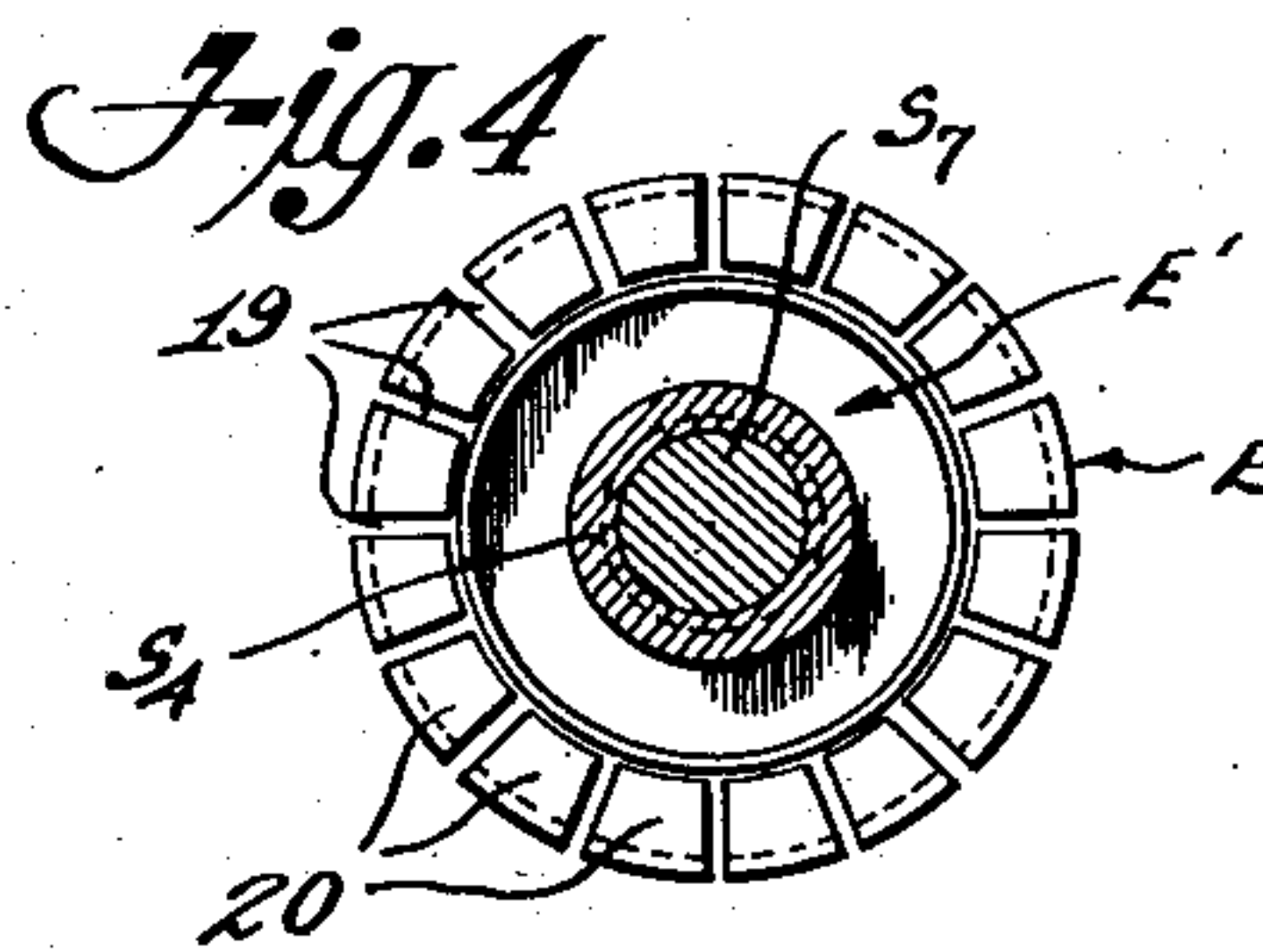


Fig. 4

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SLEEVE EXTRACTOR

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4 Claims. (Cl. 29—252)

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This invention relates to means for extracting sleeves from bodies, such as motor blocks, etc., and embodies certain improvements over means for a similar purpose shown in Patent Number 2,547,345, granted to me on April 3, 1951.

An object of the present invention is to provide a simple, economical, and satisfactory hydraulically operable mechanism affixed to the cylinder of a ram and adapted together with said cylinder to be inserted into the bore of a sleeve carried by a body to an extent which, when elements are disposed below or beyond an opposite end of the sleeve to that in which the unit is inserted, and said elements are expanded sufficiently to engage the adjacent end of the sleeve, will, upon application of pressure to the ram, effectually and quickly remove the sleeve from the body.

More specifically, the invention contemplates the provision of a portable extractor unit including a cylinder, a fluid pressure operated ram slidable therein, and an extractor head carried by the cylinder and embracing a cylindrical expander and a multiple fingered extractor releasably adjustable on the cylinder and by reason of such adjustment and the engagement of cooperating parts of the expander and extractor, the extractor is expanded to and retracted from position of operative engagement with a sleeve to be removed.

Another object of the invention is to so arrange the expander and extractor on the cylinder that one of said elements may be anchored to the cylinder while the other element is rotatively and axially adjustable on the anchored element.

A further object is to provide detachably one or both elements of the extractor head on the cylinder.

A still further object is to provide the extractor and expander elements with interengaging frusto-conical annuli, one of which is integral and the other composed of a plurality of like sections at the termini of tensioned fingers cut on a common sleeve body, whereby the axial adjustment of the tensioned sections of one element over the frusto-conical annulus of the other element will effect the expansion and retraction of the fingers.

Other objects will appear as the description of the structure and operation of the disclosed mechanism progresses.

A preferred form of mechanism is shown in the annexed drawings, in which:

Fig. 1 is a small scale elevational view of a suitable primary power unit and the instant extrac-

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tor unit operatively associated for carrying out sleeve extracting and other operations;

Fig. 2 is a sectional elevation of a sleeve bearing body such as a motor block in which the portable extracting unit is operatively mounted for removing a sleeve, the extracting unit and portions of a hydraulic cylinder and ram being shown in section;

Fig. 3 is an external view of the extracting unit; and

Fig. 4 is a transverse view of the same on line 4—4 of Fig. 2.

Referring particularly to Fig. 1, there is shown a primary power unit M and a portable secondary applicator unit S operatively connected as and for the purpose of removing sleeves from supporting bodies. The unit M includes a large cylinder C having a plunger D movable therein by air pressure from a source through an inlet 5. Plunger D has a stem D₁ extended therefrom into a hydraulic cylinder I and a piston D₂ is fixed to said stem for movement in cylinder I as plunger D is moved by air pressure.

Cylinder I has a head I' which is connected by a flexible tube 12 with an inlet 11 of head I' and with unit S as by means of an inlet 10. Unit S includes a cylinder S₁, a head S₂ preferably welded as at 13 to said cylinder, a piston S₃ slidable in the cylinder, and a tubular stem S₄ to which is affixed a foot S₇ beyond the open lower end of the cylinder. Head S₂ has an extension 14 which is bored at 15 for the passage of fluid from a radial port 16 leading from tube 12 into and from the cylinder S₁ above piston S₃ as said piston is moved downwardly and upwardly on reverse strokes.

An elongated telescoping sleeve S₅ is telescopically fitted over cylinder S₁ and is formed with an external annular flange 17 at its lower end to which is welded, as at 18, the upper end of a cylindrical extractor E which is longitudinally slit at uniformly spaced points 19, 19, etc. to form a plurality of tensioned finger sections 20, 20, etc. The sections 20 combine to form a multiple split annulus 21 with frusto-conical inner surfaces 22 having their major dimensions at their lower margins and the minor dimensions at their upper margins thereof.

A cylindrical expander E' is telescopically fitted over cylinder S₁ and is formed with an upper externally threaded section 23, a lower annulus 24 having internal threads 25 screwed onto the externally threaded lower end portion 26 of cylinder S₁ and of frusto-conical cross section, as shown in Fig. 2, to provide a tapered outer sur-

face 27 engageable with surface 22 of the extractor E.

The surfaces 22 of the extractor and 27 of the expander are of corresponding inclination so that as the expander and extractor are relatively moved axially the fingers 21 of the extractor will be expanded to an extent which will position ribs 28 on the lower ends of fingers 20 beneath the lower edge of a sleeve F supported in a body G, or retracted and disengaged from the sleeve, as the case may be.

It is preferable (and so shown) to adjustably mount the extractor E relative to the expander E' and to such end the expander section 23 is screwed onto the threaded section 26 of the cylinder S₁ to an uppermost extent as established by an annular shoulder 29 on the expander while an internally threaded section 30 of the extractor threadedly receives the threaded section 23 of the expander. Sleeve S₅ carries at its upper end a knurled collar or flange 31 by means of which said sleeve S₅ and extractor E may be manually rotatable on cylinder S₁ for expanding and contracting the fingers 20 into and from sleeve engaging positions, depending upon the direction in which said elements are rotated.

Obviously, the expander is in its uppermost position in which it is fixed and the extractor is in its lowermost position as limited by engagement of the lower edge of section 30 with the lowermost thread of section 23 (Fig. 2) and the finger ribs 20 are in a common plane below that of sleeve F but completely retracted from operative positions on said sleeve F.

The ensuing rotation of sleeve S₅ and extractor E by turning collar or flange 31 will move the extractor bodily in sleeve F until fingers 20 are sufficiently expanded to positions of engagement with the lower edge of sleeve F and thereafter with said sleeve F in and outwardly of the sleeve supporting body G. During such a sleeve extracting operation the foot S₇ is or can be engaged with a fixed member 32 which may be a crank pin on the driving shaft of an automotive engine, but not necessarily so.

Power is applied to ram piston S₃ by hydraulic pressure introduced to the head of cylinder S₁ through tube 12 leading from hydraulic unit I of the primary unit M and in response to the application of air pressure in cylinder C to plunger D, the piston D₂ (Fig. 1) of unit I thereby applying pressure to a fluid in cylinder I above piston D₂, tube 12, and cylinder S₁. Pressure thus applied to piston S₃ tends to force the piston downwardly in its cylinder S₁ but such action being prevented by engagement of foot S₇ with anchor 32, the cylinder S₁, expander E', and extractor E are forced upwardly together and relative to the stationary piston S₃ and adequate forces are applied to sleeve F to completely remove said sleeve from its supporting body G.

Piston S₃ is retracted relative to the cylinder S₁, and vice versa, depending upon the type of anchor employed by any suitable means such as springs shown in said prior patent, or otherwise.

Necessarily, the stroke of piston S₃ is sufficient to remove sleeves F of usual or maximum length, and the range of adjustment of the extractor is sufficient to adjust the finger ribs 28 from positions of complete retraction within the area of sleeve F to sleeve engaging and removing positions.

I claim:

1. A sleeve extractor applicable to a cylinder and a fluid actuated piston of a hydraulic ram

comprising: an expander externally telescoping and fixed to said cylinder and a multiple fingered cylindrical extractor telescopically adjustable on said cylinder for axial movement relative to said expander, said expander having an annular head with external frusto-conical surfaces which taper downwardly and inwardly toward said piston, the fingers of said extractor having complementary frusto-conical terminal portions bearing against the frusto-conical surface of the expander and cooperating with said expander head whereby said finger terminals are expanded and retracted in response to the axial movement of the extractor, for, respectively, engaging the finger terminals with a sleeve to be extracted and normal positions of disengagement with such sleeve, and manually operable means connected with and for moving the extractor.

2. A sleeve extractor applicable to a cylinder and a fluid actuated piston of a hydraulic ram comprising: an expander externally telescoping and fixed to said cylinder and a multiple fingered cylindrical extractor telescopically adjustable on said cylinder for axial movement relative to said expander, said expander having an annular head with external frusto-conical surfaces which taper downwardly and inwardly toward said piston, the fingers of said extractor having complementary frusto-conical terminal portions bearing against the frusto-conical surface of the expander and cooperating with said expander head whereby said finger terminals are expanded and retracted in response to the axial movement of the extractor, for, respectively, engaging the finger terminals with a sleeve to be extracted and normal positions of disengagement with such sleeve, said expander and said extractor being threadedly connected so as to axially adjust the extractor thereon as the extractor is rotated, and a cylindrical operating member telescoping said cylinder and secured to and for rotating the extractor.

3. A sleeve extractor applicable to a cylinder and a fluid actuated piston of a hydraulic ram comprising: an expander externally telescoping and fixed to said cylinder and a multiple fingered cylindrical extractor telescopically adjustable on said cylinder for axial movement relative to said expander, said expander having an annular head with external frusto-conical surfaces which taper downwardly and inwardly toward said piston, the fingers of said extractor having complementary frusto-conical terminal portions bearing against the frusto-conical surface of the expander and cooperating with said expander head whereby said finger terminals are expanded and retracted in response to the axial movement of the extractor, for, respectively, engaging the finger terminals with a sleeve to be extracted and normal positions of disengagement with such sleeve, said expander being threadedly secured to said cylinder and also threadedly connected with said extractor, and means rotatable on said cylinder for correspondingly rotating the extractor to effect axial adjustment of the same on the expander.

4. A sleeve extractor applicable to the cylinder and piston of a hydraulic ram comprising: an expander fixed to said cylinder and a multiple fingered extractor borne by said cylinder for axial movement relative to said expander, said expander having an annular head of frusto-conical cross section tapering downwardly and inwardly toward said piston, and the fingers of said extractor having frusto-conical terminal portions

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bearing against and cooperating with said expander head whereby said finger terminals are expanded and retracted in response to the axial movement of the extractor, for, respectively, engaging the finger terminals with a sleeve to be extracted and normal positions of disengagement with such sleeve, said expander head being internally threaded for attachment to said cylinder and externally threaded for attachment to the extractor, whereby while the expander is held stationary on the cylinder the extractor may be rotatably adjusted on the expander to effect corresponding axial adjustment of the extractor relative to the expander, and means borne by said cylinder for operating the extractor.

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