

Feb. 11, 1969

F. PRINCZ ET AL
TEXTILE COMBING MACHINES

3,426,609

Filed Oct. 24, 1966

Sheet 1 of 3

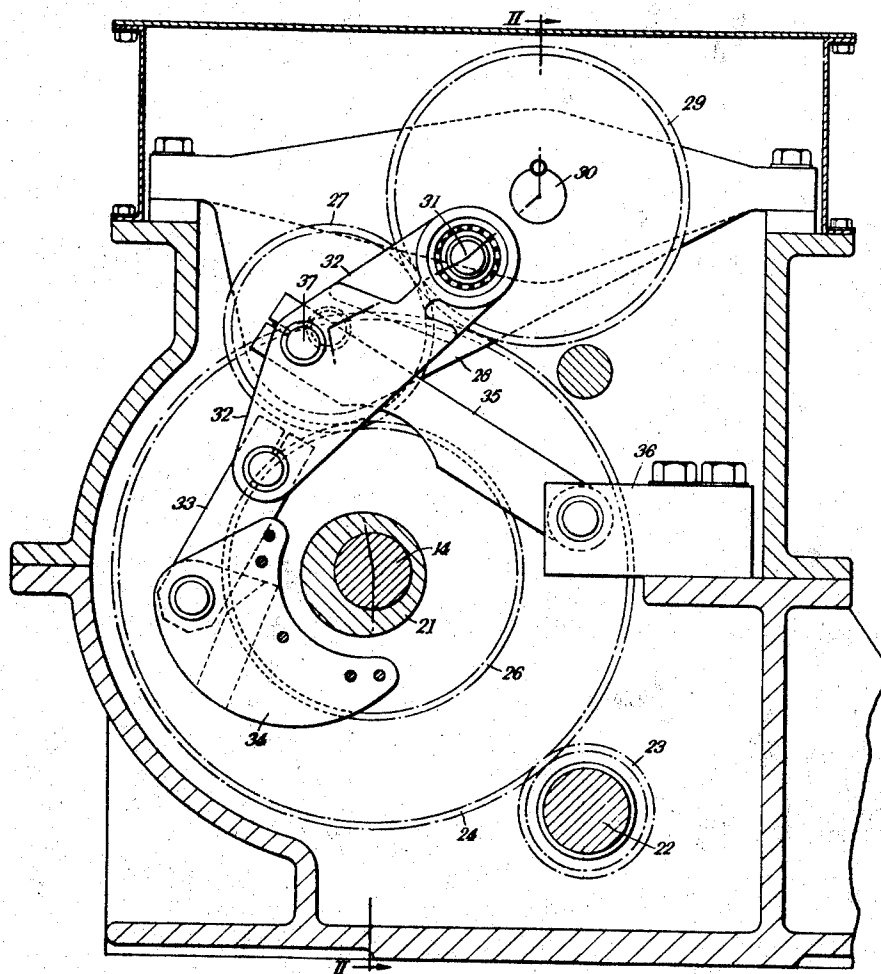


Fig. 1.

Inventors
Ferdinand Princz
and William Scott
By Harte + Harte
Attorneys

Feb. 11, 1969

F. PRINCZ ET AL
TEXTILE COMBING MACHINES

3,426,609

Filed Oct. 24, 1966

Sheet 2 of 3

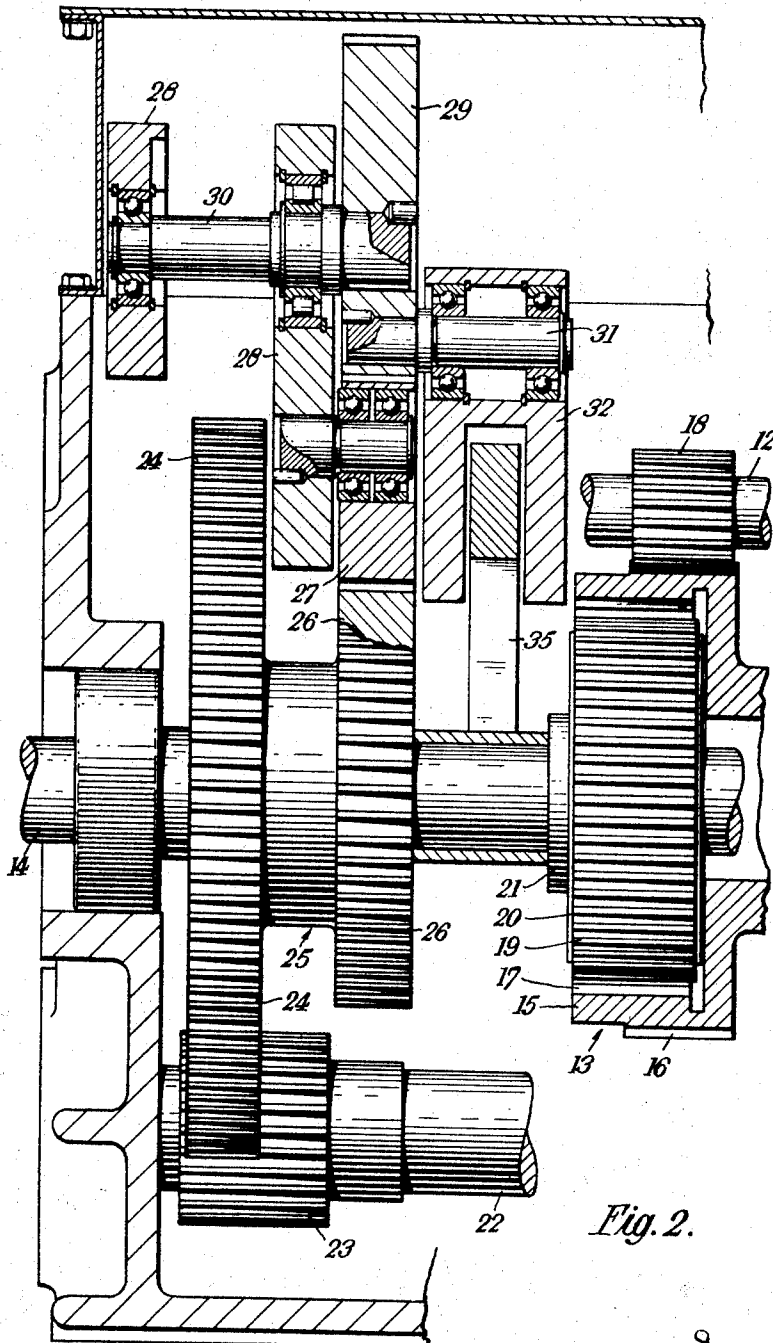


Fig. 2.

Inventors.
Ferdinand Princz
and William Scott
By Noote & Noote
Attorneys

Feb. 11, 1969

F. PRINCZ ET AL

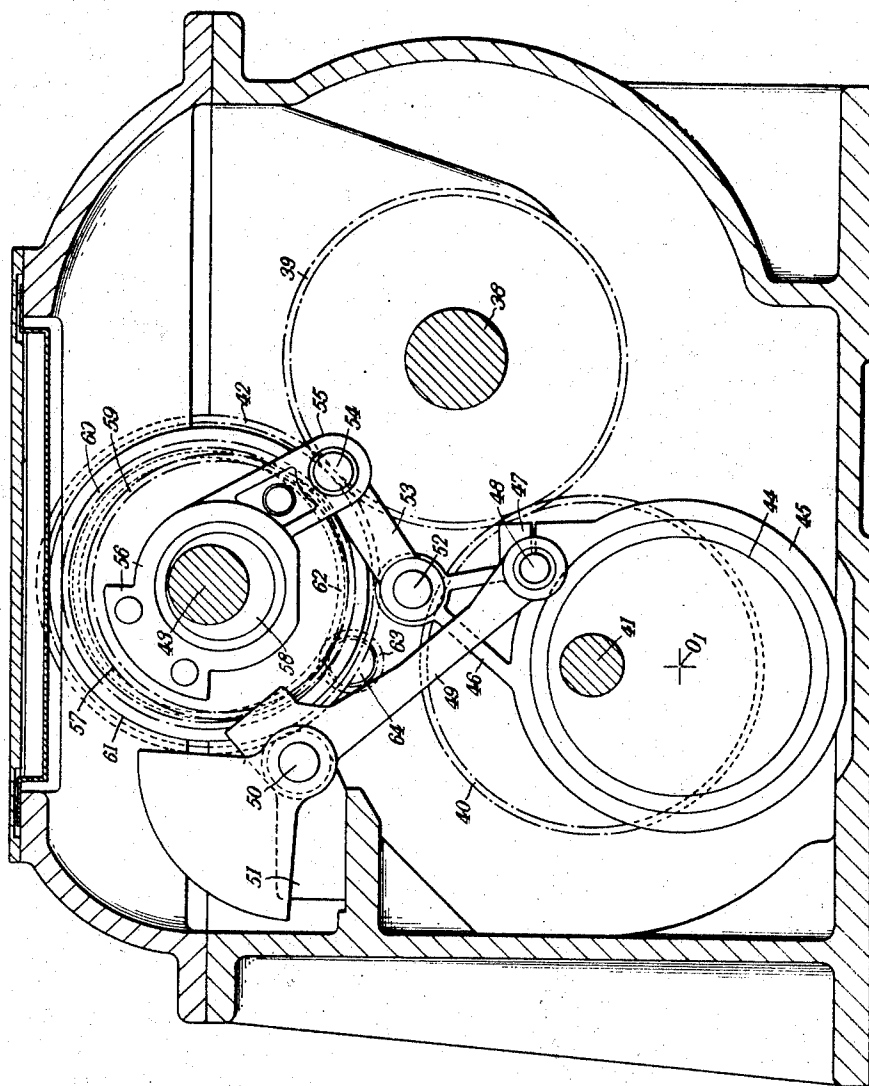
3,426,609

TEXTILE COMBING MACHINES

Filed Oct. 24, 1966

Sheet 3 of 3

Fig. 3



Inventors
Ferdinand Princz
and William Scott
By Noel & Noel
Attorneys

1

3,426,609

TEXTILE COMBING MACHINES

Ferdinand Princz, Oldham, and William Scott, Bury, England, assignors to T.M.M. (Research) Limited, Oldham, England, a British company

Filed Oct. 24, 1966, Ser. No. 588,998

Claims priority, application Great Britain, Oct. 22, 1965, 44,884/65

U.S. Cl. 74—394

Int. Cl. F16h 27/10, 35/02, 37/06

7 Claims

ABSTRACT OF THE DISCLOSURE

A drive for the detaching rollers of a textile combing machine comprising a differential gear including a rotary motion-compounding element compounding a constant speed rotary motion of a first input drive to the gear with an oscillatory motion of a second input drive to the gear, said second input drive comprising a first pivotal element pivotally attached at one point thereof to an eccentrically located point on a rotary driving member arranged for rotation in one direction at constant speed and pivotally attached at a second point remote from said first point to a first point on a second pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to an eccentrically located point on the rotary motion-compounding element of the differential gear, the first pivotal element being pivotally attached at a third point thereon intermediate said first and second points thereon to a first point on a third pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to a stationary portion of the machine frame.

The present invention relates to textile combing machines of the type in which detaching rollers are driven alternately in opposite directions of rotation and is particularly concerned with a drive for such rollers.

Detaching roller drives hitherto proposed conventionally comprise a differential gear which compounds a constant rotary motion with an oscillatory motion to provide the required gradually advancing forward and backward motion of the rollers. In one arrangement hitherto proposed, the oscillatory motion is provided by an arrangement of articulated levers driven by an eccentric in the form of a rotary cam plate having a continuous cam groove in which is engaged a cam bowl drivingly connected to one of the levers, the arrangement being such that a complete revolution of the cam plate causes the articulated levers to impart a forward movement and then a backward movement to a planet wheel of a differential gear. Although this latter arrangement has proved effective in operation there is the disadvantage that the cam bowl is subjected to considerable wear and requires frequent replacement.

It is an object of the present invention to provide a drive for the detaching rollers of a textile combing machine which does not suffer from the aforesaid disadvantage.

According to the present invention, there is provided a drive for detaching rollers of a textile combing machine comprising a differential gear including a rotary motion-compounding element compounding a constant speed rotary motion of a first input drive to the gear with an oscillatory motion of a second input drive to the gear, said second input drive comprising a first pivotal element pivotally attached at one point thereof to an eccentrically located point on a rotary driving member arranged for rotation in one direction at constant speed and pivotally attached at a second point remote from said first point to a first point on a second pivotal element which is pivotally attached at a second point thereon remote from the

2

first point thereon to an eccentrically located point on the rotary motion-compounding element of the differential gear, the first pivotal element being pivotally attached at a third point thereon intermediate said first and second points thereon to a first point on a third pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to a stationary portion of the machine frame.

Two embodiments of the invention will now be described by way of example, with reference to the accompanying drawings in which:

FIG. 1 is a sectional side elevation of a detaching roller drive according to a first embodiment of the invention,

FIG. 2 is a rear sectional elevation of the drive shown in FIG. 1, taken on the line II—II in FIG. 1, and

FIG. 3 is a sectional side elevation of a detaching roller drive according to a second embodiment of the invention.

As shown in FIGS. 1 and 2, a drive to the detaching rollers of a textile combing machine is taken from an output shaft 12 of a differential gear comprising an annular sun wheel 13 mounted for free rotation about the axis of the comber cylinder shaft 14 and formed with a peripheral gear annulus 15 having external gear teeth 16 and internal gear teeth 17, the former of which are arranged to drive a gear 18 fixed to the output shaft 12 of the differential and the latter of which are arranged to be drivably engaged by the external peripheral gear teeth 19 on a planet wheel 20 mounted for free rotation on an eccentric bush 21 fixedly mounted on the comber cylinder shaft 14. The drive to the cylinder shaft 14 is taken from a main input shaft 22 arranged below the cylinder shaft and provided with a gear 23 which is fixedly mounted thereon and which drivably engages a gear wheel 24 of a compound gear 25 fixedly mounted on the cylinder shaft 14, and a drive is taken from the gear wheel 26 of the compound gear via an idler gear wheel 27 mounted on frame 28 to an eccentric drive formed by a gear wheel 29 concentrically and fixedly mounted on the end of a rotatable supporting shaft 30 positioned well above the cylinder shaft 14, the gear wheel 29 being provided with an eccentrically mounted stub axle 31 upon which is rotatably mounted one end of a double-arm lever 32, as best seen in FIG. 1, which in a bottom dead center position of the stub axle 31 is inclined downwardly toward and rearwardly of the cylinder shaft 14, its other end being connected to the uppermost end of a link 33 which in the bottom dead center position also extends rearwardly and downwardly in line with the lever 32 and which is pivotally connected at its other end to a bracket 34 eccentrically positioned on the planet wheel 20, the arrangement being such that in the bottom dead center position the planet wheel 20 is in a position in which the point of attachment of the link to the bracket is just rearward of and below the cylinder shaft 14. The double-arm lever 32 is pivotally supported at an intermediate position on the uppermost end of a supporting lever 35 which in the bottom dead center position is inclined downwardly and forwardly and which is pivotally attached at its lower end to a fixed bracket 36 on the machine frame at a point just above and well forward of the cylinder shaft 14.

In operation, the main input shaft 22 is rotated at constant speed, imparting a constant speed drive to the cylinder shaft 14 which it will be recalled carries the eccentric bush 21 rotatably supporting the planet wheel 20 of the differential gear. The constant speed drive is taken to the drive shaft 30 for the eccentric and the stub axle 31 pivotally supporting the upper end of the double-arm lever 32 is caused to rotate at constant speed about the axis of the drive shaft 30, which it will be recalled as well above and forward of the cylinder shaft

14. As the stub axle 31 moves in its arcuate path from the bottom dead center position in a clockwise sense as viewed from the lefthand end of the machine the double-arm lever 32 pivots in an anti-clockwise sense about its pivot point 37 on the uppermost end of the supporting lever 35, which in turn pivots about its lowermost end on the machine frame to permit the required upward translational displacement of the double-arm lever 32. The link 33 which is attached to the lower end of the double-arm lever 32 turns in a clockwise sense and as a result of the raising of the double-arm lever 32 and the oppositely direction turning movements of the latter and the link 33, the planet wheel 20 is caused to turn clockwise on its eccentric bush 21, the cranking of the lever 32 and the link 33 from their in-line positions combining with the translational raising movements of the double-arm lever 32 and link 33 to produce a rapid clockwise turning movement of the planet wheel 20.

As the stub axle 31 rotates, a region in its path is reached in which the lever 32 and link 33 begin to straighten and following this the lever 32 and link 33 straighten and the upper end of the double-arm lever 32 passes to the top dead center position after which the lever 32 and the link 33 then start to pivot in the opposite sense. Such cranking of the lever 32 and link 33 then acts against the now downward movement of the upper end of the double-arm lever 32 and results in a slow anti-clockwise movement of the planet wheel 20. As the upper end of the double-arm lever 32 approaches the completion of a revolution, the lever 32 and link 33 begin to straighten and they reach their in-line positions as the upper end of the double-arm lever 32 passes through the bottom dead center position, during which movement the planet wheel reaches the end of its excursion and dwells for a predetermined period there.

The planet wheel 20 is given two motions by the arrangement hereinbefore described, one being a constant speed angular displacement derived from the bush 21 rotated with the cylinder shaft 14 and the other being an oscillatory motion about the bush 21 and derived from the eccentric drive from stub axle 31, the double-arm lever 32 and the link 33. To facilitate the understanding of the compound motion imparted to the sun wheel 13 of the differential gear it may be assumed that the planet wheel 20 is fixed in relation to the bush 21 carried by the cylinder shaft. In this event, the planet wheel 20 moves round with the constantly rotating bush 21 and imparts a constant speed drive to the sun wheel 13. It may then be assumed that the bush 21 is stationary and the planet wheel 20 is subjected to the oscillatory motion applied to it from the eccentric through the lever 32 and link 33. In the later event, the oscillatory motion of the planet wheel 20 about the bush 21 causes alternate forward and backward motions of the sun wheel 13.

In a second embodiment of the invention, as shown in FIG. 3 of the drawings, the drive for the detaching rollers is obtained from a main comb cylinder shaft 38 which has fixedly mounted thereon a gear wheel 39 which drivingly engages a gear wheel 40 fixed on shaft 41, and a gear wheel 42 fixedly mounted on a shaft 43. The shaft 41 is provided with an eccentric boss 44 which is fixedly mounted on the shaft 41 for rotation therewith and which is arranged to carry an eccentric ring 45 freely rotatable on the boss 44 and provided with a radially extending bracket 46 formed with an offset enlargement 47. The enlargement 47 is arranged to carry a pivot pin 48 upon which is rotatably mounted one end of a supporting arm 49 the other end of which is pivotally mounted on a pivot pin 50 carried on a bracket 51 of the machine frame. The bracket 46 carries a pivot pin 52 upon which is rotatably mounted one end of a link 53, the other end of which is pivotally mounted on a pivot pin 54 carried by an arm 55 of a bracket 56 secured to a planet wheel 57 which is rotatably mounted on an eccentric bush 58 fixed on the shaft 43.

The planet wheel 57 is provided with external teeth 59 which engage internal teeth 60 of a sun wheel 61 rotatably mounted on the shaft 43 in concentric relation therewith. The sun wheel is further provided with external teeth 62 which drivingly engage the teeth on a pinion 63 fixedly mounted on an output shaft 64 which serves as a drive for the detaching rollers.

In operation, the cylinder shaft 38 is rotated at constant speed so as to impart a constant speed drive to the shaft 43 carrying the eccentric bush 58 rotatably supporting the planet wheel 57, as well as to impart a constant speed drive to the shaft 41 carrying the eccentric boss 44 supporting the eccentric ring 45.

During clockwise rotation of the shaft 41 and corresponding clockwise rotation of the shaft 43, the center C₁ of the eccentric ring 45 is caused to move clockwise round the shaft 41 from the position shown in the drawing to a position in which the center of the ring 45, the center of the shaft 41 and the centers of the pivot pins 52 and 54 lie approximately in the same straight line, which position is hereinafter referred to as the bottom dead center position. As the center of the ring 45 moves in its arcuate path about the center of the shaft 41 from the bottom dead center position in a clockwise sense the link 53 attached to the bracket 46 turns in an anti-clockwise sense and, as a result of the oppositely directed turning movement of the ring 45 and link 53 the planet wheel 57 is caused to turn anticlockwise on its eccentric bush 58, commencing with a slow movement resulting from the cranking of the link 53 and then followed by a rapid movement as the pivot pins 54 and 52, the shaft 41 and the center of the ring 45 move toward a position in which they are generally in line and hereinafter referred to as the top dead-center position. In the region of the top dead-center position a slow rotary movement is imparted to the planet wheel 57 which then changes its direction of rotation as the link 53 commences to crank in the opposite sense. Such cranking of the link 53 then combines with the translational lowering movement of the ring 45 to produce a rapid clockwise movement of the planet wheel 57. As the ring 45 approaches the completion of a revolution, the link 53 begins to straighten and takes up the in-line position as the bottom dead center position is reached during which movement the planet wheel 57 reaches the end of its excursion and dwells for a predetermined period there.

As in the first described embodiment of the invention the planet wheel 57 is given two motions, one being the constant speed angular displacement derived from the bush 58 and the other being an oscillatory motion about the bush 58 and derived from the eccentric drive to the ring 45, and the connection of the ring to the arm 55 on the planet wheel by the link 53.

What we claim as our invention and desire to secure by Letters Patent is:

1. A drive for the detaching rollers of a textile combing machine provided with a machine frame comprising a differential gear, a first input drive to said gear, a second input drive to said gear, said differential gear including a rotary motion-compounding element compounding a constant speed rotary motion of said first input drive to the gear with an oscillatory motion of said second input drive to the gear, said second input drive comprising a first pivotal element pivotally attached at one point thereof to an eccentrically located point on a rotary driving member arranged for rotation in one direction at constant speed, a second pivotal element, said first pivotal element being pivotally attached at a second point remote from said first point to another first point on said second pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to an eccentrically located point on the rotary motion-compounding element of the differential gear, a third pivotal element, said first pivotal element being pivotally attached at a third point thereon

5

intermediate said first and second points thereon to a first point on said third pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to a stationary portion of said machine frame.

2. A drive according to claim 1, wherein said second pivotal element further comprises a link to one end of which the first pivotal element is pivotally attached and the other end of which is pivotally attached to said eccentrically located point on said motion-compounding element of the differential gear.

3. A drive according to claim 1, wherein said third pivotal element comprises a supporting arm, the first pivotal element being pivotally supported on one end of the arm, the other end of which is pivotally attached to said stationary portion of said machine frame.

4. A drive according to claim 1, wherein said first pivotal element comprises a double-arm lever pivotally attached at one end to said eccentrically located point on the rotary driving member, at the other end to said second pivotal element and at a point intermediate the ends of the double-arm lever to said third pivotal element.

5. A drive according to claim 4, wherein said rotary driving member comprises a driving shaft and driving plate concentrically mounted thereon and wherein said double-arm lever is pivotally attached to an eccentrically located point on said driving plate.

6. A drive according to claim 1, wherein said motion-compounding element comprises a planetary wheel arranged to drive a sun gear of said differential gear wherein said first input drive to the differential gear comprises a further rotary driving member arranged for rotation in one direction at constant speed, and wherein said planetary wheel is eccentrically rotatably mounted on said further rotary driving member.

7. A drive for the detaching rollers of a textile combing machine provided with a machine frame comprising

6

a differential gear, a first input drive to said gear, a second input drive to said gear, said differential gear including a rotary motion compounding element compounding a constant speed rotary motion of said first input drive to the gear with acceleratory motion of said second input drive to the gear, said second input drive comprising a first pivotal element in the form of a ring element mounted for rotation at an eccentric located on said rotary first input drive, a second pivotal element, said first pivotal element being pivotally attached at a second point remote from said first point to another first point on said second pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to an eccentrically located point on the rotary motion compounding element of the differential gear, a third pivotal element, said first pivotal element being pivotally attached at a third point thereon intermediate said first and second points thereon to a first point on said third pivotal element which is pivotally attached at a second point thereon remote from the first point thereon to a stationary portion of said machine frame, said ring element being provided with a radial extension to which said second and third pivotal elements are pivotally attached.

References Cited

UNITED STATES PATENTS

1,190,407	7/1916	Helmbold et al.	74—394
2,748,616	6/1956	Foster et al.	74—394

FOREIGN PATENTS

44,657	6/1961	Poland.
--------	--------	---------

ARTHUR T. McKEON, *Primary Examiner.*

U.S. Cl. X.R.

74—84, 679