Ironman Articles
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A Pistol Barrel or a Pillow

Assuming equal force, a blow to the head can be fatal or funny – the difference in results being primarily determined by the weapon. A hard blow with a pistol barrel is frequently fatal – an equally hard blow with a pillow may be a gesture of good-natured horseplay.

Unfortunately, the movies (and television) have given a totally false impression of the probable effects of a blow from pistol barrel – if the villain REALLY HIT THE HERO AS HARD AS HE APPEARD TO, THEN "exit on hero". If such a blow didn't kill him outright – and it probably would – it would almost certainly scramble his brains permanently, and at the very least it would put him out of action for a matter of several weeks with a fractured skull.

So – the next time you mugg somebody by tapping him over the head with a pistol barrel, don't expect him to be back on his feet with a slight headache within a few minutes. And the next time you drop rapidly into a full squat with 600 pounds pressing down on your spine, don't expect your back to be the same again – ever. It might – but then again, it might not.

Some years ago, a man named Klein wrote an expose of the squat – pointing out the "great dangers" of this exercise. And while it is almost certain that Dr. Klein was perfectly sincere, it was even more certain that he was wrong in his conclusions.

Knowing little or nothing about weight-training, and usually being biased by the old "muscle bound" myth, most coaches were quick to accept Dr. Klein's statements at face value – primarily because many coaches then wanted to believe that any form of weight-training was bad. A lot of them still do – some always will.

But a lot of other people – many of them people who should have known better – were equally quick to condemn the squat. Primarily, I think, because it gave them an excuse to avoid doing squats themselves. The squat is still avoided by thousands of trainees who almost desperately need to do squats, by trainees who will never make reasonable gains and until and unless they start doing squats. But the truth of the matter is – in almost all such cases – that squats are avoided only and simply because the trainees are too lazy to do them, because squats are hard, because squats are brutally hard if they are done right.

But since most people don't like to admit that they are lazy, they usually claim they have a "bad back" – or "bad knees" – or some such excuse.

So the truth of the matter is that most people are simply too lazy to do squats properly if at all – which is understandable, because squats certainly are "hard" and squats certainly are uncomfortable, and squats certainly are downright painful if they are performed correctly, and squats just as certainly can be dangerous if they are performed in an improper manner. But the fact still remains, SQUATS ARE IMPORTANT – best-possible progress is almost impossible without squats.

Or, at least, that was the situation as recently as eighteen months ago – but now there appears to be light at the end of the tunnel. Three years ago, I asked myself "…would it be possible to do squats WITHOUT DOING SQUATS? Could we derive the enormous benefits of squats without the pain, without the discomfort, without the danger?"

Eighteen months later, the answer appeared to be NO. In the meantime, I had figured out exactly what was required – but meeting those requirements appeared to be impossible. I knew what to do – but I didn't now how to do it.

More than that – in the meantime, I had only figured out the requirements, but had carefully studied the problems, and understood them fully: I knew what was "required" from a squat. I knew what the real value of a squat was – but I also knew several things that were NOT required, things that contributed only discomfort and danger.

But I still didn't know how to go about providing the requirements while eliminating the problems.

Then, about eighteen months ago, Dan Howard (the physical trainer for Tulsa University) visited DeLand for a few days in order to see some of our new equipment and because he wanted to train with Casey Viator for a couple of hard workouts. While he was here, I carefully explained the situation regarding squats to Dan – and I told him in detail about my attempts to provide the requirements while avoiding the problems.

During the course of this explanation, in an attempt to make the situation perfectly clear, I cut out three small "paper dolls" – cutting them out of cardboard with a pair of scissors. Crude as they were, these figures made it possible to clearly show the required movements. One of the figures represented a man's torso and head – another simulated the thighs (as viewed from the side, so that only one thigh could be seen) – and the third figure was supposed to look like the calves and feet as seen from the side.

Using these three crude cut-out figures, and two thumbtacks, it was easily possible to depict a profile of the movements involved in the performance of as squat – one tack attached the top of the "thighs" to the bottom of the "torso" – and the second tack attached the bottom of the thighs to the top of the "calves".

During a squat (or any exercise for the thighs), the calves move in relation to the thighs – rotating around the axis of the knees. Such movement occurs in a squat, in a leg-press, in a thigh extension – and even in a thigh curl; in the first three cases the movement is powered by the large muscles of the frontal thighs – in the case of the thigh curl, the movement is produced by the muscles located on the rear of the thigh.

But the relative movement of the calves and thighs is not the only movement involved in a squat – additional rotation occurs around the axis of the hips, relative movement involving the thighs and torso. This secondary rotation is powered by the muscles of the hips, the muscles of the back, and to a slighter degree by the muscles of the rear side of the upper thighs.

Thus, when the situation is viewed clearly, it is immediately obvious that a squat involves far more than work for the frontal muscles of the thighs –squatting also involves heavy work for the REAR of the thighs, as well as work for the hips and the back. In no other manner – EXCEPT IN A SQUAT – is it possible to involve such a mass of muscle, so many large muscles. In no other manner is it possible to produce the power that you can in a squat.

And remember – it isn't the "amount' of exercise that stimulates muscular growth, it is the "intensity of exercise." Only HARD exercise will stimulate growth – and "too much" exercise will literally prevent growth, make growth impossible.

So – Dan and I cut out paper dolls, and we moved the various figures into various positions and I carefully outlined both the requirements and the problems. And, within a very few minutes, he clearly understood the situation – but he could suggest no solution that I hadn't already tried, tried without success.

So then I asked him to explain the situation – and the problems – to a German girl who neither understood nor care about the benefits or the problems of squats. BECAUSE – I hoped that the very act of trying to make such an explanation might trigger Dan's thinking into a channel of thought that perhaps both of us were overlooking. And it did.

"Why not restrain the thighs?"

The obvious solution – once mentioned: but one I hadn't thought of – although, prior to that moment, I honestly felt that I had thought of everything.

During a leg-press, the torso is restrained – while movement involves both the thighs and calves. During a squat, the calves are effectively restrained – while movement involves both the thighs and the torso. And up to that point in my thinking, my attempts to solve problems were limited to situations where either the torso or the calves were restrained – and in either case, the required exercise tool would be so complex that it would almost defy belief. While not literally impossible, such a machine would certainly be impractical.

But – if, instead, we restrained the thighs – then such a machine could be made in a practical form. In a way, it would be two machines hooked together – a joining of a thigh-extension machine and what I then called a "torso-extension" machine. A compound-function machine providing resistance around two separate points of rotation.

But it still wasn't quite a "simple" machine – it would still be by far the most complex machine in the history of exercise; as it had to be in order to provide the required functions.

So –was it worth such complexity, such cost, such size? What were the disadvantages?

Well, taking the disadvantages first, it was undeniably a large, complex, expensive machine – but so is a car, as it must be in order to perform its functions. A Model T provided "transportation" – after a fashion; but it provided very little else – when it rained, you got wet – when the dust blew, you got dirty – when it was cold, you froze – when it was hot, you baked – and you spent a good part of every motoring hour changing tires. As a kid, my job on trips was to watch the trunk – and I was supposed to inform the driver when the trunk fell off; not "if" it fell off, WHEN – the trunk was a separate part of the car, held on loosely by straps, and it fell off with reasonable regularity. And we had a BUICK in those days – at the time, Fords didn't have trunks, or much else. But it still beat walking – even if not very much.

Now, cars are far more complex – they provide much more reliable transportation and they provide many other desirable features, protection form both heat and cold, much more comfort, a clean, dry ride in any weather, musical entertainment, and much greater safety. So they are larger, and they cost more – as they must under the circumstances. But I tell you very clearly – modern automobiles would be a near miracle at ten times their present price. They could be better than they are – but the very fact that they exist at present prices is almost a miracle, and if you think otherwise then just try to build an automobile from scratch.

Which is much of the problem I was faced with when it came time to start work on an exercise machine that was intended to replace the squat – a machine that would provide all of the benefits of the squat and none of the disadvantages.

And what were the benefits? And what were the disadvantages? Well – with a barbell – the benefits of squats derive primarily from the fact that you are involving several large muscular groups in hard work. So our machine had to involve all of the same muscles – and if possible, it was desirable to provide work that was even HARDER than squats with a barbell.

And – with a barbell – the disadvantages of squats are several fold; the work is NOT full-range – undesirable (and UNNECESSARY) compression forces are imposed on the spine – you are limited in most cases to a weight that the muscles of your lower back can safely handle, and thus the thighs are seldom worked as hard as they should be – and squats are very uncomfortable – and squats can be dangerous, usually to the lower back but sometimes to the knees.

So we needed a machine that would provide constant resistance against the movement of both the calves and the torso; full range resistance, rotary resistance around two separate points of rotation (the knee joints and the hip joints), omni-directional resistance against movement in any possible direction, automatically-variable resistance that would change during the actual movements, balanced resistance that would be "right" in every position (not too light, not too heavy), double-direct resistance that would be provided directly against the involved body-parts –more than that, for reasons far too complex to go into here, the machine had to provide a common source of straight-rise resistance for the two movements, and the machine had to be the right size for anybody.

If people came in only one size, then the machine could be built in a far less complex manner. If the distance from the axis of the hips to the axis of the knees was the same in all people – well, that would have made our job much simpler.

But people come in various sizes – so the machine would have to be made so that it would work perfectly with a man of any reasonable size, and a machine COULD BE made to fit a giant or a midget.

In the end, making the machines adjustable turned out to be one of the greatest problems – because such adjustment had to be simple, foolproof, easy and PERFECTLY accurate; the adjustment had to be easy enough for an old woman, simple enough for an idiot, sturdy enough for a malicious giant, accurate enough for a perfectionist – and it had to be a quick, simple, "no tools" type job. Pull this, push that – done. Pressures in ounces, accuracy in thousands of an inch.

You see, if you moved the front part of the machine four inches (for example) closer to the rear part – in order to make it right for a very short man – then you would create four inches of slack in the cables going to the weight source. And-or it would change the relationship of the spiral pulleys to their first redirectional pulleys – which would utterly ruin the designed-in function of the machine. And, of course, trying to move the two parts of the machine farther apart by four inches would require lifting the weight-stack (500 pounds) a distance of four inches – a job most old women would find difficult.

So the front part of the machine must be on rails – perfectly aligned rails – and it must move "in" and "out" easily, smoothly, precisely in line with the rear part of the machine, and it must lock in any desired position.

As the front part of the machine moves closer to the rear part, it drives a "rack" (a straight gear) – one inch of movement of the machine moves the rack an inch, no more, no less. The rack must be perfectly aligned, and must move in a perfectly straight path – within less than five one thousands of an inch deviation – because it drives a large round gear that is located in the rear part of the machine, and if the rack is out of line then the two gears will jam.

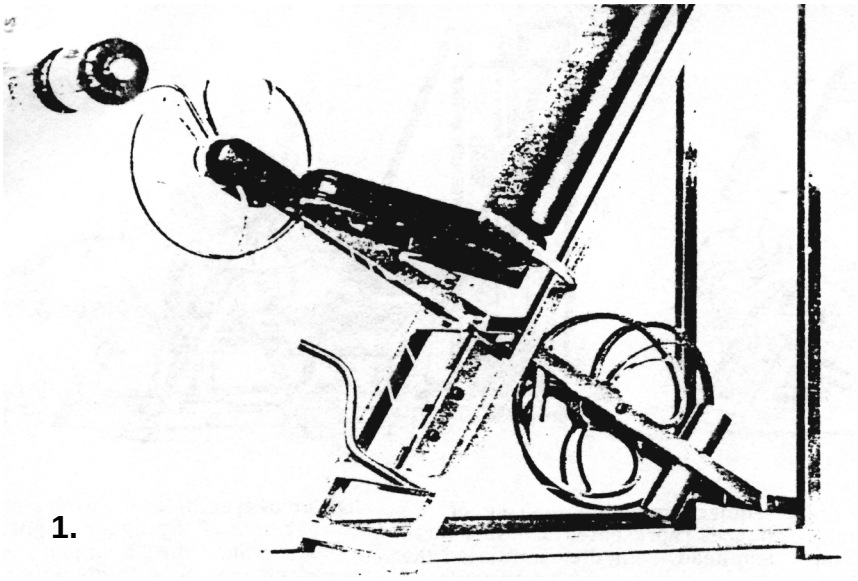
The first round gear drives a smaller round gear on a common axis and thus reduces the range of movement by a ratio of two to one – and the smaller round gear drives a second "free floating" rack. The second rack moves a free-floating redirectional pulley, which thus automatically takes up or provides the required slack in the cables. As you move the front part of the machine – thereby creating slack, or demanding slack in the cables – the free-floating redirectional pulley instantly, automatically, precisely gives you the slack you need – or takes up any slack you cause. The cables stay tight as a banjo string – constantly, automatically.

So there it is – simple enough in theory; but just try building a machine that provides the required degree of accuracy – something on the order of the accuracy with which a piston must fit a cylinder. And try building it not only accurately but strong enough to last in hard service – almost literally "forever", so that you can guarantee perfect, problem-free functioning for at least ten years.

And, mind you, that problem was involved simply with the required adjustment.

But, at first, we didn't have anything to "adjust" – so, first, we had to design the two parts of the machine, the front part and the rear part. First, we had to design and build a near-perfect thigh extension machine – and then we had to design and build an equally near-perfect machine that we now call the "Hip and Back Machine."

In picture number 1, you can see the results of our work towards a perfect thigh-extension machine; or, rather part of the results –since the machine shown in that picture is not complete, the pictured machine does not have all of its parts, no weight stack, no selector system, etc. But we used this picture for a very good reason – note the fact that the moment-arm is sticking out in front of the machine, yet it doesn't swing down. The moment-arm is balanced – if it isn't attached to the weight-stack, it will stay in any position in which it is placed. In effect, it weighs literally "nothing." If it wasn't balanced, then the moment-arm would add 245 inch-pounds of unwanted torque to the resistance when in a horizontal position – random torque, undesirable torque, force that would upset the delicate balance of resistance established elsewhere.



1.

And while it wouldn't be impossible to balance out this unwanted torque by using a counterweight located on the moment-arm itself, the resulting shape of the required counterweight rod would be downright ridiculous; if not, it would either hit you in the groin or elsewhere. So the only practical manner of balancing out this undesirable torque was to use a "closed circuit" system of twin pulleys – and attach the required counterweight to the second pulley, a pulley located elsewhere, located in such a position that the counterweight would not get in the way of any of your body parts.

The first pulley – the "front" pulley – is concentric, and it drives a second concentric pulley located behind and below the seat; the ratio of movement between these pulleys is an exact one-to-one. If the front pulley rotates three degrees then the second pulley also rotates exactly three degrees, no more, no less, with zero backlash.

And as it turns, the second pulley also turns the attached counterweight, which counterweight exactly balances out the random torque produced by the mass of the front pulley and its attendant parts.

Now look at picture number 2 – the lower part of the complete machine. This photo shows the starting position of a movement. Note that the moment-arm of the machine is angled back of vertical – which position would normally produce a situation where the mass of the moment-arm would be "helping you" – but also note in the same picture the fact that the counterweight is also back-of-vertical, in a position where it is "hurting you." Thus the counterweight "hurts you" exactly as much as the moment-arm "helps you" – and the result is zero, a state of perfect balance.

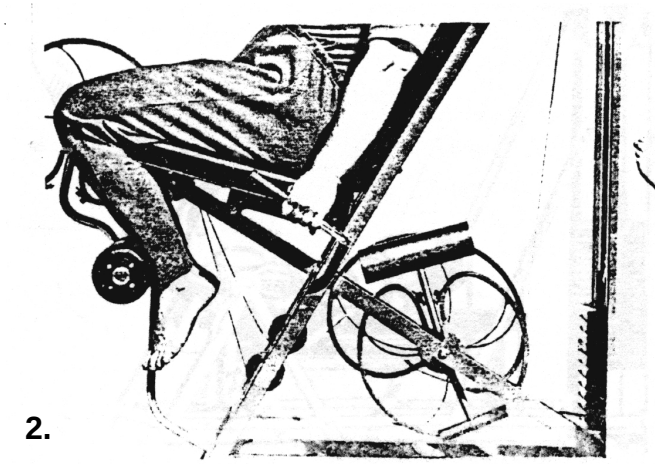
Then look at picture number 3 – which shows the end of a movement. Note that the moment-arm is now out in front, actually above a horizontal position – and note that the counterweight has moved into an exactly opposite position, just below horizontal. In this case you would be getting almost all of the unwanted torque from the moment-arm – except for the fact that the counterweight is exactly balancing it out, in every possible position.

If you are sharp eyed, you may have noted that there are actually two counterweight clubs on the second pulley – the large club provides the counterweighting needed to balance out the torque from the front pulley – the small club is required to balance the second pulley itself.

Located on the same hub with the second concentric pulley is a larger, eccentric pulley – which pulley (or cam) provides the required variation and automatic balancing of resistance.

Note the radius of the working part of the eccentric pulley while the machine is in the starting position – as shown in picture number 2. Then compare that to the working radius of the same pulley in picture number 3. Even in a picture it's obvious that the radius of the eccentric pulley changes as the movement progresses – note, for example, the angle of the cable going up from the eccentric pulley to the redirectional pulley (which isn't shown) above the weight stack.

The changing radius of the eccentric pulley provides automatically variable resistance by varying the effective moment-arm of the resistance; while the resistance remains constant, the varying moment-arm provides variation of torque in exact ratio with its own changes.



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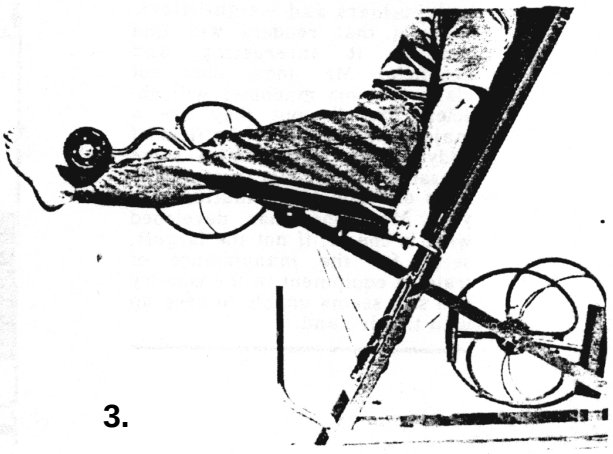

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same during the movement; but the torque won't be the same in every position – it won't take much power to move the weight, at first, later in the movement it will take more power to move the same weight.

But since this varying torque is provided in perfect balance to the strength of your muscles in various positions, the weight will "feel" the same in all positions – it won't seem to grow heavier as the movements are performed, it will feel the same in any position. Provided, of course that your frontal thigh muscles are properly proportionately developed – equally developed in all parts.

Working on such a machine works ALL of your frontal thigh muscles – not just part of them – it works your frontal thigh muscles in every position from a fully-bent position to a perfectly straight position. And it does NOT make them sore – because, apparently, it works them so evenly that the factors that produce muscular soreness are not involved in this exercise.

During careful tests of this machine we have worked previously untrained subjects until they literally could not stand up – until the muscles of their thighs were shaking like a bowl of jelly in an earthquake – but not a single one of them had even the slightest trace of soreness afterwards. Not then, not the next day, not three days later – never.

Several of our machines produce no traces of muscular soreness – but don't ask me to explain "why" this is true – I simply know that it is true. Some of our other machines produce extreme muscular soreness in previously-untrained subjects – as I am writing these works, my arms are so sore from testing a new type of triceps machine that I can't fully straighten or bend my arms – so soreness, or lack of soreness, is not a constant feature of our machines. Some do – some don't – but we don't know "why".

But I do know that "muscular soreness" is itself a misleading term – since it is NOT the muscle that gets sore in any case. A muscle can NOT get sore – it has no nerves capable of registering pain; much like the human brain, a muscle can not record or experience pain involving itself.

"Something" gets sore – but NOBODY yet knows what, or why (it may be the muscular attachments, or something else, but it is NOT the muscle itself – at this point in history of physiology, it remains a pure guessing game.

But – understood or not – it remains true that our new thigh extension machines don't make people sore.

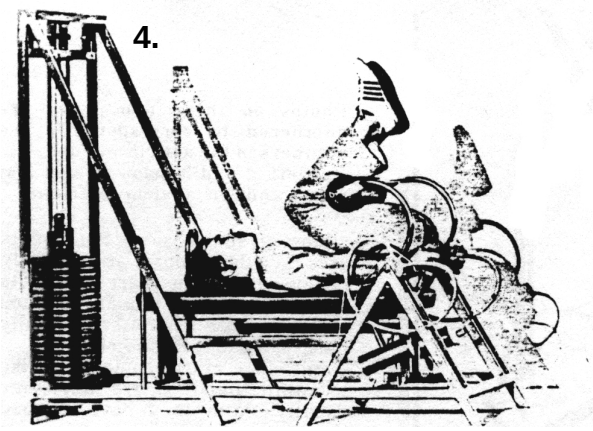
So – that gave us half of the machine required for replacing the squat; and it also gave us a thigh extension machine that is so far ahead of any other thigh extension machine that no meaningful comparison is possible. One hard set on our machine and you won't be able to walk for a few minutes – but it will build your thighs like no other such machine (or other exercise) in history, and it won't make you sore in the process.

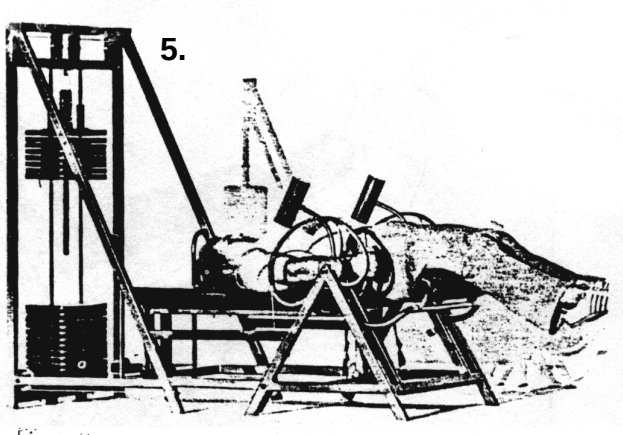
And, at this point in the article, I want it clearly understood that the frontal thigh muscles are NOT the most important muscles involved in the squat. In a squat, the most important muscles – the STRONGEST muscles – the "most-directly involved" muscles – are the muscles of the hips and buttocks. Which muscles it is literally IMPOSSIBLE to directly work with any conventional exercise or exercise machine.

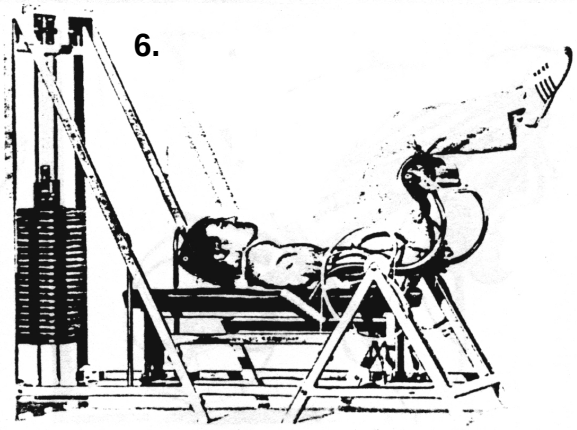
Enter the Hip Machine – or, rather, as we call it, the "Hip and Back" Machine.

Look at picture number 4 – Casey Viator (at a bodyweight below 190 pounds) in the starting position in our new Hip Machine. Note that his back is straight and solidly supported along its entire surface – yet his thighs are bent back so far that the tops of his thighs are pressing lightly against his chest. In this early-model machine we were using a 500 pound weight-stack moving it a distance of 24 inches vertically, a total of 12,000 inch-pounds, or 1,000 foot pounds, exactly equal to lifting 1,000 pounds a distance of one foot vertically – and ALL of the work is being performed by the muscles of the hips, the back, and the rear of the thighs. Try doing that with your frontal thigh muscles alone.

In picture number 5, Casey is demonstrating the finishing position of the movement – his thighs have rotated around into a position directly in line with his torso. In this picture (No. 5), it is obvious just how far the weight has moved up. While posing for these pictures, Casey was using only 200 pounds on the machine – an amount of weight that my wife can handle, and she weighs just over 100 pounds soaking wet.







So these muscles are strong – just how strong we don't know yet, but we are quickly finding out. And we have already learned that moving 500 pounds a distance of 24 inches wasn't "enough" – so we scaled-up the machine, now we are using only 400 pounds but we are moving it a greater distance – and our regular model machines that don't have selectorized weight stacks are built with a weight basket that will take as much as 500 pounds of barbell plates.

So, in plain English, in undeniable terms – simply and only in order that I can later say "I told you so" – I now want it clearly understood that this type of machine will literally REVOLUTIONIZE both power lifting and Olympic lifting, as well as doing almost unbelievable things for any sport requiring great strength.

In picture number 6, Casey is show at the "midpoint" of a movement with the full 500 pounds contained in the weight-stack – having moved it approximately a foot, which is EXACTLY equivalent to lifting 1,000 pounds a distance of six inches. He could not then complete the movement – but he eventually will, for high reps, in a flash; wait and see – and when he can, then you will see squatting like nobody ever dreamed of.

In fact, the rear part of the machine designed to replace the squat turned out so well – and the front part already worked so well – that we were tempted to stop right there. Having moved from the Model T to a modern automobile and a helicopter. I was also once tempted to stop – but, then, a jet certainly is a strong temptation to a man in a hurry; much in the same lift, I felt we should keep rolling the dice as long as we were winning –so we moved on again, all the way to the ultimate exercise machine, the "Final Breakthrough," the "Nautilus Leg and Lower-back Machine."

As I said in an article a year or so ago, if you are on relief – and if your Cadillac isn't paid for – or if you live in a phone booth, then don't plan on buying a Leg and Lower-back Machine; they won't fit into your coat pocket, and they aren't cheap. So not many private individuals will be able to afford one – or house one – but it won't be long before you can find one in almost any well-equipped gym, and if you can't find a gym with one, then ask for it, and if they wont' get it then find a gym that will.

IT IS JUST THAT GOOD.

And along those same lines, while I am thinking of it, I would greatly appreciate it if certain gym owners would stop telling their members that they have ordered Nautilus equipment when, in fact, they have not. A young man came up to me at a certain contest in New York and thoroughly gave me "what for" for having cheated the owner of the gym where he worked – according to this young man, I had cashed a check for several machines, shipped nothing in return,

refused to answer letters, and even could not be reached by phone. And he believed what he was saying – because the owner of the gym where he trained told him exactly that. But in fact, we had never heard from – or even heard of – the gym where this young man trained; and we proved the facts to his satisfaction – whereupon I had a bit of trouble stopping the young man from going back and killing the gym owner in question.

So – between the two types of machines, the thigh extension machine and the hip and back machine – we had both "parts" of the machine required to replace the squat, but in this case, the sum of the parts more than equaled the sum of the parts – in effect, we added two and two and came up with six, or eight, or ten, but certainly more than the expected four.

This machine is so effective that we now have no slightest intention of ever doing more than TWO SETS with it – TWO SETS A WEEK, one set on Monday and one set on Friday.

Not enough? Well, think what you like – but believe me, you literally can't stand much, if any more than that; this machine works muscles that you never worked before in your life, works them throughout their full range of movement, works them against constant, double direct, omni-directional, balanced, automatically variable, rotary resistance around two separate points of rotation – and works them HARD.

And this machine provides features that nobody ever even dreamed of before – the moment-arm of the "front part" of the resistance is certainly balanced well as it is in the thigh extension machine, but more than that this machine also automatically compensates for the mass of your legs themselves, balances out the actual weight of your lower legs and feet. And it also balances out the undesirable torque provide by the mass of your own torso – force that would otherwise remove some of the exactly-controlled resistance designed into the machine. And, of course, it balances out the moment-arm of the rear part of the machine as well.

And it removes – not reduces, totally REMOVES – the compression force on the spine encountered in squats as a result of having the weight sitting on your shoulders.

And it spreads the weight over an area of several hundred square inches of contact – instead of concentrating it in a small area of only a few square inches on your upper back or neck; in effect, the change in comfort between this machine and a barbell squat is something on the order of the difference between a blow with a pillow or a blow with a pistol barrel.

And you can't go "too low". And you can't fall. And you don't need spotters. And you are working the muscles that you have been trying to work in squats – but, now, for the first time in your life, you are working these muscles properly, involving almost literally every last fiber contained in all of these large muscles instead of only part of the fibers.

And you DO HAVE resistance in the position of full contraction – where it is most valuable, and where you never had it in a squat.

And you DON'T HAVE sticking points. And you can't drop the weight. And you can't bend too far forward and pull your back from improper form – or dump the bar onto the back of your head.

And what will the proper use of this machine do for your barbell squats? Well, in every single test that we have conducted up to date, tests show that squatting strength with a barbell will go up at a rate so fast that it is almost unbelievable. Casey Viator increased his squatting strength nearly 15 percent in exactly two weeks – WITHOUT DOING SQUATS, WITHOUT EVEN USING A THIGH EXTENSION MACHINE (or any other frontal-thigh muscles) SIMPLY BY USING A HIP AND BACK MACHINE, two sets in each workout, two workouts per week, a total of eight sets, an increase of more than one and one-half percent in squatting strength as a result of each set performed on the hip and back machine.

And how long can he continue such a rate of progress? We don't know yet – but at that rate, he doesn't have to keep it up very long; that's the advantage of a jet – it may not have as much endurance as a slower airplane, but it moves so fast that it has more than enough "range." If you can get there in two or three months – why spend ten years enroute?

Incidentally – when, earlier, I mentioned "cables" in connection with the Leg and Lower-back Machines, it should have been "chains." In an effort to produce a literally perfect machine, we have replaced the normally-used cables with a very heavy-duty chain – so, with this machine, your days of replacing worn or broken cables are behind you; if you ever have to replace a chain, it will be a simple, quick, no special tools needed type job. But we really expect the chains in this machine to last a lifetime of hard service. "Chains" meaning, of course, "sprocket-type chains," like those used in a motorcycle drive – big, heavy, strong chains with a test strength of 3,700 pounds.

Nor is the use of chains limited in usefulness to a matter of convenience – chain drive also prevents "cable stretch", assures perfectly smooth operation, and of course makes the machines far safer.

Exactly describing the full functions of this machine would require a rather lengthy book – so all I will add is that it is, in my own carefully considered opinion, the most advanced, the most productive, the most revolutionary exercise device that has ever been produced, by far. I cannot now look into the future and see even the slightest hope of a better machine. It will eventually be copied – I honestly do not think it can be improved.

Whether Dr. Klein was right or wrong, regarding squats is no longer of any importance – because, now you can have all of the undeniable advantages of squats with none of the dangers, or even without the discomfort.

The new Nautilus closed-circuit, double-balanced thigh extension machines are simply in a class by themselves – the new Nautilus Hip and Back Machines are even more productive – put them together into one, even better combination and the result is almost unreal. But don't take my word for it, try one yourself and see.